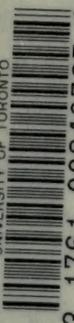


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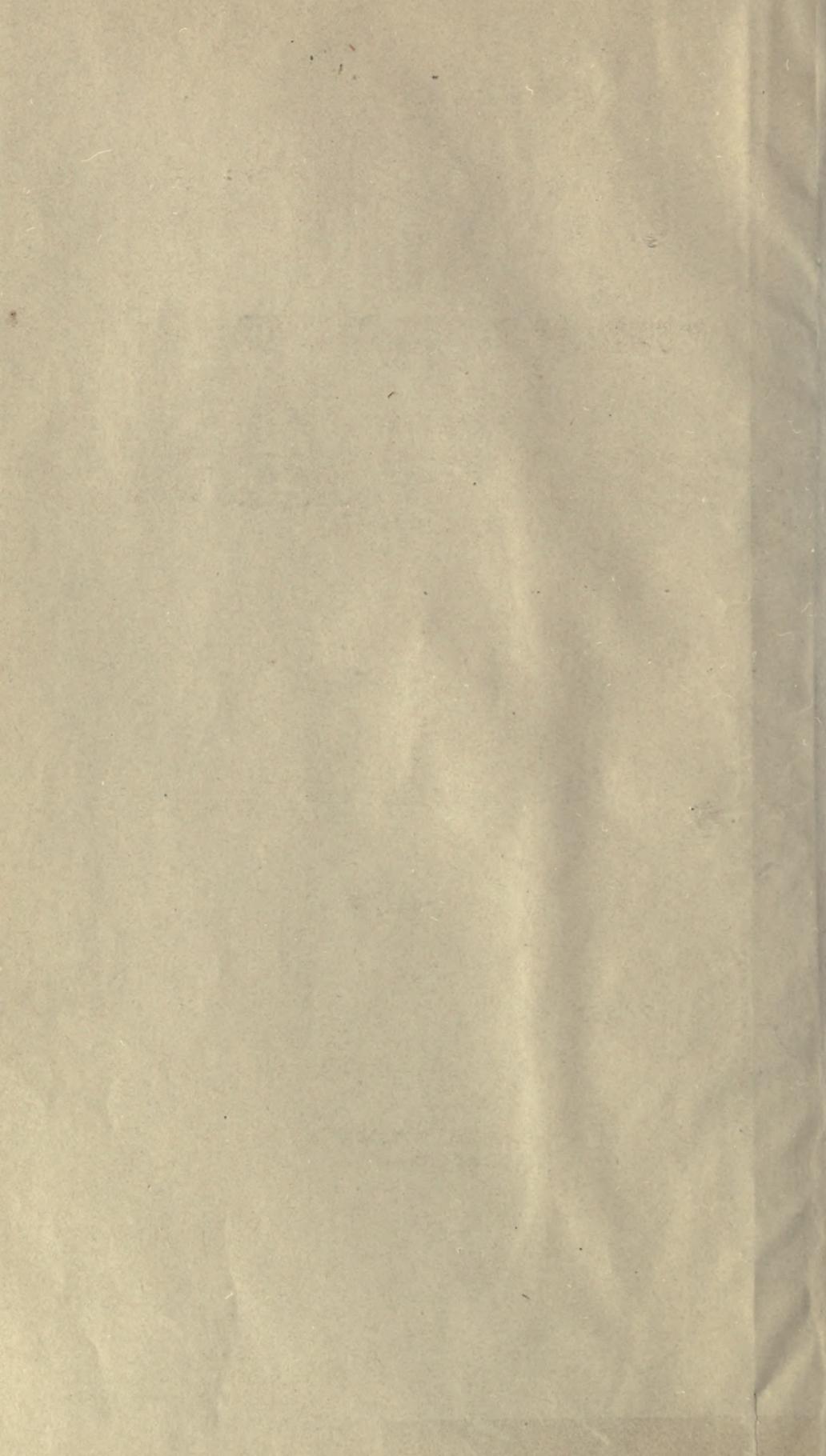


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FLORA OF NORTHWEST AMERICA.

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.

PHANEROGAMÆ.

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PORTLAND OREGON,
Aug. 10th, 1903.

FLORA OF NORTHWEST AMERICA.

CONTAINING
A DESCRIPTION OF ALL THE KNOWN TERRESTRIAL AND
MARINE PLANTS GROWING WITHIN OR NEAR
THE BOUNDARIES OF CALIFORNIA, UTAH, AND PARTS OF
BRITISH COLUMBIA.



BY
THOMAS HOWELL.

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VOL. I

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Preface.

All the territory of the United States of America south of the British boundary, except Oregon Washington and Idaho, being supplied with local Floras this work is intended to fill up the corner left out by other authors.

As the writing of descriptions of plants at this late date is, to a great extent, writing or copying what others have previously done, it is hardly right to claim originality for work done in that field; I, therefor, wish to acknowledge that I have used the works of Torrey & Gray, Dr. Asa Gray, Sereno Watson, William Trelease Coulter & Rose, Edward L. Greene and others, and to save repetition (which would otherwise occur on every page) I wish to give full credit here to all authors, any portion of whose works have been copied herein.

Wherever possible descriptions have been drawn from specimens in hand, but some I have been unable to procure and for these I have had no other alternative than to copy from descriptions already published.

Believing that if a plant has one constant character that is different from any of its congeners it is sufficient for a species; and that if a plant is sufficiently distinct from others to deserve a name it is better to have it described as a distinct species than as a variety of some other species, I have therefor, raised nearly all published varieties of the region embraced in this work to specific rank.

A FLORA
OF
NORTHWEST AMERICA.

SERIES I. CORMOPHYTA ENDLICHER.

Plants consisting of root and stem growing in opposite directions, composed of regular cellular tissue traversed (except in the very lowest forms) by woody fibre. Stems increasing in size either at the apex and circumference simultaneously, or at the apex only, producing buds, and usually, distinct leaves at definite points and in regular order. Propagation effected by means of flowers and seeds, or spores.

PHANEROGAMÆ. Plants producing flowers and perfect seeds.

CRYPTOGAMÆ. Plants producing spores but not flowers.

SUBSERIES 1. PHANEROGAMÆ.

Plants bearing flowers with one or more stamens and producing seeds that contain an embryo.

ANGIOSPERMÆ. Ovule enclosed in an ovary, and fertilized through a stigma.

GYMNOSPERMÆ. Ovule not enclosed in an ovary and fertilized by direct application of pollen.

CLASS 1. ANGIOSPERMÆ.

Pistil consisting of a closed ovary which contains the ovule and forms the fruit, and a more or less manifest style and stigma.

EXOGENÆ. Stems with pith in the centre and the woody fibre in annual layers or rings: embryo usually with two opposite cotyledons.

ENDOGENÆ. Stems without pith, and the woody fibre scattered irregularly: embryo with a single cotyledon.

SUBCLASS 1. EXOGENÆ.

Stem consisting of pith in the centre, bark on the outside, and these separated by one or more layers of fibrous or woody tissue which, when the stem lives for more than one year, increases by the addition of new layers outside next to the bark. Embryo usually with two opposite cotyledons.

POLYPETALÆ. Petals distinct, rarely united at base or wanting.

GAMOPETALÆ. Petals more or less united: very rarely wanting.

APETALÆ. Petals always wanting.

DIVISION 1. POLYPETALÆ.

Floral envelopes consisting usually of both calyx and corolla; the petals distinct or rarely united with each other, sometimes wanting.

SYNOPTICAL KEY TO THE POLYPETALOUS ORDERS.

§ 1. Stamens hypogynous, free from the calyx and the superior ovary.

* Carpels solitary, or distinct.

+ Sepals and petals deciduous, rarely persistent in No. 1. Leaves alternate or all radical, rarely opposite or whorled.

1 Ranunculaceæ. Sepals 4 or more: petals as many and alternate with them or wanting: stamens usually numerous: carpels one to many: fruit achenes or follicles, or in *Actæa* a berry.

2 Berberidaceæ. Parts of the flower in threes, in opposite ranks, distinct, (sepals and petals wanting in *Achlys*): anthers opening by valves: carpel solitary, (a berry in *Berberis*).

Sepals 3, petals 6, stamens many, carpels several, soon distinct, becoming linear torulose several-seeded pods: *Plutystemon* in *Papaveraceæ*.

** Ovary compound with parietal placentæ, or seeds covering the cell-walls.

+ Capsule many-celled, indehiscent: sepals and petals persistent.

3 Nymphæaceæ. Parts of the flower indefinite, mostly numerous: seeds numerous, covering the walls of the cells. Aquatic herbs with entire plain leaves and solitary flowers.

4 Sarraceniaceæ. Sepals and petals 5. Acaulescent marsh perennials with odd-shaped leaves and solitary flowers.

+ + Valves of the capsule separating from the persistent placentæ. Sepals and petals persistent.

++ Seeds albuminous.

5 Papaveraceæ. Sepals 2 or 3, caducous: petals twice as many, alike: stamens numerous: capsule 2-several-valved, one- (rarely several) celled. Herbs, or shrubs with mostly alternate leaves without stipules, and often colored juice.

6 Fumariaceæ. Flowers very irregular: sepals 2, small: petals 4, in 2 dissimilar pairs: stamens 6, diadelphous: capsule 1-celled, 2-valved, several to many-seeded. Herbs with alternate leaves without stipules.

++ + Seeds without albumen; flowers regular.

7 Cruciferaæ. Sepals and petals 4: stamens 6, tetradynamous (rarely 4 or 2); capsule 2-celled, 2-valved, 2-many-seeded; rarely 1-celled and indehiscent. Herbs with alternate leaves without stipules.

8 Cappariidaceæ. Sepals and petals 4: stamens 6 or more, nearly equal: capsule 2-valved, 1-2-celled, 1-several-seeded. Mostly herbs with alternate often stipulate leaves.

+ + + Capsule 1-celled, several-carpelled, the valves not separating from the placentæ.

++ Flowers irregular.

6 Violaceæ. Sepals and petals 5: anthers 5, coherent: style 1, clavate: capsule 3-valved, many-seeded. Low herbs with alternate or radical stipulate leaves.

++ ++ Flowers regular: leaves without stipules.

Sepals and petals 5; styles 3, 2-parted: capsule 3-valved, many seeded.
Low herbs with the leaves all radical. *Droseraceæ*.

Sepals and petals 5: stamens indefinite: styles 3: capsule 3-valved. Low herbs with opposite leaves. *Hypericum* in *Hypericaceæ*.

*** Ovary of 2-several carpels and central placentæ: stamens mostly strictly hypogynous: sepals persistent.

+ Flowers very irregular.

10 Polygalaceæ. Capsule compressed, narrowly winged, 2-celled, 2-seeded: stamens 4-8, monadelphous (united into a tube that is split on the upper side), or distinct: anthers 1-celled, opening at the top.

+ + Flowers regular: capsule 2-celled with free central placentæ: embryo curved around central albumen.

11 Caryophyllaceæ. Flowers mostly 5-merous; petals sometimes none: stamens 10 or fewer: styles 3-5, the capsule opening by as many or twice as many valves: ovules numerous. Herbs, rarely woody at base, with opposite leaves mostly without stipules.

12 Portulacaceæ. Sepals 2, 4-8 in *Lewisia*: petals 2-5 or more: stamens few-many: style 2-cleft: ovules few or many; capsule 2-3-valved or circumscissile.

+ + + Flowers regular: ovary 2-several celled.

++ Capsule not lobed nor winged.

= Stamens distinct or nearly so, not in fascicles.

Sepals and petals 5, persistent: stamens many: style 5-lobed: capsule 5-celled, 5-valved, many-seeded. Acaulescent marsh perennials with pitcher-shaped leaves and solitary flowers. *Sarraceniaceæ*.

13 Elatinaceæ. Sepals and petals 2-5: styles distinct: capsule 2-5-celled, many-ovuled. Low herbs with opposite leaves, membranous stipules, and axillary flowers.

= = Stamens clustered at base into fascicles.

14 Hypericaceæ. Sepals and petals 5: stamens numerous, in 3 fascicles: styles 3: capsule 3-celled, many-seeded. Herbs with opposite entire leaves without stipules, and yellow flowers in cymes.

= = = Stamens monadelphous (united into a tube).

15 Malvaceæ. Calyx valvate: petals 5, united at base: stamens numerous; anthers 1-celled: carpels either in a ring 1-few-seeded and at length separating, or forming a 5-10-celled many-seeded capsule. Herbs or shrubs with alternate stipulate leaves.

= = = = Stamens 5, not united.

16 Linaceæ. Flowers 5-merous: styles 2-5: capsule 2-5-valved, 4-10-celled, 4-10-seeded. Low herbs with entire leaves and paniced flowers.

Flowers 5-merous: petals none: styles 3: capsule 3-celled, several-seeded. Prostrate annual with entire verticillate leaves and axillary flowers. *Mollugo* in *Ficoideæ*.

++ ++ Fruit lobed or winged: ovules 1 or 2 in each cell, pendulous.

= = = = Flowers slightly irregular.

17 Geraniaceæ. Sepals 5; imbricated in the bud: petals 5, mostly imbricated: stamens mostly 10: styles 5, coherent to an axis at length separating from it: capsule 5-celled, the cells 2-ovuled but only 1 maturing. Herbs with opposite stipulate leaves and long-beaked carpels.

= = Flowers regular.

18 Limnanthaceæ. Flowers 5-merous: sepals valvate and petals convolute in the bud: carpels fleshy, indehiscent, 1-ovuled. Tender annuals

with alternate dissected leaves without stipules.

- 19 Oxalidaceæ.** Flowers 5-merous: sepals imbricated and petals mostly convolute in the bud: carpels combined into a 5-celled and few-many-ovuled capsule. Low herbs with sour juice and alternate or radical trifoliate leaves.

= = = Flowers very irregular.

- 20 Balsaminaceæ.** Sepals 5, imbricated in the bud: petals 4, united in pairs, rarely 5 and distinct: fruit a 5-celled several-seeded capsule. Coarse succulent herbs with entire leaves without stipules.

* * * * Ovary compound with central placenta: stamens borne upon a more or less perigynous disk: flowers mostly polygamous or dioecious: calyx persistent or the limb deciduous: cells of the ovary 1-few-ovuled: seeds mostly erect or ascending and albuminous.

- 21 Celastraceæ.** Flowers perfect, 4-5-merous: capsule 2-5-celled: seeds arillate. Shrubs with opposite pinnately veined leaves and no stipules.
- 22 Rhamnaceæ.** Calyx valvate, the 4 or 5 lobes alternate with as many stamens, deciduous: petals often none: style often 4- or 5-lobed or cleft: fruit a berry, drupe-like, or dry, 1-4-celled. Shrubs or trees with simple leaves and small stipules.
- 23 Vitaceæ.** Flowers 4-5-merous: calyx minute: petals valvate with a stamen at the base of each: fruit a 2-celled, 2-4-seeded berry. Woody vines climbing by tendrils.
- 24 Aceraceæ.** Flowers dioecious or polygamous, often apetalous: styles 1-3: fruit, in ours, a double samara or a single follicle. Trees or shrubs with opposite, rarely alternate, leaves and mostly no stipules.
- 25 Anacardiaceæ.** Flowers mostly 5-merous: stigmas 3: fruit a drupelet. Shrubs with milky juice and alternate leaves without stipules.

§ 2, Stamens perigynous (upon the calyx) or epigynous (upon the top of the ovary).

* Ovary superior or nearly so.

— Carpels solitary or distinct.

- 26 Leguminosæ.** Flowers mostly irregular: stamens 10, rarely fewer, mostly monadelphous (all united) or diadelphous (9 and 1): carpel solitary, becoming a legume. Herbs shrubs or trees with alternate stipulate leaves.
- 27 Amygdalaceæ.** Carpel solitary or rarely 5, becoming a drupe, entirely free from the calyx; ovules 2, pendulous: seed usually solitary.
- 28 Pomaceæ.** Carpels 2-5, enclosed in the fleshy calyx-tube, with 2 erect ovules in each cell. Trees or shrubs with free stipules.
- 29 Rosaceæ.** Flowers regular, mostly 5-merous, or the stamens usually numerous: carpels 1-many, becoming achenes. Herbs shrubs or trees with alternate, mostly stipulate leaves.

+ + Carpels united or free: seeds mostly albuminous: leaves simple; stipules none, or adnate to the base of the petiole.

- 30 Saxifragaceæ.** Flowers 5-merous; styles or tips of the carpels distinct and soon divergent; fruit a 2-celled capsule. Herbs with mostly alternate simple leaves without distinct stipules.
- 31 Hydrangeaceæ.** Flowers 5-merous: fruit a 3-5-celled capsule. Shrubs with opposite simple leaves without stipules.
- 32 Ribesiaceæ.** Flowers 5-merous: fruit a 1-celled berry. Shrubs with alternate simple leaves with adnate stipules or none.
- 33 Crassulaceæ.** Flowers 3 or 5-merous: stamens nearly hypogynous: carpels 3-5, becoming 1-many-seeded follicles.

- 34 Droseraceæ.** Sepals and petals 5 : styles 3, 2-parted : capsule 3-valved, many-seeded. Low marsh herbs with the leaves all radical and beset with gland-tipped hairs.
- 35 Ceratophyllaceæ.** Fruit a crustaceous 1-seeded achene. Submersed aquatic herbs with finely dissected whorled leaves and minute axillary flowers.
- 36 Lythraceæ.** Flowers 4- or 6-merous : style 1 : capsule enclosed in the calyx, 2-4-celled, many-seeded. Herbs with mostly opposite leaves and axillary flowers.
- * * Ovary wholly inferior.
- + Fruit with central placentæ: stamens few.
- ++ Not tendril-bearing and flowers not in umbels: stipules none.
- 37 Haloragææ.** Fruit indehiscent, nut-like, 1-4-celled, with a single suspended seed in each cell. Aquatic herbs with opposite or verticillate leaves and inconspicuous axillary flowers.
- 38 Onagraceæ.** Flowers 2- or 4-merous : calyx valvate in the bud ; style 1 ; fruit a 2- or 4-celled capsule or berry-like.
- ++ ++ Tendril-bearing herbs with alternate leaves without stipules.
- 39 Cucurbitaceæ.** Flowers monoecious or dioecious, often gamopetalous : fruit fleshy, indehiscent, 1-several-celled.
- + + Fruit with parietal placentæ, several-many-seeded: stamens many: stipules none.
- 40 Loasaceæ.** Flowers perfect, conspicuous ; style 3-cleft : capsule 1-celled ; leaves rough with tenacious hairs.
- 41 Ficoideæ** Sepals mostly 5 ; petals none ; capsule 3-5-celled.
- 42 Cactaceæ.** Sepals and petals numerous : stamens many : capsule 1-celled. Leafless, usually prickly, fleshy perennials.
- + + + Fruit indehiscent ; dry, berry-like, or drupe-like, mostly 2-celled, with a suspended seed in each cell : ovary with an epigynous disk (wanting in *Garrya*).
- ++ Flowers in umbels.
- 43 Umbelliferaæ.** Carpels and styles 2 : fruit dry.
- 44 Araliaceæ.** Carpels and styles 4 or 5, becoming a berry-like fruit.
- ++ ++ Flowers in cymes or aments.
- 45 Cornaceæ.** Inflorescence cymose : flowers perfect, 4-merous : style 1 : fruit baccate, 2-3-celled. Herbs shrubs or trees with opposite leaves.
- 46 Garryaceæ.** Flowers in aments, dioecious : sepals 4 : petals none : styles 2 : fruit baccate, 1-celled. Shrubs with opposite, simple leaves.
- Flowers perfect, cymose, 5-merous ; petals imbricated, united : fruit baccate berries containing 1-5 seed-like nutlets. *Sambuceæ*.

ORDER I. RANUNCULACEÆ Endl. Gen. 843.

Sepals 3-6 or more but usually 5, distinct, hypogynous, often colored and petaloid. Petals 1-several or none, hypogynous. Stamens indefinite in number, hypogynous, distinct. Ovaries usually numerous, sometimes few or solitary, distinct: ovules solitary or several. Fruit achenes or follicles or baccate. Seeds anatropous. Embryo minute, near the base of horny or fleshy albumen. Herbs or rarely shrubs with colorless usually acrid juice, alternate or rarely opposite leaves without stipules, the base of the petiole generally dilated and partly clasping the stem.

TRIBE I. Leaves opposite. Sepals valvate in the bud, petaloid. Petals very small or none. Fruit a head of hairy-tailed achenes.

1 **Clematis**. Half-woody plants climbing by their petioles, or erect herbs.

TRIBE II. Sepals petaloid or greenish, imbricated in the bud. Fruit a head or spike of achenes.

* Achenes in a more or less gloular or oblong head. Sepals not spurred at base, petaloid. Petals none.

2 **Anemone**. Sepals indefinite in number. Leaves on the stem opposite, or whorled on or below 1-flowered peduncles.

3 **Thalictrum**. Flowers mostly dioecious, panicled: leaves alternate, ternately decomposed.

** Achenes numerous, in a long and slender, or short spike. Sepals spurred at base. Petals present.

4 **Myosurus**. Petals slender; flowers, solitary on scapes.

TRIBE III. Sepals imbricate in the bud. Pistils numerous, becoming achenes. Ovule solitary, ascending. Leaves alternate.

5 **Trautvetteria**. Flowers perfect, corymbosely panicled; sepals petaloid, soon deciduous; leaves alternate, palmately cleft.

6 **Batrachium**. Flowers perfect: peduncles solitary, opposite the leaves: petals white with a naked nectariferous pit near the base: achenes transversely wrinkled on the sides.

7 **Ranunculus**. Flowers perfect: peduncles axillary or terminal: petals mostly yellow, with a nectariferous spot or pit covered by a scale on the claw: achenes not wrinkled on the sides.

TRIBE IV. Sepals imbricated in the bud. Petals small or irregular or none. Fruit 1-several follicles, or a 1-celled berry. Leaves alternate.

* Fruit 1-several follicles.

+ Flowers regular; follicles 1-15.

8 **Caltha**. Sepals petaloid; petals none; leaves simple; carpels 5-15.

9 **Trollius**. Sepals 5-15, petaloid: petals 5-20, tubular at base; follicles sessile; leaves palmately parted.

10 **Coptis**. Sepals 5-6, greenish: petals 5-6 enlarged in the middle or at the summit; carpels 5-10, stipitate: leaves compound, persistent.

11 **Aquilegia**. Sepals 5, colored: petals 5, all spurred backwards: carpels 5, sessile: leaves ternately compound.

+ + Flowers irregular: follicles 1-5: leaves lobed or dissected.

12 Delphinium. Sepals 5, the upper one produced backwards into a spur: petals 4, the 2 upper ones produced backwards.

13 Aconitum. Sepals 5, the upper one arched into a hood: petals 5, the 3 lower ones minute or stamen-like.

+ + + Flowers regular: carpels 1-5: leaves compound.

14 Isopyrum. Sepals 5, petaloid: petals 5, sometimes none: low herbs.

15 Cimicifuga. Sepals 5, petaloid, caducous: petals 5 or none; tall herbs.

** Fruit a 1-celled berry.

16 Actæa. Sepals 3-5, petaloid, caducous: petals 4-10, small, soon deciduous: leaves ternately compound.

TRIBE V. Sepals herbaceous, imbricated in the bud, persistent. Petals conspicuous. Carpels few, many-ovuled, becoming follicles.

17 Pæonia. Herbs or shrubs with alternate compound leaves and large fleshy roots.

Tribe 1. Clematidæ DC. Sepals valvate in the bud. Stamens numerous, with adnate anthers. Carpels numerous, 1-ovuled, becoming indehiscent hairy-tailed achenes. Ovule suspended. Herbs or trailing woody plants with opposite leaves.

1 CLEMATIS Tourn. Inst. 255. Linn. Gen. n. 696.

Erect herbs or somewhat woody plants that climb by their petioles. Sepals 5, rarely more, colored, valvate or with the edges turned inwards in the bud. Petals shorter than the sepals or wanting. Stamens numerous with extrorse anthers. Style persistent, becoming plumous appendages of the compressed achenes.

§ 1. FLAMMULA DC. partly. Flowers comparatively small and usually cymous-paniculate, white or whitish, in ours diœcious. Sepals petaloid, thin, widely spreading. Petals none. Anthers mostly short, blunt.

C. ligusticifolia Nutt. T. & G. Fl. i, 9. Somewhat pubescent: stems 2-30 feet long: leaves quinate to quinate-ternate: leaflets oblong, acute, mostly somewhat lanceolate-cuneate, incisely lobed and trifid, 2-6 inches long: flowers in paniculate corymbs: sepals thin, silky, white, 4-6 lines long, equaling the stamens: achenes pubescent, tails 1-2 inches long. Along streams, from N. Cal. to Brit. Columbia and the Rocky Mountains.

C. brevifolia. *C. ligusticifolia* var. *brevifolia* Nutt. T. & G. Fl. i, 9. Stems woody, climbing over brush and cliffs, 3-18 feet long: leaves nearly smooth, mostly 5-foliolate, somewhat coriaceous; leaflets broadly ovate to lanceolate-ovate, acute or acuminate, usually 3-lobed and coarsely toothed: sepals white, thin, 4-6 lines long, equaling the stamens: achenes densely pubescent: silky-white tails 1-2 inches long. Along streams, from the Blue Mountains in Oregon to Brit. Columbia.

C. Suksdorfii Robinson in Gray's Syn. Fl. i 4. Leaves quinate, glabrous; leaflets 1-1½ inches long: sepals widely spreading or reflexed in anthesis, velvety-pubescent on the outside: heads of fruit small and few-carpelled, not over an inch in diameter at full maturity including the curling tails: pubescence of the young achenes woolly or felt-like, the hairs crinkly, not straight nor silky as in *C. ligusticifolia*: mature achenes with broadly ovate nearly orbicular body and filiform sparsely pubescent tails. Klickitat river Washington, collected and first recognized as distinct by W. M. Suksdorf July 15th. 1881.

§ 2 VIORNA Spach. Flowers large, hermaphrodite, solitary and mostly nodding on rather long peduncles. Petals none. Anthers long and slender, pointed. Filaments hirsute or pubescent. Ours herbaceous perennials.

C. Douglasii Hook. Fl. i, 1. t. 1. Stems simple or branched, more or less villous, woolly at the joints: leaves 2-3-pinnatifid with linear to linear-lanceolate segments: flowers nodding, on erect naked peduncles that elongate in fruit: sepals thick, pubescent, more or less spreading and woolly at the apex, deep purple inside, paler externally. High mountains, E. Oregon to Brit. Columbia and the Rocky Mountains.

C. Scottii Porter Fl. Col. 1. More or less villous with soft spreading hairs; bushy, branching from a suffrutescent base; branches erect, 9-18 inches high; leaves opposite, on rather long petioles, large, pinnate, with some or all of the divisions 3-5-parted or 3-5-foliolate; lobes or leaflets oblong or ovate-lanceolate, acute or acuminate, 4-5 lines broad by an inch long; some upper leaves with distinctly tortuous partial petioles: flowers axillary and terminal, nodding, on peduncles 3-6 inches long: sepals 4, ovate, with reflexed summits, nearly an inch long, dark- or brownish-purple, thickish, more or less tomentose outside: achenes silky-pubescent, with densely plumose tails 1-1½ inches long. Beaver Canyon Idaho to southern Colorado.

§ 3. ATRAGENE DC. Flowers large, hermaphrodite, solitary on naked peduncles. Sepals much exceeding the stamens and pistils, spreading from the base, thin, petaloid. Anthers short, on long pubescent filaments: usually some of the outermost filaments enlarging to small spatulate petals. Half-woody plants that climb by the petioles.

C. verticillaris DC. Syst. i, 166. Stems slender, somewhat woody, almost glabrous; leaves ternate; leaflets petiolulate, ovate or subcordate, abruptly acuminate: flowers solitary, bluish-purple, 2-3 inches across. In mountains from Idaho northward, and eastward to the Atlantic States.

C. Columbiana T. & G. Fl. i, 11. Stems somewhat woody: leaves ternate; leaflets petiolulate, ovate, acute, obscurely crenulate: flowers solitary 1-2 inches broad, pale blue; sepals ovate, acuminate, nearly twice the length of the stamens. Wild Horse Plains Washington to the Rocky Mountains and Brit. Columbia.

C. ochotensis Poir. Suppl. ii, 298. *C. alpina* var. *occidentalis* Gray. Stems woody, trailing: leaves biternately divided, with ovate or oblong-lanceolate acuminate, often 3-lobed, irregularly toothed segments: sepals 4, lance-ovate, purplish-blue: spatulate and petaloid staminodes few and usually with rudiments of anthers, or none: carpels glabrous with very finely plumose tails 1½ inches long. Washington to the Rocky Mountains and Dakota.

Tribe 2. Anemoneæ DC. Sepals petaloid or greenish, imbricated in the bud. Pistils numerous, becoming achenes. Ovule suspended. Herbs with the leaves all radical, or alternate, or whorled below 1-several-flowered peduncles.

2 ANEMONE Tourn. Inst. 275. L Gen. n. 696. ed. 4

Erect perennial herbs with lobed or divided leaves which are all radical except those that form an involucre below the flower. Sepals 4-20, colored and petaloid. Petals none. Ovaries numerous; style short; stigma lateral; ovule suspended. Achenes

compressed, pointed, or ending in long feathery tails.

§ 1. *PREONATHUS*, DC. Prod. i. 17. Involucre of 2 or 3 more or less petiolate and petiolulate leaves. Flowers large, solitary. Sepals thin, widely spreading. Carpels with long filiform styles that become plumose tails to the achenes.

A. occidentalis Watson Proc. Am. Acad. xi, 121. More or less silky-villous throughout: stem stout, 6-18 inches high: radical leaves large, long-petioled, biternate and pinnate; involucreal leaves similar, nearly sessile: sepals 6-8, 6-9 lines long, white, or purplish at base. On high mountains near perpetual snow, California to Alaska and the Rocky Mountains.

§ 2. *EUANEMONE* Gray Syn. Fl. i, 8. Carpels with short and not plumose styles. Involucre petioled. peduncle solitary.

* Style short, nearly naked, not becoming elongated.

† Carpels numerous, in a close head, villous.

A. Drummondii Watson Bot. Cal. ii, 424, { sparingly pubescent; stems slender, from tufted rootstocks, 3-15 inches high: radical leaves on long petioles, ternate; leaflets deeply 3-5 lobed, the narrow segments 2-3-cleft: involucreal leaves similar, nearly sessile, with a slightly narrowed base: sepals 5-7, pale blue, 4-5 lines long, silky-villous outside: style slender, glabrous: achenes densely villous. On the highest mountains near perpetual snow, Washington and Oregon to northern California.

A. multifida Poir. Suppl. i, 364. Somewhat silky-villous: stems 3-15 inches high: radical leaves long petioled, nearly semicircular in outline, ternate, the sessile divisions deeply lobed with cleft linear segments: involucreal leaves similar, shortly petioled: sepals 5-8, red or bluish or whitish. 4-6 lines long, villous outside: receptacle oblong, the head in fruit globular to oblong; achenes densely woolly, ovate-oblong, with a straight beak. On high mountains, Oregon to Alaska and the Eastern States.

A. Tetonensis Porter in Britton An. N. Y. Acad. Sci. vi. 224. Nearly related to the last but lower and more slender: leaf-segments somewhat broader, obtuse, glabrate: flowers deep purple: achenes dorsally glabrate. Idaho Teton Range 10,000 feet *J. M. Coulter*, and Needle Peak of Lost River Mountains, *V. Bailey*. *Robinson in Gray, Syn. Fl. i, 10.*

+ + Carpels fewer, pubescent but not villous.

A. deltoidea Hook Fl. i, 6, t. 3. Stem simple, slender, 6-14 inches high, from long running root stocks: radical leaves trifoliolate; leaflets rhomboid, crenate-serrate; involucreal leaves rhomboid or rhombic-ovate, on very short petioles, serrate and sometimes 3-lobed: sepals about 5, white, oval. 4-6 lines long, usually unequal: achenes few globose-ovoid, tipped with the short style. Common in wooded districts, N. California to Brit. Col.

A. Oregona Gray Proc. Am. Acad. xxii, 308. Smoothish: stem slender, 3-12 inches high from a fleshy, very brittle, somewhat running root-stock: radical leaves trifoliolate, the leaflets coarsely serrate; involucreal leaves long-petioled, trifoliolate, the terminal leaflet 3-lobed, the lateral ones usually 2-lobed, all coarsely toothed and cut: sepals 4-7, oval to obovate, blue: carpels 15-20, oblong, tipped with a hooked beak. Moist shady slopes, western Oregon and Washington.

A. Lyallii Britton l. c. 227. *A. quinquefolia* var. *Lyallii* Robinson l. c. 13. Stem slender, 2 to 4 inches high: leaves trifoliolate; leaflets ovate to lanceolate, obtuse or acute, obtusely toothed: flowers small, a third to half inch in diameter, pale blue or whitish. From Vancouver Island to the Willamette valley and the Redwoods of California.

THALICTRUM.

A. trifolia L. Sp. i, 540. Involucral leaves with rare exceptions regularly trifoliate; leaflets ovate-lanceolate, rather regularly serrate, large, in well developed specimens 2 to 3 inches long, and more than an inch wide; radical leaves subsimilar, but sometimes 5-foliate: peduncle long and slender, usually more than 2 inches in length: flowers large, 15 to 16 lines in diameter: sepals white or pinkish: carpels in a globular head. Idaho, *Sandberg*, to the Atlantic States and Europe.

§ 3. **OMALOCARPUS** DC. Style short, not plumose. Mature achenes smooth, orbicular, much compressed, wing-margined. Involucre sessile, palmately parted or cleft. Peduncles 1-several.

A. narcissiflora L. Sp. i, 542. Villous: radical leaves palmately 3-5-parted; segments cuneiform, incisely many-cleft into linear lobes: involucral leaves similar, 3-5-cleft, sessile: peduncles several, umbelled, leafless: sepals white: carpels roundish-oval, much compressed. Alpine: Idaho to Alaska and the Rocky Mountains.

3 THALICTRUM Tourn. Inst. 270. L. Gen. n. 597.

Tall, usually smooth perennial herbs with 2- or 3-ternately compound leaves and diœcious or polygamous flowers in panicles. Sepals 4-8, white or greenish, petaloid. Petals none. Stamens several; with linear anthers on rather long almost capillary filaments. Pistils few-several, becoming ribbed or veined achenes that are tipped with the persistent style.

T. sparsiflorum Turcz. in F. & M. Ind. Sem. i, 40. Stem firm, erect, 1-6 feet high, with ascending branches: leaves 3-ternate, ample, the lowest petioled; leaflets approximate, short-petioled, thinnish, round- or spatulate-oblong, 3-15 lines long, slightly cordate at base, divided above into 3 obtuse or short-acuminate lobes that are again incised: flowers perfect, not large, erect or soon nodding on slender pedicels in a short, branched, leafy panicle: sepals obovate, whitish, soon reflexed: stamens 10-25, the short exerted filaments widened to the pointless elliptical anthers: achenes 9-15, short-stipitate, obliquely obovate, with 4 or 5 low, often forked nerves on each side. From the mountains of California to Alaska and Colorado.

T. polycarpum Watson Bot. Cal. ii, 424. Stout, 3-8 feet high, glabrous: leaves with short petioles or the upper sessile; leaflets variable, 3-12 lines long, 3-lobed with acute or acuminate lobes: panicle narrow: flowers diœcious; the staminate usually crowded, on short pedicels; anthers acute, on very slender filaments: fruit in dense heads; achenes compressed, 3-5 lines long, on a short stipe. obovoid, turgid, tapering into a reflexed beak their thin walls with free, or anastomosing low veins: seed slender, terete, 2 lines long. Along small streams from the Columbia river to California.

T. Fendleri Engelm. in Gray Pl. Fendl. 5. Stems 1-3 feet high, with 3 to 5 cauline leaves, the lower ones petioled; the stalked remote leaflets often deeply cordate with three divergent lobes, the central or all of them again lobed, their divisions rounded or mucronate-pointed: flowers diœcious; stamens numerous; anthers linear, 1-2 lines long, mucronate; akenes few to numerous in the heads, substipitate, 2-3 lines long, obliquely oval or with the dorsal suture straightish, thin-walled, flattened, with 8 to 10 prominent nearly parallel ribs the median heaviest, not filled by the oblong or linear seed. From the Siskiyou mountains, in southern Oregon, to Arizona, New Mexico, and the Rocky Mountains.

T. venulosum Trelease Proc. Bost. Soc. xxiii, 302. Glabrous and glaucous. the stem, petioles and sepals purple-tinted, the foliage typically pale or whitened: stem simple, erect, 7-20 inches high: stem leaves 2 or 3, long

petioled, 3-4-ternate; leaflets approximate, petiolulate, moderately firm, rounded and lobed at the apex, rugose-veiny beneath; panicle simple, narrow, its short erect branches few-flowered: flowers dioecious, small; sepals ovate: stamens 10-20, on slender filaments; anthers oblong, slender-pointed: achenes about 8, nearly sessile, 2 lines long, ovoid, tapering into a straight beak, thick-walled, 2-edged, with 4 or 5 longitudinal grooves and rounded ridges on each side: seed ovoid, pointed at one end, filling the achene. Klickitat Co, Washington to Brit. Columbia and Wyoming.

T. occidentale Gray Proc. Am. Acad. viii, 372. Stem slender, 1-3 feet high; leaves 2-4-ternate, the lowermost petioled; leaflets thin, 3-10 lines long, 3-9-lobed at the summit, sparingly glandular-puberulent beneath: flowers dioecious, rarely polygamous, nodding, on very slender pedicels, in an ample open panicle: filaments purplish, slender; anthers linear, cuspidate: achenes 1-10 in each head, lanceolate or somewhat falcate, 4-7 lines long, tapering below into a short stipe, and above into a long one-sided curved beak, acutely 8-10 ribbed. Along streams, and moist shady places, Brit. Columbia to California, west of the Cascade Mountains.

4 MYOSURUS Dillenius Giess. 106, t. 4. L. Gen. n. 394.

Little annuals with linear or linear-spatulate entire leaves, and solitary flowers on simple scapes. Sepals 5 or 6, spurred at base. Petals as many as sepals, on long claws, with a pit at the summit. Stamens 6-20. Achenes with a prominent costa terminating in an erect or more or less spreading beak, numerous on a slender or conical receptacle. Ovule suspended.

M. minimus L. Sp. i, 284. Leaves linear: scapes 1-4 inches high, about equaling the leaves; receptacle in fruit an inch or more high: achenes quadrate with a broad back, truncate at the apex; beak short, appressed: seed oval. In wet places, Willamette valley to California and the Atlantic States and Europe.

M. apetalus Gay Hist. Chil. Bot. i, 31, t. 1, fig. 1. Scapes 1-2 inches high, usually spreading, but little surpassing the linear leaves; petals often wanting: spike of achenes 3-10 lines long, ovoid-oblong and more or less squarose, or cylindrical: achenes oblong, thin-walled, with narrow, prominently carinate back prolonged into a spreading or ascending beak: seed oblong. In alkaline places, California to Brit. Columbia east of the Cascade Mountains: also Chili.

M. lepturus. *M. apetalus* var. *lepturus*, Gray, Bull. Torr. Club, xiii, 2. Scapes in fruit 3-6 inches high, erect, surpassing the linear-spatulate leaves: receptacle in fruit 8-24 lines high: achenes with broad, distinctly carinate back, and short, appressed beak: seed elongated-oblong. Common in wet places, from California to Brit. Columbia and the Rocky Mountains.

M. sessilis Watson Proc. Am. Acad. xvii, 362. Scapes very short or none: fruiting heads several, crowded, much shorter than the leaves: receptacle short and thick, often sessile, 1-6 lines long by 1-2 lines thick at base; achenes oval, scarious-utricular, with narrow salient keel, and subulate, erect beak: seed short-oval. A rare species, the only locality known, being an alkaline flat seven miles south of Arlington Oregon.

Tribe 3. Ranunculeæ, DC. Sepals imbricated in the bud. Pistils numerous, rarely few, 1-ovuled, becoming achenes. Ovule ascending. Herbs with alternate cauline leaves

5 TRAUTVETTERIA Fischer & Meyer Ind. Sem. 1835, 22.

Herbs with palmately lobed alternate leaves, and small flowers in terminal corymbose panicles. Sepals usually 4, concave, petal-

oid. Petals none. Pistils numerous; capitate, becoming inflated, 4-angled membranaceous achenes.

T. grandis Nutt. in T. & G. Fl. i, 37. Stem slender, 1-3 feet high: leaves few, thin, radical long-petioled, cauline short-petioled, all deeply 5-7-lobed with irregularly lacinate-toothed, acuminate lobes; flowers white: achenes a little more than a line long, broadly gibbous at base, rather abruptly beaked by the slender revolute style. Along streams in the Cascade Mountains from California to Brit. Columbia.

6 BATRACHIUM S. F. Gray Brit. Pl. ii, 720.

Aquatic herbs with the submersed leaves if any finely dissected into capillary divisions. Sepals 5, plain. Petals white with yellow base, and a naked nectariferous spot on the claw of each. Achenes transversely wrinkled on the sides. Peduncles solitary, opposite the leaves.

B. aquatile Du Mortier Bull. Bot. Soc. Belg. ii, 207. *Ranunculus aquatilis* L. Glabrous: stems 6-20 inches long: floating leaves round-reniform, 5-9 lines in diameter, 3-5-lobed. the lobes coarsely crenate-toothed: peduncles thicker than the petioles, 8-10 lines long, spreading or recurved in fruit: sepals deciduous: flowers white, 5-10 lines in diameter: style subulate, not longer than the ovary, introrsely stigmatic: receptacle hairy: achenes reticulated, short-beaked. In ponds and shallow streams, California to Alaska, Europe and Asia,

B. trichophyllum Bosch Prodr. Fl. Bat. 5. *Ranunculus aquatilis* var. *trichophyllum* Gray. Annual: stems coarsely filiform, 2-20 inches long: leaves all submersed, round-reniform in outline, cut into numerous capillary segments which are 4-10 lines long, short-petioled: peduncles 1-2 inches long, longer than the petioles: flowers 3-5 lines in diameter: style subulate, shorter than the ovary introrsely stigmatic: receptacle hairy; achenes several, in a close globular head, glabrous obliquely oblong. In ponds and ditches: Oregon and Washington and across the continent.

B. Lobbii. *Ranunculus Lobbii* Gray. Glabrous annual: stems 6-12 inches long: leaves commonly all floating, 3-9 lines wide, truncate or cordate at base, deeply 3-lobed, middle lobe usually elliptical and entire, the lateral ones usually oblong and with a broad notch in the apex; submersed leaves none or rudimentary: peduncles opposite the upper leaves, thicker than the petioles 6-8 lines long: sepals a line long, persistent: petals 2 lines long, obovate-oblong: stamens 5-9: style long and filiform, with a small terminal stigma: receptacle glabrous: achenes 4-6, finely rugose, obovate, about a line long, embraced by the persistent calyx. In pools that go dry in summer, Oregon and California.

7 RANUNCULUS Tourn. Inst. 285. L. Gen. n. 699.

Herbs with alternate, entire or variously lobed leaves, and solitary or scattered flowers. Sepals 5, plain, commonly colored and reflexed. Petals 1-15, usually broad and conspicuous, with a small pit or spot covered by a scale, on the claw inside. Achenes usually numerous, in a globose to oblong head, usually flattened, and beaked with the persistent style, not transversely rugose on the sides. Ovule ascending.

§ 1 HALODES Gray Proc. Am. Acad. xxi, 366. Mature carpels thin-walled and utricular, compressed, striate with several simple or sparingly branched nerves. Petals yellow with a nectariferous scale near the base, deciduous with the sepals.

R. Cymbalaria Pursh Fl. ii, 392. Flowering stems 3-6 inches long, 1-7-flowered: leaves broadly ovate or ovate-cordate, coarsely crenate, clustered at the base and joints of the long filiform rooting runners: petals yellow, 2 lines long, longer than the sepals: mature achenes a line long, striate-veined on the sides, apex blunt, with a short oblique beak: heads oblong, 2-6 lines long. In wet saline places; California to Alaska and the Atlantic States.

§ 2 EURANUNCULUS Gray l. c. Mature carpels crustaceous or firm-coriaceous, the sides nerveless. Petals usually yellow, with a nectariferous spot or pit and scale near the base.

* Amphibious, the submersed leaves cut into numerous filiform divisions: petals yellow, with a broad scale at the base: achenes with a broad white caruncle.

R. delphinifolius Torr. in Eat. Man. ed. 4, 424. ? Glabrous: annual: stems floating, a foot or two long: submersed leaves dissected into several-times forked capillary divisions; emersed leaves round or reniform, vari-ously lobed or cleft: peduncles stout, 2 inches or more long: petals 5-8, 4-6 lines long, much longer than the sepals; scale $\frac{1}{3}$ as long as its petal, inrolled and its edges joined together for half its length: achenes strongly margined, and pointed with a stout curved beak. In ponds that are dry art of each year, Western Oregon and Washington.

R. limosus Nutt. T. & G. Fl. i, 20. Subaquatic, soft-villous, procumbent: leaves reniform, palmately 5-cleft, the segments 2-3-toothed or somewhat lobed, the divisions blunt, short and shallow; stems 1-2-flowered: petals 3 lines long, rounded, longer than the sepals: achenes small, scarcely keeled, with a short, nearly straight, subulate beak. Margins of brackish lakes, plains of Idaho and Utah.

* * Subaquatic, with entire or merely denticulate or crenulate, petioled leaves; petals 5 or more; achenes in a globular head, subulate-beaked.

R. reptans L. Sp. 549. *R. Flammula* var. *reptans* Meyer Pl. Lab. 96. Stems filiform, creeping and rooting at the joints, 4-12 inches long: leaves lanceolate to linear, acute at both ends, glabrous, entire: flowers 2-5 lines wide; petals obovate: achenes barely a line long, roundish-ovate, tipped with a slender curved beak. Common in wet places, Oregon to Alaska, New York and Canada.

R. microlonchus Greene Eyth. iii, 122. Perennial, the rather large cluster of fleshy-fibrous roots supporting a tuft of erect lanceolate leaves and a single slender tortuous, often partly reclining, leafy and few-flowered stem: leaves all entire, acute at both ends, the radical 1-2 inches long, on slender petioles as long, narrowly lanceolate, nearly glabrous above, but rather densely appressed-pubescent beneath; cauline few, relatively somewhat broader, with short petioles or sessile: flowers 1-several, yellow, 4 lines broad: sepals spreading: petals 5-8, obovate, obtuse; achenes few, in a depressed-globose head, obliquely obovoid, slightly narrowed at base, tipped with a short stout blunt style, moderately compressed, marginless, smooth and glabrous. Collected by *E. L. Greene* in N. Idaho, Aug. 1889.

R. Unalaschcensis Bess. in Ledeb. Fl. Ross. i, 32. *R. Flammula* var. *intermedius* Hook. Fl. i, 11. Stems decumbent and creeping, 4-12 inches long leaves all lanceolate or linear-lanceolate, entire or nearly so, 1-2 inches long, tapering below into the petiole: petals obovate, 2-3 lines long; achenes roundish-ovate, with a short oblique beak, in small globular heads. In wet places, Idaho to Alaska.

R. samolifolius Greene Pitt. iii, 13. Stems several from a perennial root, weak, somewhat flexuous and half reclining, 6-10 inches long, leafy throughout, simple and 1-flowered or branched and several-flowered: her-

bage light green, glabrous or nearly so, leaves all entire, obtuse, radical ones oblanceolate, long-petioled, 2-4 inches long; cauline lanceolate to obovoid or oval, the upper ones with very short dilated and thin sheath-like petioles: sepals roundish, spreading, thin: petals 5-8, broadly obovate, 2-3 lines long, golden yellow: achenes obovate, moderately compressed, obscurely margined, obliquely tipped with a short style. Very common in wet places in the Willamette valley, and from W. Washington to the Sierra Nevada Mountains in California.

R. Gormanii Greene Pitt. iii, 91. Stems several, from a fascicle of perennial, thick but slenderly tapering fleshy-fibrous roots, simple, prostrate at base, rooting and bearing leaves at 2-3 nodes, the terminal part naked, ascending and scapiform, bearing a solitary small flower: leaves broadly ovate or deltoid-ovate, acute, coarsely few-toothed, 6-9 lines long, glabrous, on almost filiform somewhat pilose-hairy petioles 1-3 inches long: petals 5, oblong, obtuse, twice the length of the spreading sepals: achenes small, glabrous, moderately compressed, with a slender curved beak as long as the body. Collected by *Mr. M. W. Gorman* on wet banks at Cathedral Springs, Crater Lake, southern Oregon, Aug. 22nd, 1896.

R. alismellus Greene Fl. Fr. 297. *R. alismæfolius* var. *alismellus* Gray. Glabrous; stems slender 2-12 inches long: radical leaves ovate or elliptical to oblong or cordate, 6-15 lines long, on long slender petioles; cauline 1-2 or none, narrower, subsessile: flowers solitary, 4-7 lines broad, on long slender peduncles: achenes few, the mature ones unknown. In wet meadows on the highest mountains, Washington to California.

R. Populago Greene Eryth. iii, 19. *R. Cusickii* Jones Proc. Cal. Acad. new series v. 615. Stem solitary, from a fascicle of fibrous roots, erect, leafy, the whole plant flaccid and glabrous, 6-10 inches high: leaves thin-membranaceous, from round-reniform to cordate-ovate, obtuse, entire or obscurely crenate, long petioled; the cauline smaller, ovate and ovate-lanceolate, sessile: peduncles many, slender, longer than the cauline leaves to which they are axillary: flowers yellow, 4 lines broad: petals 5-6, obovate-oblong: heads of rather numerous thick short-pointed achenes small, globose or depressed-globose. Mountains of eastern Oregon and Idaho.

R. Bolanderi Greene, Bull. Calif. Acad. ii, 58. Glabrous throughout or the peduncles and calyx pubescent: stem stout, erect, 1-3 feet high: leaves lanceolate, sparingly callous-denticulate, obtuse, the lower ones with blade 4-6 inches long on petioles 5-12 inches long, the cauline ones few and short-petioled or subsessile; petals broadly obovate 3-5 lines long, twice as long as the rounded spreading sepals; scales minute: achenes smooth, moderately compressed, pointed with a slender beak, crowded in a compact ovoid head. In wet places, Willamette valley to northern California.

* * * Terrestrial species with at least some lobed or divided leaves, and no stoloniferous rooting or creeping stems except in *R. repens*.

+ Radical leaves few, only lobed: achenes turgid and dorsally rounded, in a globose head.

R. glaberrimus Hook. Fl. i, 12, t. 5, Fig. A. Glabrous: stems weak, 2-6 inches long, erect or decumbent: leaves all petioled, radical broadly oval, rounded and coarsely toothed or lobed at the apex; cauline subcuneate, trifid or entire: petals 5, obovoid, 4-6 lines long, twice the length of the oval spreading sepals: achenes plump, puberulent, slender-beaked, in large globose heads. In wet places, eastern Washington and northward: flowering in very early spring.

R. ellipticus Greene Pitt. ii, 110. Very glabrous: stems several, 2-3 inches high, from a large fascicle of perennial fleshy-fibrous roots: radical leaves elliptical, entire, acutish at both ends, the petiole equaling the blade; the cauline narrower, often cleft into 2-3 linear divisions: petals often wanting, sometimes 1 only, or 5, large, broadly obovate or more rounded, bright

yellow: achenes numerous, in a large globose head, plump, smooth, tipped with a short curved beak: peduncles recurving in fruit until the heads rest on the ground. In wet places from the Blue Mountains of Oregon to eastern California and the Rocky Mountains. ...

R. digitatus Hook. Kew Misc. iii, 124, t. 4. Less than a span high from a cluster of short and downwardly tuberous-thickened roots; glabrous: leaves few, petioled, entire and lanceolate, or digitately or somewhat pedately lobed the 3 to 5 segments narrowly lanceolate or oblong-spatulate, obtuse: flowers 2 or 3, terminal, 5 to 10 lines in diameter, with 5 to 11 oblong-spatulate petals: fruit subglobose, achenes beaked with the subulate recurved style. Mountains of southern Idaho, Nevada, Utah, and Wyoming,

+ + Leaves all 2-4-ternately parted or divided into numerous narrow divisions: achenes turgid, subulate-beaked, dorsally marginless, smooth or nearly so. Low perennials with fibrous-fascicled roots.

R. triternatus Gray Proc. Am. Acad. xxi, 370. Stems ascending, 2-6 inches long; leaves usually triternately divided and parted; primary divisions petiolulate, lobes filiform-linear to linear-spatulate, obtuse: inflorescence secund: peduncles stout, 2 inches long, at length recurved and the heads resting on the ground: petals broadly obovate, 4-6 lines long: achenes very turgid, rounded on the back, slender-beaked, the head globose with a thick globular receptacle. Klickitat Co. Washington, on the highest hills opposite the Dalles; flowering in very early spring.

R. eximius Greene Eryth. iii, 19. Radical leaves very few, often only one, on short stout petioles 1-2 inches long, the blade of cuneate-obovate or almost flabelliform outline deeply about 7-lobed at the broad summit, otherwise entire: upper cauline leaves sessile, broadly cuneiform, an inch long, cleft to the middle into about 5 lanceolate or broadly linear lobes: periphery of the expanded large corolla quite circular by the overlapping of the numerous broadly obovate or almost obovate yellow petals. Alpine or subalpine, Idaho and Wyoming to the Rocky Mountains.

+ + + Leaves mostly cleft or more divided, some radical ones undivided but at least crenate or dentate: achenes turgid or lenticular, marginless: high mountain perennials with rather large flowers.

R. Suksdorfii Gray Proc. Am. Acad. xxi, 371. Glabrous: stems 4-10 inches high from a fascicle of fleshy-fibrous roots, 1-3-flowered; leaves small, somewhat reniform, 3-5-cleft or parted, divisions of the radical ones 3-5-cleft or incised, of the cauline linear; petals round-obovate, retuse, 4-6 lines long, deep yellow: achenes glabrous, turgid-lenticular, acutish-edged, tipped with an almost filiform long style. In damp ground on Mount Adams, Washington at 6000 to 7800 feet elevation.

R. Eschscholtzii Schlecht. Animad. Ranunc. ii, 16, t. 1. Stems ascending, 6-12 inches long, 1-3-flowered: leaves roundish in outline; radical all 3-5-parted or deeply cleft, and their obovate or cuneate divisions mostly lobed or incised; cauline similar or with oblong to spatulate or lanceolate and often entire divisions: petals 3-6 lines long: achenes glabrous, with slender-subulate and mostly straight style of more than half their length; heads oblong. Alpine, in the Cascade Mountains to Alaska and the Rocky Mountains.

R. cardiophyllus Hook. Fl. i, 14, t. 5. Hirsutely pubescent: stems robust, 10-12 inches high: radical leaves round-cordate, coarsely crenate to 3-7-cleft; cauline nearly sessile, palmately many-cleft, the linear lobes incisely crenate: petals golden yellow, broadly oval, very obtuse, twice as long as the spreading sepals: achenes small, roundish, tipped with a long hooked style. On high mountains, Oregon to Alaska, Canada and the Rocky Mountains.

+ + + + Slender-rooted annual, with small flowers and achenes.

R. eremogenes Greene Eryth. iv, 121. *R. sceleratus* of authors as to the western plant. Glabrous: stem erect, stout and fistulous, 6-30 inches high, sparingly leafy, simple below, loosely corymbose-paniculate above, herbage light-green; lower leaves round-reniform, deeply 2-5-lobed, the lobes obtusely-toothed above; upper leaves more deeply and narrowly cut: petals light yellow, surpassing the sepals: achenes numerous, smooth, flattened, with very short beak, crowded in a short-oblong head: the oblong-ovoid receptacle much inflated. Wet springy places, northern California to Brit. Columbia and the Rocky Mountains; east of the Cascade Mts.

+ + + + + Leaves variously cleft or divided: achenes compressed, usually flat, surrounded by a firm or indurated margin: none truly alpine.

++ Radical leaves not divided into separate leaflets: petals usually only 5: achenes smooth or barely pubescent, in globose or oblong heads.

= Style long, recurving, wholly persistent in a rigid and uncinat, elongated beak.

1 Perennials with erect stems from somewhat fleshy-fibrous roots.

R. occidentalis Nutt. T. & G. Fl. i, 22. Pilose with spreading hairs: stems rather slender, 10-18 inches high, at length much branched: radical leaves orbicular, subcordate, more or less deeply 3-lobed, or 3-parted, and coarsely toothed, an inch or less in diameter; cauline leaves deeply cut into 3-5 linear lobes: petals obovate-oblong, 3-7 lines long, twice as long as the reflexed sepals: achenes smooth or nearly so, flat, a line in diameter; beak nearly as long as the body; heads globose. Common in dry open places, Oregon to Alaska and the Rocky Mountains,

R. Eiseni Kellogg Proc. Cal. Acad. vii, 115. Sparingly villous: stems slender, at length widely branched above, 1-2 feet high: leaves rather small, not cordate at base, palmately 3-lobed or 3-parted, the broad cuneiform lobes of the radical ones trifid: petals obovate-oblong, 3-5 lines long, twice as long as the reflexed sepals: achenes broad and rounded, compressed and thin, glabrous, tipped with a short recurved beak. In dry ground, mountains of southern Oregon to middle California.

R. Rattani. *R. occidentalis* var. *Rattani* Gray Proc. Am. Acad. xxi, 372. More or less villous with long white hairs: stem slender, 1-2 feet high, widely branching above: leaves palmately 3-parted or 3-lobed, not cordate at base, the broad cuneiform lobes of the radical ones trifid: sepals 2-3 lines long, reflexed; petals obovate-oblong, 4-6 lines long or more: achenes becoming roughish-papillose, and sparsely or thickly beset with short hairs. Dry ground, southern Oregon and northern California.

R. Howellii Greene ms. *R. occidentalis* var. *Howellii* Greene Pitt. iii, 14. *R. canus* Howell P. C. Pl. No. 1331. not Benth. Stems slender, smooth, 1-2 feet high, widely branched above: leaves broadly cuneate, palmately 3-5-lobed or -parted, the cuneiform segments 3-toothed or -lobed, canescent with a long appressed-silky pubescence: sepals ovate, acute, pubescent outside, soon reflexed, 2-3 lines long: petals obovate-oblong, 4-6 lines long or more: achenes rather small, smooth, tipped with a subulate, slightly hooked to almost straight, elongated style. Dry hillsides about Ashland Oregon, extending to near the Klamath river in California.

R. ciliolus. Soft-pubescent with moderately long, white, at length spreading hairs: stems 1-several from a fascicle of fleshy-fibrous perennial roots, erect or ascending; lower leaves 3-parted, the obovate or oblanceolate segments acutely 2-5-lobed; the cauline 3-parted, the acute lanceolate segments entire or 2-3-lobed; the uppermost lanceolate and entire: sepals ovate, acutish, 2-3 lines long, soon reflexed; petals broadly obovate, 4-6 lines long: young achenes roundish, ciliate on the outer edge, tipped with a long subulate hooked style: mature achenes not seen. Moist banks, in Bear Valley, Blue Mountains, Oregon. *Howell. May 23, 1885.*

R. Greenii. *R. occidentalis* var. *Lyallii* Gray Proc. Am. Acad. xxi, 373. *R. tenellus* var. *Lyallii* Robinson in Gray Syn. Fl. i, 33. Hispidly hirsute with tawny hairs, or the upper parts nearly smooth: stem usually solitary, erect, 1-3 feet high, with few-several slender erect branches: leaves rather few, thin, 1-3 inches in diameter, cordate, deeply 3-cleft, the broadly-obovate divisions acute, 3-5-cleft and acutely toothed: flowers small, on slender pedicels, the pale yellow petals 1-3 lines long, not surpassing the spreading sepals achenes in rather dense globose heads, scarcely a line broad, minutely papillose and hispid, tipped with a long slender-subulate curved and hooked beak. Common in open Fir forest, Oregon to Brit. Columbia and northern Idaho.

2 Winter annuals.

R. Douglasii. *R. tenellus* Nutt, T. & G. Fl. i, 23. not *Viviani*. Stem solitary, slender or moderately stout, branching, 1-3 feet high: radical leaves long-petioled, 3-parted or trifoliolate, the divisions deeply 3-lobed and the lobes acutely 3-toothed; cauline similar, or the upper 3-parted with linear lobes, or reduced to a single linear-lanceolate leaf or bract, all sparingly pubescent with small appressed hairs: sepals greenish, pubescent outside, oblong, obtuse, 1-2 lines long: petals broadly spatulate, a third longer than the reflexed sepals, attenuate below to a claw: achenes smooth, tipped with a short stout hooked beak. Common in moist places and river bottoms, California to Brit. Columbia.

R. PARVIFLORUS L. Sp. ed. 2, i, 780. Soft-pubescent with spreading hairs: stem erect, slender or stoutish, simple-much branched, 2-12 inches high; lower leaves 3-parted; the broad segment deeply 3-7-lobed; cauline leaves trifoliolate, the broad cuneiform leaflets deeply cut into 3-5 lanceolate acute lobes: sepals about a line long, oblong, obtuse, subsistent: petals obovate, attenuate below to a claw, about as long as the sepals, subsistent: achenes few, in a loose globose head, papillose-hispid with short hooked hairs, tipped with a very short, hooked beak. In the shade of bushes and rocks, from the Columbia river to southern Oregon. Introduced from Eu.

= = Style comparatively short.

R. Californicus Benth. Pl. Hartw. 295. More or less pilose or hirsute: stems erect or nearly so, 6-25 inches high, from a cluster of somewhat thickened fibrous perennial roots: radical leaves usually pinnately ternate, the leaflets laciniately cut into 3-7 usually linear lobes or parts: flowers 5-10 lines in diameter; petals 5-15, narrowly obovate, deep glossy yellow, longer than the reflexed sepals: achenes nearly 2 lines long, much flattened and with sharp edges, tipped with the short curved beak: heads compact, ovate or globular. Dry or moist ground, southern Oregon near the coast, and California.

** ** Stems erect or ascending, not stoloniferous: roots fibrous, of short duration: ovaries with the stout subulate style stigmatose for much of its length, persisting in a straight or merely oblique beak.

R. Pennsylvanicus L. f. Suppl. 272. Hirsute with rough spreading hairs: stem stout, erect 1-2 feet high: leaves ternate; the somewhat ovate acute leaflets 3-cleft, the divisions sharply cut and toothed: petals pale yellow, not longer than the spreading sepals: achenes flat, tipped with the short straight beak, crowded in an oblong head. In damp places, eastern Oregon to Brit. Columbia and the Eastern States.

R. Maccounii Britton Trans. N. Y. Acad. xii, 3. *R. hispidus* Pursh Fl. ii, 395, not *Michx.* Stems ascending or declined, usually hirsute with spreading hairs, stout, 1-2 feet long: leaves all ternately compound; segments oval, acute, laciniately toothed: flowers few, middle-sized, rather long-peduncled; petals obovate, about 3 lines long, surpassing the spreading or hardly reflexed soon deciduous sepals; achenes mostly $1\frac{1}{2}$ lines long, smooth, tipped with a stout straight flat-subulate beak, in globular or at

most oval heads. Washington to Brit. Columbia and Canada.

R. Oreganus. *R. hispidus* var. *Oreganus* Gray Proc. Am. Acad. xxi, 376. Smooth or somewhat pubescent below with scattered hairs: stem stout, $\frac{1}{2}$ -3 feet high, usually several from the fascicle of annual roots: leaves ample, trifoliolate; the broadly-ovate leaflets deeply 3-lobed; lobes mostly lanceolate, serrate above the middle: petals obovate, 3-4 lines long, twice as long as the reflexed sepals: achenes flat with a prominent border, 1-1 $\frac{1}{2}$ lines long, tipped with a short subulate beak, in a large dense oblong or oval head. Shady, and wet places about the mouth of the Willamette river.

++ ++ ++ Stems prostrate and stoloniferous.

R. REPENS L. Sp. i, 554. Pubescent; stems 1-2 feet long, trailing, rooting at the lower joints: leaves ternately parted and often subdivided: sepals spreading: petals 5; achenes 1 $\frac{1}{4}$ lines long, rather sharply margined, the nearly straight beak about 1 $\frac{1}{2}$ lines long. Naturalized in various places from California to Brit. Columbia.

R. septentrionalis Poir. Diet. vi, 125. Coarsely hirsute to glabrous: stems stout, 1-3 feet high: often stoloniferous: leaves nearly all pedately and pinnately 3-foliolate; leaflets 3-parted and sharply incised: flowers large, often more than an inch broad: achenes strongly compressed, rather gradually contracted into a long flat beak; heads ovoid. Northern Idaho and eastward to New Brunswick.

++ ++ ++ ++ Style more or less elongated and attenuate upwards, stigmatose at the tip only: petals 5-15: roots perennial.

R. orthorhynchus Hook. Fl. i. 21, t. 9. Hirsute to nearly glabrous: stems erect or ascending, 1-2 feet long, usually several from the fascicle of thick fibrous roots: leaves mostly oblong in outline, pinnate, with 5-7 usually cleft or incised leaflets; petals narrow obovate purple outside, 4-6 lines long, much surpassing the reflexed sepals: achenes not very numerous, ovate, nearly 2 lines long, strongly margined, tipped with a slender-subulate, rigid and quite straight beak about the same length. In wet places, western Oregon to Brit. Columbia.

R. maximus Greene Bull Torr. Club, xiv, 118. *R. orthorhynchus* var. *platyphyllus* Gray l. c. 377. Pilose or hirsute with spreading hairs: stems stout, 1-4 feet high, ascending or trailing, but not rooting: radical leaves pinnate, 2-8 inches long, on long petioles; leaflets deeply 3-cleft or -parted, the divisions laciniately 3-9-toothed: sepals ovate, acute, 3-4 lines long, hirsute outside, soon reflexed: petals obovate-oblong, rounded at the summit, short clawed, 5-9 lines long, yellow with a dark base: achenes strongly margined, tipped with a rigid, subulate, straight or slightly incurved beak as long as the body. In wet places, Oregon and Washington to California and the Wahsatch Mountains.

+ + + + + Annuals or biennials with muricate-echinate achenes.

R. MURICATUS L. Sp. 1, 555. Glabrous: stems rather stout, 4-8 inches high; leaves roundish or reniform, coarsely toothed: petals pale yellow, longer than the sepals: achenes very large, flat, the sides coarsely muricate-prickly, surrounded by a wide sharp smooth margin; beak stout and straight. In wet places, Umpqua valley Oregon. Introduced from Europe.

Tribe 4. *Helleboreæ* DC. *Sepals imbricated in the bud, petaloid. Petals small or irregular or none. Carpels few, becoming several-seeded follicles.*

* Perennial herbs. Flowers regular. Follicles 5-15.

6 CALTHA L. Gen. n. 703.

Smooth marsh plants with mostly radical, cordate or reniform

leaves and white or yellow flowers. Sepals 5-15. petaloid. Petals none. Stamens numerous. Pistils 5-15, several ovuled, becoming several-seeded. flattened follicles that are dehiscent their whole length on the inner edge.

C. leptosepala DC. Syst. i, 310. Stems erect, 2-8 inches high, 1-2-flowered; the lower flower subtended by a petaloid lanceolate bract: leaves roundish- to oblong-cordate, longer than wide, irregularly crenate-toothed: sepals white tinged with purple outside, lanceolate, acute, 5-8 lines long: follicles obscurely stipitate. Wet meadows, Mount Adams Washington to the Rocky Mountains and Alaska.

C. biflora DC. Syst. i, 310. Stems scape-like, 5-12 inches high, 1-2-flowered: leaves round-reniform, with broad overlapping base, broader than long, 1-4 inches broad, obscurely crenate: sepals white, oblong to spatulate, obtuse, 6-10 lines long: follicles distinctly stipitate when mature. In cold bogs and rivulets of high mountains. California to Alaska.

C. palustris L. Sp. i, 784. Stems erect or ascending. rather thick and succulent, 6-10 inches long or more, corymbosely or dichotomously branched above: lower leaves 2-4 inches broad, cordate or reniform, on petioles 3-9 inches or more long, crenately or acutely dentate, or quite entire; cauline leaves on shorter petioles: flowers few, pedunculate, yellow; sepals 5-6, broadly oval, 6-9 lines long: follicles oblong, somewhat curved, mucronate with the, at length, nearly straight style. In marshes, Oregon to Alaska and the Atlantic States and Canada.

8 TROLLIUS L. Gen. n. 700.

Glabrous perennial herbs with palmately lobed or dissected leaves, and few or solitary yellow or lilac flowers. Sepals 5-15, regular, petaloid, deciduous. Petals 5-8, small, 1-lipped, tubular at base. Stamens and ovaries numerous. Follicles sessile, somewhat cylindrical, many-seeded. Seeds oblong with a smooth crustaceous testa.

T. laxus Salisb. Trans. Linn. Soc. viii, 303. Stems erect, 1-2 feet high: leaves palmately divided; the segments many-cleft: sepals 5-6, spreading, ochroleucous with a tinge of green beneath: petals 15-25, deep orange-yellow. Headwaters of the Skokomish river, Olympic Mountains Washington, and the eastern States.

9 COPTIS Salisb. Trans. Linn. Soc. viii, 305.

Low, smooth and shining evergreen herbs with 1-3-flowered scapes and ternate or quinate leaves. Flowering in very early spring. Sepals 5-7, petaloid. Petals as many, thread-like, enlarging and cucullate near the upper end or near the middle. Stamens 10-25. Follicles 3-12, stipitate, several seeded. Seeds with shining crustaceous testa.

§ 1. **CHRYZA** Gray Gen. Ill. i, 38. Sepals oval. Petals shorter than the stamens, clavate, with enlarged and thickened, hollow, nectariferous summit. Leaflets 3, rarely 5, subsessile and undivided. Scapes 1-flowered.

C. trifolia Salisb. l. c. Leaves trifoliolate; leaflets cuneiform-obovate, mucronately toothed, obscurely 3-lobed, about an inch long: scapes slender, 3-5 inches high, 1-flowered: sepals 5-7, oblong, obtuse, white: petals shorter than the sepals, cucullate-obconic, white with yellow base, soon deciduous: follicles ovate-oblong, longer than the style, equaled by

the stipe: seeds black. In marshes and low woods, northwest Washington to Alaska and the Atlantic States, Newfoundland and northward.

§ 2 **CHRYSOCOPTIS** Gray l. c. Sepals linear or ligulate, attenuate, greenish- or yellowish-white. Petals filiform or ligulate, enlarged and cucullate near the middle. Scapes 1 3-flowered.

C. occidentalis T. & G. Fl. i, 28. Leaves simply trifoliolate: leaflets long-petiolate, roundish in outline, 2-3 inches long, 3-lobed to about the middle, lobes obtuse, slightly 3-lobed or incised and obtusely dentate: petals shorter than the sepals and apparently subulate from a subsessile ovate and concave base; mature follicles longer than the stipe; seeds oblong. In the mountains of Idaho. A little known species.

C. venosa. Leaves ternate, coriaceous, smooth and shining prominently veined; leaflets ovate with cordate base, deeply 3-cleft, the divisions again cleft into 3-5 cuspidate dentate lobes, the terminal one long and the lateral ones short petiolulate: scapes at length 7-12 inches high, equaling or exceeding the leaves: sepals petal-like, very narrowly lanceolate, long-acuminate 3-4 lines long: petals a little shorter, filiform, dilated and gibbous below the middle: follicles longer than the stipe: seeds oblong, chestnut-brown. Cascade mountains near the head of Elk Creek Oregon. So far as known only collected by myself, and distributed as *C. occidentalis* in 1881-82.

C. laciniata Gray Bot. Gaz. xii, 297. Leaves chartaceous, ternate, triternate, or ternate-quinate; the ovate leaflets deeply 3-5-cleft, acute and acutely toothed: sepals linear-lanceolate, 4-5 lines long, spreading or reflexed: petals a third shorter, nearly filiform, cucullate in the middle: follicles 4-5 lines long, exceeding the stipe: seeds oval. Along streams, Coast and Cascade mountains from Oregon to northern California.

C. asplenifolia Salisb. l. c. 303. Leaves pinnately 5-foliolate; leaflets all rather long-petiolate, mostly ovate-oblong in outline and pinnately 5-parted or divided; lowest pair of pinnæ commonly petiolulate and upper confluent all 3-5-cleft and incised: sepals filiform, 2-3 lines long: petals filiform with a thickened and concave nectary below the middle: mature follicles shorter than the stipe. Damp woods and marshes, Alaska to Brit. Columbia. To be looked for in northern Washington.

10. **AQUILEGIA** Tourn. Inst. 428. L. Gen. n. 684.

Perennial herbs with biternate or triternate leaves and showy terminal flowers in early summer. Sepals 5, colored and petaloid. Petals 5, alternate with the sepals, with short spreading lips, and produced backwards into long tubular spurs. Stamens many, the outer ones long-exserted, the inner ones reduced to thin scales. Follicles 5, sessile, pointed with the slender style.

A. formosa Fischer in DC. Prod. i, 50. Sparingly pubescent with soft spreading hairs: stems branching, 2-4 feet high, from a simple or branched fleshy fusiform root: lower leaves triternate, on long petioles, the upper sessile and ternate or reduced to simple bracts: leaflets broadly cuneate, 3-cleft, the divisions variously 3-5-lobed: flowers red, pendulous in anthesis; sepals spreading or reflexed, 10-14 lines long, lanceolate, abruptly narrowed to a short claw: spurs little or not at all longer than the sepals: style not longer than the stamens: follicles an inch long by 2 lines wide. Common from California to Alaska Nevada and Utah.

A. truncata F. & M. Ind. Sem. Petr. Suppl. 8. (1843.) Glabrous: stems 1-3 feet high, with lax spreading branches: flowers 1-2 inches in diameter, red tinged with yellow: sepals widely spreading or reflexed: petals truncate, the limb very short; the spurs 6-9 lines long, thick and blunt. In

shady ravines, southern Oregon near Crater Lake, *Gorman*, and California.

A. flavescens Watson Bot. King, 10. Smooth: stems 1-3 feet high: leaves ternate: leaflets round-cordate, 3-parted, the segments 2-3-cleft and coarsely toothed: flowers yellow, pendulous; sepals reflexed, oblong-ovate, acute, longer than the spurs: style nearly equaling the stamens, much longer than the pubescent ovary. Subalpine, eastern Oregon to Nevada, Utah and Brit. Columbia.

A. leptosera Nutt. Journ. Acad. Philad. vii, 9. Stems 1-2 feet high, glabrous, few-flowered: flowers white or slightly tinged with blue, soon becoming erect: sepals ovate, an inch to inch and a half long; spur straight, 2 inches long, very slender: Shaded mountain slopes, Idaho to eastern California and Utah.

* * *Flowers irregular. Carpels 1-5. Leaves palmately lobed or dissected.*

11 DELPHINIUM Tourn. Inst. 426. L. Gen. n. 781.

Erect herbs from grumous or fleshy-fibrous roots, with palmately lobed cleft or divided alternate leaves and showy flowers in simple or paniculate racemes. Sepals 5, very irregular, usually colored and petaloid, the upper one produced backwards at the base into a hollow spur the others plain. Petals 2-4, very irregular, the 2 upper ones developed backwards and enclosed in the spur of the calyx. Stamens many. Pistils 1-5, many-ovuled. Style persistent. Ours all of

§ DELPHINASTRUM DC. Syst. i, 351. Petals 4. distinct, the upper pair usually glabrous: the lateral ones unguiculate, more or less hairy on the face, in ours emarginate or 2-lobed at the apex. Follicles in ours usually. 3.

* Flowers blue or white, never scarlet nor orange.

D. Menziesii DC. Syst. i, 355. Glabrous or pubescent with spreading hairs; 5 to 18 inches high, sparingly leafy: lower leaves round-reniform, irregularly cut into oblong lobes: the upper finely dissected into linear lobes: flowers blue, in a few-branched panicle: sepals lanceolate, obtuse, 5-8 lines long by 2-3 lines wide, about as long as the stout spur, pubescent with spreading hairs: petals exserted, white with purple veins: follicles glabrous, 8-10 lines long with acute widely spreading tips: seeds turbinate, with a broad depressed summit. Northern California to Brit. Columbia: usually in open woods.

D. pauperculum Greene Pitt. i, 284. Stem solitary, simple, 2-7-leaved, 6-10 inches high; from a small globose or ovate tuber: pubescence sparse and soft: leaves parted into broad-linear, trifid segments: flowers only 3 or 4 on ascending pedicels, deep blue, an inch broad; spur straight, ascending. Near the coast, Washington. *M. A. Knapp.*

D. Oregonum. Finely pubescent with short reflexed hairs: stem often slender, 1-3 feet high, from a somewhat branched flattish tuber, sparingly leafy: leaves all dissected into acute linear lobes: flowers blue, in few to many-flowered racemes; sepals broadly lanceolate, half inch or more long, shorter than the slender spur; lower petals blue, very obtuse or truncate, repand and ciliate at the apex, the blade only 2-3 lines long; upper ones light blue bordered with white, lanceolate, obtuse: follicles 3-4 lines long by a line broad, densely tomentose, erect and not at all spreading at the tips: seed triangular, with rounded and rugose back, and truncate summit. Open plains and hillsides of the Willamette valley.

D. leucophæum Greene Eryth. iii, 118. *D. Menziesii* var. *ochroleucum* Nutt. *T. & G. Fl. i, 31*. Very finely pubescent with retrorsely appressed hairs, usually rather slender, 1-3 feet high from a more or less branching tuber: leaves ternate, the nearly sessile leaflets deeply cut into 3-5 laciniately trifid lobes: racemes virgate, 3-10 inches long: pedicels erect in fruit, the lowest 1-2 inches long, the upper 2-6 lines long, all more or less glandular: sepals whitish or ochroleucous outside, spur slender, 8-10 lines long, longer than the oblong lower petals, blue bordered with white, rounded at the summit, repand-dentate, rather densely bearded: follicles erect, rather densely pubescent, oblong, 5-7 lines long. Open plains, Willamette valley and along the Willamette river near Oswego.

D. simplex Dougl. Hook. *Fl. i, 25*. Tall and strict, 2-3 feet high: pubescent throughout, with short and soft spreading almost velvety down: leaves all dissected into linear divisions and lobes, racemes spiciform and virgate: pedicels shorter than the spur, erect in flower and fruit: calyx pubescent outside. Root and fruit not seen. Western Idaho. (*Gray Syn. Fl. i, 49.*)

D. distichum Geyer Lond. Journ. Bot. vi. 68. Stem strict a foot or two to rarely 3 feet high from a fasciculate tuberous root, glaucescent, glabrous or the inflorescence puberulent, rather rigid, several-leaved, simple or the larger plants having one or more lateral racemes: leaves thickish; lower ones of rounded outline, with cuneate or narrow divisions and lobes; upper ones short-petioled, erect, and with approximate or little spreading linear divisions and lobes: raceme spiciform and virgate, many-flowered: pedicels shorter than the spur, erect or appressed both in flower and fruit: flowers blue or violet, approximate and conspicuously distichous in the very spiciform raceme: sepals at first canescent puberulent outside, a third to nearly a half inch long, follicles erect, seldom over a half inch long. Low prairies, etc., Oregon and Washington to Montana.

D. Columbianum Greene Eryth. ii, 193. Densely canescent: stems simple, 4-12 inches high or more, from a fascicle of thickened roots: lower leaves reniform, irregularly cut into oblong callous-tipped lobes; upper ones finely dissected into linear lobes: inflorescence tawny pubescent: flowers dark blue, rather small, in a strict secund or virgate spike: pedicels erect, short and stout: sepals oblong, about half as long as the slender spur, appressed canescent; follicles densely tawny-pubescent, 5-8 lines long by a line or more wide, erect: seeds winged. In winter rivulets, eastern Washington to Nevada and California.

D. Andersoni Gray l. c. Sparingly pubescent or glabrous, 4-18 inches high, rather stout: leaves thickish, round-reniform in outline, the lower coarsely and the upper finely dissected into obtuse linear lobes; flowers blue, in a condensed spike: sepals broadly spatulate, 6 lines long or more, finely pubescent: petals pale blue veined with dark blue: follicles glabrous, 8-12 lines long by $1\frac{1}{4}$ -2 lines wide, erect, with acute spreading tips: seeds broadly winged with a broad depressed summit. Southeastern Oregon to Nevada and California.

D. Nuttallianum Pritz. in Walp. Rep. ii, 744. Glabrous or barely puberulent: stem slender, a span to a foot high from a fasciculate-tuberous root; leaves small, all pedately parted into narrowly linear divisions of an inch or more in length: racemes 3-15 flowered: pedicels about the length, of the flowers; sepals 3 lines long, oblong, little surpassing the petals much shorter than the slender spur: follicles (so far as known) oval-oblong, erect, about 4 lines long. Eastern borders of Washington to the Rocky Mountains.

D. bicolor Nutt. Jour. Acad. Philad. vii, 10. Pubescent, a span to a foot high from fascicled, and mostly deep descending roots, rather stout: leaves thickish, the lower orbicular in outline, all deeply cleft or parted with mostly linear and obtuse segments; racemes few to several-flowered: lower pedicels an inch or two long, ascending: sepals and spur half to

three-fourths inch long; upper petals pale yellow and white and copiously blue-veined: follicles glabrous, or when young puberulent, sometimes quite erect, but usually recurving above. Dry ground, mountains of eastern Oregon and Washington to Utah, Colorado and British Columbia.

D. depauperatum Nutt. l. c. Stem very slender, simple, 1-3 leaved: leaves scarcely an inch in diameter, glabrous. the lower one flabelliform or reniform: upper part of the stem and carpels minutely villous: raceme 1-7-flowered; flowers deep blue, upper petals yellowish: follicles 5-6 lines long, erect. Mountains of eastern Oregon and Nevada.

D. trollifolium Gray Proc. Am. Acad. viii, 275. Glabrous throughout or the inflorescence sparingly villous, tall and stout, 2-5 feet high: leaves large, long petioled, 5-7 lobed, the lobes laciniately cleft and toothed with acuminate segments: flowers large, in a loose raceme: sepals oblong-lanceolate, acuminate, 8-10 lines long, sparingly villous: follicles glabrous, 6-8 lines long by two lines broad: seeds turbinate with a narrow rim at the top. Common along streams from British Columbia to California. Known as "Poison Larkspur."

D. occidentale Watson. Glabrous or densely pubescent above, 4-6 feet high: leaves deeply 3-5 cleft, the divisions broadly cuneate somewhat 5-lobed and sparingly gash-toothed, the teeth narrowing abruptly to a callous point: flowers small in a many-flowered sparingly branched panicle: sepals spatulate acuminate attached by a broad base, 6 lines long or more, follicles glabrous or sometimes pubescent: seeds light colored and spongy. Subalpine in damp soil, from the Blue Mountains of Oregon to Nevada.

D. scopulorum Gray Pl. Wright, ii, 9. Glabrous below or throughout: stems 1-6 feet high from a fascicle of thick roots; leaves numerous, mostly orbicular in outline, 2-3 inches in diameter, 5-7 parted, the lower into cuneate and the upper into narrower cleft and lacinate divisions: petioles, except the lowest, hardly dilated at base: bracts and bractlets mainly filiform: racemes many flowered; flowers blue varying to white or pink on short erect pedicels; sepals about half an inch long, about equaling the spur: lower petals deeply notched and with the whitish upper ones but little shorter than the oblong sepals: follicles not over half inch long, short-oblong, erect: seeds with a loose cellular coat. Mountains of eastern Washington (*Sandberg No. 921*) to the Rocky Mountains and New Mexico

D. glaucum Watson Bot. Cal. ii, 427. Tall and stout, glabrous and more or less glaucous: leaves large, laciniately lobed and toothed, the lobes mostly acuminate, the upper leaves sparingly lobed or entire and narrowly lanceolate: flowers pale blue, numerous in a narrow raceme, upon slender and rather short pedicels, the somewhat minutely tomentose sepals rather narrow, about 6 lines long or less, follicles glabrous. From Yakima county, Washington, to California and north to the Yukon river.

D. Burkei Greene Eryth. ii. 183. Stems one or several, a foot high or more, erect, not slender, from a manifestly woody-fibrous root, leafy at or near the base only: foliage and lower part of stem seeming glabrous, though somewhat puberulent under a lens; upper part of stem and the inflorescence clothed with a short villous-hirsute pubescence: leaves 2 inches broad, deeply parted into many linear and oblong-linear obtusish segments, the texture rather fleshy: raceme rather long and narrow, the pedicels being equal and quite erect: sepals deep blue, pubescent exteriorly, spur rather long, usually blunt, nearly straight and horizontal; petals conspicuously white, or perhaps ochroleucous: ovaries densely-appressed-villous: follicles unknown. "Snake Country" Idaho. *Burke*.

* * Flowers scarlet.

D. nudicaule T. & G. l. c. Smooth or slightly villous, stems a foot or two high; leaves mostly near the base, 1-3 inches in diameter, 3-5 lobed,

the lobes more or less deeply 3-7 toothed, with broad obtuse segments: flowers red: sepals broadly lanceolate, abruptly acuminate, 6 lines long or more, much shorter than the long stout spur. In the mountains of southern Oregon and California.

12. ACONITUM Tourn. Inst. 424. L. Gen. n. 682.

Tall perennial herbs with palmately lobed alternate leaves and showy flowers in open racemes. Sepals 5, colored and petaloid, very irregular, the upper ones arched into a hood, the lateral ones plain. Petals 2-5, the upper 2 irregular, with long claw and spur-like blade which are concealed in the hood of the sepals; the 3 lower ones small or obsolete. Follicles 3-5, sessile, many-seeded.

A. Columbianum Nutt. T. & G. Fl. i, 34. Rather stout, 2-6 feet high, smooth below, somewhat tomentose above: leaves ample, the lower on long petioles, the upper subsessile, all deeply 3-5 cleft into broadly cuneate laciniately toothed acuminate lobes: hood 6-8 lines long with helmet-shaped portion higher than broad, at length much shorter than the downwardly narrowed basal portion, very strongly beaked: follicles usually 3, oblong, obtuse, 6-8 lines long, many-seeded: seeds flat, strongly keeled and transversely wrinkled. Along mountains steams, California to Brit. Columbia, east to the Rocky Mountains and New Mexico.

A. bulbiferum. Stems slender, weak and viney, 2-4 feet long: smooth below, tomentose above: leaves rather small, on short petioles, or the upper sessile bearing bulblets in their axils, all laciniately cut into acute lobes: sepals pale blue; hood 6-8 lines long. Fruit not seen. In marshes on the eastern slope of the Cascade Mountains near Mount Hood, flowering in September.

* * * *Flowers regular. Carpels 1-5. Leaves ternately compound.*

+Fruit dry. Follicles 1-20.

13. ISOPYRUM L. Gen. n. ed. 2. 533.

Low perennial herbs with mostly alternate 2-3-ternately decomposed leaves and white flowers in lax terminal panicles or solitary. Sepals 5-6, petaloid, regular, deciduous. Petals 5, very small and nectariferous or none. Stamens 10-40. Follicles 2-20, several-ovuled. Seeds with a smooth or rugulose crustaceous testa.

I. stipitatum Gray Proc. Am. Acad. xii, 54. Glabrous; stems very slender, 2-4 inches high from a large fascicle of thickened fibrous roots, with about 2 ternate cauline leaves and a single flower; radical leaves biterminate, petiolate, with cuneate often 2-3 lobed leaflets, 3-5 lines long: peduncle thickened at the summit; sepals 4-6, oblong, 3 lines long: filaments enlarged in the middle: follicles 2-6, shortly stipitate, oblong, 3 lines long, 3-4 seeded: seeds globular, transversely rugose. Under trees in open moist places, southern Oregon, near Oakland, to northern California.

I. Hallii Gray Proc. Am. Acad. viii, 374. Stems slender, erect, 1-3 feet high, 2-leaved; leaves ample, 2-3-ternate; leaflets obovate-cuneate $\frac{1}{2}$ -2 inches long, irregularly 3-incised at the apex: flowers in simple or once or twice forked foliaceous-bracted subumbellate corymbs: pedicels slender, an inch or two long: sepals 5, obovate, 4 lines long: filaments as long as the sepals, clavate: follicles 3-5, sessile, ovate-oblong, acuminate, 2-4 seeded: seeds rugulose. Along mountain streams both sides of the Willamette valley. A rare species.

14 CIMICIFUGA L, Amœn. Acad. viii, 193 t. 4.

Tall perennial herbs with ample ternately compound leaves and small white flowers in paniculate racemes in summer. Sepals 4-6, falling soon after the flower opens. Petals 1-8, or none, small, with short, claws. Stamens numerous. Follicles 1-8, many-seeded.

C. elata Nutt. T. & G. Fl. i, 36. Canescently pubescent or the panicle tomentose and glandular, 4-8 feet high; leaves ample; leaflets thin 2-4 inches in diameter, 5-7 lobed, segments acute, coarsely cuspidate-serrate: petals none: filaments equal: pistils 2-5 in the early flowers, only one in the later ones, glabrous or minutely glandular; follicles sessile, 4 lines long, obtuse, 6-10 seeded: seeds terete transversely rugose. In woodlands Willamette valley to Puget Sound.

C. laciniata Watson Proc. Am. Acad. xx, 352. Glabrous or the panicle tomentose: 3-5 feet high: leaves ample, ternate, the divisions 3-parted or deeply 3-lobed, the acuminate segments coarsely lacinate-toothed: petals usually present: filaments unequal: pistils 2-5 pubescent; follicles stipitate 4-5 lines long, 6-8 seeded: seeds flat linear, light brown, scaly. Lost Lake, north side of Mount Hood. Rare.

+ + *Fruit a one-celled, many-seeded berry.*

15 ACTÆA L. Gen. n. 644.

Tall perennial herbs with alternate, triterately decomposed leaves and small white flowers in short terminal racemes. Sepals 5-6, nearly equal, petaloid, caducous. Petals 4-10, or none, less showy than the numerous white filaments. Carpel solitary, sessile, covered with a broad and obscurely 2-lobed depressed stigma, becoming a berry filled with smooth flattened seeds packed horizontally in two rows.

A. arguta Nutt. T. & G. Fl. i. 35. Stems 1-6 feet high from a fascicle of short branching roots, 1-3 leaved; leaves ternately or quinately decomposed: leaflets ovate to oblong, often obscurely 3-lobed, acuminate, irregularly incised-dentate: racemes oblong, sometimes divided toward the base, loose: pedicels longer than the flowers, filiform, scarcely thickened in fruit: petals oblong, obtuse, shorter than the stamens: berries red or white subglobose. Common in forests from California to Alaska and the Rocky Mountains.

A. rubra Wild. Enum. 561. Stems about 2 feet high: leaves ternately decomposed; leaflets ovate, acuminate, 1-2 inches long, unequally and incisely serrate, the terminal one often 3-cleft: racemes broadly ovate or hemispherical: pedicels longer than the flowers, scarcely any thicker in fruit: sepals 4 greenish, ovate petals 3-10, rhombic-ovate, acute, shorter than the stamens: berries bright cherry-red, shining, subovate. Craig Mountains, northern Idaho (*Sandberg n. 235*), to the Atlantic States and Canada.

. *Tribe 5. Pæoniæ DC. Prod. i. 64. Sepals herbaceous, imbricated in the bud, persistent. Carpels few, many ovuled.*

16 PÆONIA Tourn. Inst. 273 t. 146. L. Gen. n. 678.

Herbs or low shrubs with tuberous roots, alternate, triterately compound or divided leaves and large solitary flowers terminating the stems or branches. Sepals 5, strongly imbricated.

cated, persistent. Petals 5-10 or more, situated with the stamens on the fleshy perigynous disk that is adnate to the sepals or concave receptacle. Stamens numerous. Carpels few becoming coriaceous many-seeded follicles. Style short or none. Seeds anatropous, oval or oblong, naked at base or the very short fleshy funiculus cupulate; embryo straight or slightly arcuate.

P. Brownii Dougl. in Hook. Fl. i, 27. Glabrous and glaucous, stems ascending or at length decumbent, 1-2 feet long: leaves thick, leaflets ternately dissected into oblong or linear lobes; sepals green, mostly unequal: petals scarcely larger than the sepals, thick and leathery, dark dull red: follicles oblong, an inch or more long: seeds round or oblong 2 lines in diameter, black and shining. Stony hillsides, Brit. Columbia to California.

ORDER II. BERBERIDACEÆ Endl. Gen. 851.

Herbs or shrubs with compound or divided leaves without stipules and perfect, hypogynous flowers. Bracts sepals petals and stamens 6 each (sepals and petals wanting, and stamens 9 or more in *Achlys*): Anthers 2-celled opening by uplifted valves that are hinged at the top. Calyx and corolla imbricated in the bud, deciduous, both usually colored Pistil 1, of a single carpel. Style short or none. Seeds anatropous, with small or minute embryo in firm-fleshy or horny albumen.

*. Flowers complete: stamens 6, mostly short.

- 1 **Berberis.** Shrubs with rigid oddpinnate leaves; flowers yellow, in clustered racemes: fruit a few-seeded berry.
- 2 **Vancouveria.** Herbs with ternately compound leaves: flowers white or yellow in a panicle: fruit a follicle.
- * * Flowers without sepals or petals: stamens 9 or more.
3. **Achlys.** Flowers spicate on a scape, without bracts, sepals or petals. Herbs with 3-parted leaves.

1 BERBERIS, Tourn. Inst. 614, t. 385, L. Gen. n. 442.

Smooth shrubs with yellow wood, pinnate leaves, yellow flowers in clustered bracketed racemes, and oblong or globose, acid, dark blue berries. Sepals 6, petal-like, with 6 closely appressed bractlets in 2 rows. Petals 6, opposite the sepals, usually 2-glandular at base. Stamens 6, opposite the petals. Stigma peltate. Fruit a 1-celled berry, with 1-3 seeds. Ours all of

§ **MAHONIA** T. & G. Fl. i, 50. Leaves evergreen, all evolute, (none reduced to spines) and 3- to several-foliolate; petioles articulated at the insertion of the leaflets: leaflets thick, coriaceous. spiny-toothed: filaments usually 2-toothed at the summit.

* Leaflets pinnately veined.

B. pumila Greene Pitt. ii, 162. A few inches to a foot high, stout and rigid, erect from the base: leaves very thick-coriaceous: leaflets 1-5, the terminal one round-ovate, the lateral ones obliquely ovate, all coarsely toothed, the teeth rigidly spinescent, conspicuously reticulate-veined on both faces, pale and glaucous beneath, deep but dull green and glaucous-

cent above racemes short, terminal and axillary; berries small, very glaucous. Coast mountains of southern Oregon and northern California.

B. repens Lindl. Bot. Reg. t. 1176. Stems stoutish erect, branching, 1-4 feet high: leaflets few, coriaceous, light green, coarsely spinose-toothed: racemes short, in terminal and axillary clusters: bud scales triangular, acute: fruit globose to oblong, dark blue. Idaho to the Rocky Mountains.

B. nana Greene Pitt. iii, 98. Low, 3-15 inches high, increasing from underground runners: leaflets 3-7, rarely more, ovate to oblong, acute or obtuse, 1-2½ inches long, not shining above: racemes few, terminating the branches, 1-2 inches long; bud-scales triangular, cuspidate 2 lines long. Brit. Columbia to California, Montana and New Mexico.

B. Aquifolium Pursh Fl. i, 219 in part. Large, 2-10 feet high: leaflets 5-9, oblong-ovate, acute, spinulose dentate, 1-3 inches long, green and shining above: bud scales triangular, acute, 3 lines long; racemes in terminal and axillary clusters, 2-4 inches long: fruit globose to oblong. Western Washington to California.

* * Leaflets palmately veined.

B. nervosa Pursh l. c. t. 5. Stems simple, a foot or two high, from long underground shoots: leaves 1-2 feet long, of 11-17 ovate acuminate spinulose-serrate leaflets; bud scales long-acuminate, 10-12 lines long, persistent, becoming dry and rigid: racemes in terminal clusters, 6-12 inches long. In Fir forests from Brit. Columbia to California.

2 VANCOUVERIA Morr. & Deesne, Ann. Sci. Nat. ser. 2, ii, 315.

Slender perennial herbs with 2-3-ternately compound leaves and white or yellow flowers in open paniculate racemes upon a naked scape. Sepals 6, obovate reflexed, soon falling with the 6-9 oblong, membranaceous bracts. Petals 6, shorter than the sepals and opposite them, linear-spatulate, nectary-like reflexed. Stigma slightly dilated. Ovules in two rows upon the ventral suture. Capsule dehiscing by a dorsal valve attached by the base, persistent. Seeds oblong somewhat curved, with a broad attachment and prominent arillus.

V. hexandra Morr. & Deesne. l. c. More or less villous, with brownish hairs, 1-2 feet high, from long running rootstocks: leaves diffuse, long petioled; leaflets 1-2 inches broad, petiolulate, subcordate, obtusely 3-lobed, the lobes emarginate, the margin thickened and often undulate: scapes exceeding the leaves: pedicels an inch long or more, recurved: sepals 2-3 lines long: carpels 4-6 lines long, gibbous-lanceolate, with a slender beak, smooth or slightly glandular; arillus 2-lobed, more than half covering the seed. In Fir forests, British Columbia to California.

V. chrysantha Greene Bull. Cal. Acad. Sci. i, 66. Stems rusty-villous pubescent: leaflets evergreen, thickish, sub-3-lobed, glabrous and reticulated above, whitened and pubescent beneath, margins only slightly crisped, revolute in places: inflorescence sub-racemose, 5-18 flowered, covered with dense dark glandular pubescence: flowers golden yellow; sepals 3-4 lines long; ovules 7-8. Eastern base of the Coast Mountains near Waldo, Josephine county, Oregon.

3 ACHYLS DC. Syst. ii, 35.

Smooth perennial herbs with one radical trifoliate leaf and small white flowers, crowded in a naked spike terminating the scape. Sepals and petals none. Stamens 9 or more in 3 or more

rows. Filaments slender, the outer ones dilated at the summit. Stigma sessile dilated. Ovule solitary, erect. Fruit at first somewhat fleshy, at length dry and coriaceous lunate-incurved, dorsally carinate, ventrally excavated each side of the fleshy salient suture or ventral appendage. Embryo minute.

A. triphylla DC. Syst. ii. 35. Rootstock creeping, clothed with glumaceous scales: leaves ample, long-petioled, a foot or more high from a scaly base; leaflets broadly cuneate, 3-5 inches long, the outer margin irregularly and coarsely sinuate, very fragrant when drying: scape solitary, equaling or surpassing the leaf. In Fir forests, Brit. Columbia to California.

ORDER III. NYMPHÆACEÆ Endl. Gen. 858.

Aquatic perennial herbs with trunk-like horizontal rootstocks or tubers. Leaves peltate or deeply cordate involute from both margins in the bud. Flowers perfect, solitary on long axillary peduncles. Stamens numerous. Ovules on the back or sides of the carpels, embryo small at the base of fleshy albumen, enclosed in a fleshy bag.

1. **Brasenia.** Carpels 4-18, in a cluster, indehiscent, 2-seeded.
2. **Nymphæa.** Carpel only one, many-celled and many-seeded: sepals 5-12, concave.
3. **Castalia.** Carpel only one, many celled and many-ovuled: sepals only 4, plain.

1. BRASENIA Schreb. Gen. 372.

Aquatic perennial herbs with peltate leaves and purple flowers. Sepals and petals nearly alike, nearly oblong, dull dark purple hypogynous persistent, 3-4 of each. Stamens 12-18 hypogynous. Filaments slender. Anthers oblong-linear. Carpels 11-18, distinct, tipped with the linear one-sided stigma. Fruit a 1-2 seeded indehiscent pod.

B. Schreberi Gmel. Syst. Veg. i, 854: *B. peltata*, Pursh. Fl. ii, 333. Stems ascending from a tuberous rootstock: leaves floating alternate on long slender petioles, elliptical, centrally peltate, light green above, red and when young covered with a clear jelly-like substance beneath; flowers 6 lines long. In ponds, Brit. Columbia to California, and east to the Atlantic.

2. NYMPHÆA Boerh. Hort. Acad. Bat. 281.

Herbs of shallow waters, sending up large and mostly rather leathery cordate leaves, and 1-flowered peduncles from large and creeping rootstocks in the mud beneath. Sepals 5-13, concave and roundish, partly colored. Petals numerous, some of the inner ones resembling sterile stamens persistent. Stamens numerous, short, hypogynous, densely crowded around the ovary, at length recurving, persistent. Anthers truncate at the apex, the two linear cells adnate introrse. Ovary oblong or ovate, 8-20 celled. Stigma sessile, peltate, many-rayed. Fruit ovoid or flask-shaped indehiscent, with a firm rind and fleshy or pulpy interior. Cells many-seeded.

N. advena Ait. Hort. Kew. ii. 226; *Nuphar advena*, Ait. f. Leaves floating or emerged and erect. on stout and half cylindrical petioles, deeply cordate 6-8 inches in diameter: flowers two inches in diameter: sepals usually 6, unequal: petals narrowly oblong, thick and fleshy, truncate shorter than the stamens: anthers longer than the filaments: stigma 12-24-rayed, the margin entire or repand: fruit strongly furrowed, ovoid-oblong. (In subalpine ponds about Mount Hood), Oregon to Alaska thence eastward across the continent.

N. polysepala Greene Bull Torr. Club, xv, 84. *Nuphar polysepalum* Engelm. Trans. Acad. St. Louis, ii, 282. Resembling the last but larger: leaves all floating, 8-14 inches in diameter: flowers fragrant, 2-5 inches in diameter: sepals 8-12, unequal: petals 11-18, dilated and unlike the stamens, yellow: fruit globose, 1-2 inches long. In ponds, British Columbia to California.

CASTALIA Salisb. Parad. Lond. 14.

Perennial acaulescent herbs with thick creeping or tuberous rootstocks, rounded cordate leaves and snow white or pink flowers blooming all summer. Sepals 4, plain, hypogynous, herbaceous on the outer and somewhat colored on the inner face. Petals plain, those of the outermost row often greenish outside, all oblong or lanceolate, imbricated over and their bases adnate to the surface of the 7-35-celled ovary: innermost reduced to staminodes or imperfect stamens with petaloid filaments. True stamens with narrow filaments and linear-oblong anthers, inserted around the broad summit of the ovary. Ovary concave and umbonate, lineate with as many radiate stigmatic lines as there are carpels, the tips of the latter produced into as many incurved short processes. Surface of the spongy-baccate fruit bearing the basis of the decaying stamens or their scars. Seeds enclosed in cellular-membranaceous arillus.

C. Leibergi Morong Bot. Gaz. xiii, 124 t. 7. Leaves oval with rather open sinus and acutish lobes, entire $1\frac{1}{2}$ -6 inches long, two-thirds as broad: flowers white $1\frac{1}{2}$ -2 inches in diameter when fully expanded: sepals an inch long, narrow, obtuse: petals in two rows, a little shorter and more obtuse than the sepals: stamens in 3-4 rows running up the ovary more than half way: stigmatic rays 7 or 8, the projecting points very short and blunt. In small ponds, northern Idaho.

ORDER IV. SARRACENIACEÆ Endl. Gen. 901.

Bog plants with pitcher-shaped or tubular and hooded leaves, and perfect, polyandrous hypogynous flowers. The persistent sepals, petals and cells of the ovary each 5. Fruit a many-seeded capsule. Embryo small, in fleshy albumen.

CHRYSAMPHORA Greene Pitt. ii, 191.

DARLINGTONIA Torr. Smith. contrib. vi, 4. t. 12.

Calyx without bracts, of 5 imbricated narrowly oblong sepals. Petals 5, ovate oblong with a small ovate tip. Stamens 12-15 in a single row. Filaments subulate. Anthers oblong of 2 unequal cells. Ovary top-shaped, with a broad concave dilated summit, longer than the stamens, 5-celled, the cells opposite the pet-

als. Style short, with 5 short linear or club-shaped lobes. Capsule loculicidally 5 valved. Seeds very numerous; obovate-clavate, thickly beset with soft slender projections.

C. Californica Greene l. c. A smooth perennial herb of greenish yellow hue, from long creeping rootstocks, leaves tubular gradually enlarging upwards to a vaulted ventricose hood which terminates in a forked deflexed appendage, under which is the contracted rounded orifice, the ventral edge winged: scapes 2-3 feet high bearing several membranaceous bracts; and a solitary noddin flower; sepals dull yellow 1-2 inches long, much longer than the brown, spotted with yellow petals. In bogs, southwestern Oregon and northern California.

ORDER V. PAPAVERACEÆ Endl. Gen. 854.

Herbaceous or rarely shrubby plants, with milky or colored juice. Leaves mostly alternate, without stipules. Peduncle 1-flowered. Sepals, petals and stamens hypogynous. Sepals 2 or 3. Petals twice as many, in two sets, imbricated and usually crumpled in the bud. Stamens indefinite. Capsule 1-celled with parietal placenta. Seeds anatropous, with minute embryo in copious albumen. Platystemon is exceptional in having the several capels distinct or at least early separating and forming as many torulose pods, and Eschscholtzia has colorless juice in the herbage.

TRIBE I. Annuals with opposite entire leaves. Sepals usually three; distinct.

1. **Platystemon**. Filaments very broad; carpels many, distinct or soon becoming so.
2. **Platystigma**. Filaments slightly dilated or filiform, ovary 8-ovuled.
3. **Canbya**. Filaments shorter than the anthers, persistent; ovary 3-valved.

TRIBE II. Annual or perennial herbs. Sepals completely united into a narrow cap which falls off entire from a top-shaped receptacle.

4. **Eschscholtzia**. Stigma lobes 4-6, subulate, unequal; style very short: capsule linear, 2-valved.

1 PLATYSTEMON Benth. Trans. Hort. Soc. ser. 2, i, 405.

Low annual with mostly opposite or whorled, entire leaves and long-peduncled yellow flowers that are nodding in the bud.

Sepals 3, distinct. Petals 6, in two series. Stamens many with broad flattened filaments and linear anthers. Carpels 6-18, each several-ovuled, at first all united in a circle into a deeply, plurisulcate, compound ovary by as many parietal placenta, in fruit separating and closing into as many torulose, narrow follicles which when mature are disposed to break up transversely into a few 1-seeded joints.

P. Californica Benth. l. c. Stems slender, branching from the base 6-12 inches high, hispid with long spreading hairs: leaves 1-4 inches long, sessile or clasping, broadly linear, obtuse: peduncles 3-8 inches long:

sepals hispid: petals pale yellow shading to orange in the center, 3-6 lines long, tardily deciduous, at length loosely closing over the forming fruit; carpels aggregated into an oblong head, 5-10 lines long, beaked with the linear persistent stigmas, the one-seeded divisions a line long: seeds smooth. Southern Oregon near the sea to California.

2. PLATYSTIGMA Benth. l. c. 406.

Low and slender annuals with verticillate or opposite entire leaves and long-peduncled white or yellow flowers in spring. Sepals 2 or 3, distinct. Petals 4 or 6, in two series, deciduous. Stamens 6-12, rarely 4, with narrow filaments. Carpels 3, rarely 4, wholly combined into a somewhat 3-lobed, or angled, or nearly terete ovary, having as many strictly parietal placenta. Stigmas ovate to subulate. Seeds smooth and shining.

P. lineare Benth. l. c. 407. Somewhat villous with spreading hairs, 6-12 inches high, the stems usually very short and leafy: leaves all linear sessile, 1-2 inches long: petals yellow, 4-6 lines long: stamens numerous, with oblong-linear anthers: capsule half inch long, obovoid or clavate-ovoid, crowned with the 3 broad and obtuse spreading introrsely stigmatose stigmas.—Valleys and low hills, Oregon to central California.

P. Oregonum Watson, Bibl. Index 43. Smooth, 1-3 inches or more high with spreading branches or peduncles: leaves a quarter to at most an inch long, lower round to spatulate, on long wing-margined petioles; upper leaves spatulate to linear 2-4 lines long, verticillate or opposite: flowers on long filiform peduncles, opening at night only: petals white 1-2 lines long: stamens 4-6, with filiform filaments and oblong anthers: stigma subulate: capsule linear, 8-10 lines long, the thin valves commonly twisted in age.

In open places, Hood River and the Willamette valley to the borders of California.

3. CANBYA Parry in Gray Proc. Am. Acad. xii, 51, t. 1.

Little annuals with alternate entire leaves and numerous filiform, one-flowered scapes. Sepals 3. Petals 6, scarious-marcescent and persistent, closing over the capsule till the fruit is grown. Stamens 6 or 9: filaments shorter than the oblong-linear anthers. Capsule ovoid, strictly 1-celled, 3-6-valved from above; valves alternating with as many nerviform placenta. Style none. Stigmas 3 oblong-linear, opposite the 3 nerviform placenta and recurved-appressed to them. Seeds neither crested nor carunculate.

C. aurea Watson Proc. Am. Acad. xxi, 445. Stems 1-2 inches high: leaves fleshy, linear, 1-3 lines long, glabrous or sparingly pubescent, all clustered at the base of the stem: scape-like peduncles few to several, half to an inch or more long: flowers bright yellow; petals ovate, 1½ lines long, deciduous. On the Sage Plains southwest of Prineville, Oregon.

4. ESCHSCHOLTZIA, Cham. in Nees. Horæ. Phys. Berol. 73, t. 15.

Smooth herbs with colorless (or of the root red,) bitter juice, finely dissected alternate petioled leaves, and bright yellow flowers in summer, usually only opening in bright sunshine. Sepals 2, completely united into a conical calyptra and is detached and pushed off by the expansion of the petals. Petals 4. Stamen numerous, with short filaments and linear anthers. Ovary linear, strictly 1-celled, with two nerviform placenta. Style very short:

stigma divided into 4-6 linear unequal, divergent lobes. Capsule elongated, strongly 10-nerved, dehiscent the whole length, usually from the bottom, by two valves separating from the placental ribs: many seeded. Seeds globular, reticulated or rough tuberculate.

E. Douglasii Benth. Pl. Hartw. 296. Perennial, smooth and glaucous, 1-2 feet high, rather stout and branching: leaves ternate to triternate, finely divided into oblong-linear lobes: flowers bright yellow, 2 inches in diameter, on pedicels 4-6 inches long: torus dilated and broadly rimmed: capsule 2-3 inches long, curved: seeds reticulated. Gravelly hillsides and river banks, Oregon and California.

E. hypocoides, Benth. Trans. Hort. Soc. Ser. 2, i, 408. Annual: stems slender, paniculately branched from the base: leaves small, mostly pinnately 5-foliolate; leaflets finely divided into linear lobes: flowers small, not over an inch in diameter, light yellow, on peduncles 1-3 inches long; torus but little dilated, and very narrowly rimmed: capsule 1-2 inches long by a line in diameter, tipped with filiform stigmas: seeds reticulate rugose. On open hillsides near Wolf Creek, Josephine county, Oregon, to California.

ORDER VI. FUMARIACEÆ, DC., Syst. ii, 105.

Tender herbs with watery and bland juice, dissected compound leaves, and perfect hypogynous flowers. Sepals 2, small and hyaline. Petals 4, one or two of them spurred. Stamens 6, diadelphous. Capsule one-celled with two parietal placentæ. Seeds anatropous, with minute embryo in copious albumen.

- 1 **Bicuculla**. Corolla 2-spurred: the two outer and larger petals similar.
- 2 **Corydalis**. Corolla with only one of the outer petals spurred.

1 BICUCULLA Adans. Fam. Pl. ii. 23.

DICENTRA Bernh. *Linnæa*, viii, 557, 468.

Smooth perennials with tuberiferous or granuliferous subterranean base, or running rootstocks, ternately or pinnately compound leaves and racemous or paniculate flowers. Sepals 2, small and scale-like. Corolla flattened and cordate, at least at base, of two pairs of petals, the outer pair larger, saccate or spurred at base, the tips spreading; the inner much narrower, spoon-shaped, mostly carinate or crested on the back; the small hollowed tips slightly united at the apex, the two forming a cavity which contains the anthers and stigma. Stamens 6, in two sets; the filaments slightly adhering in the middle: the middle anther 2-celled; the lateral ones 1-celled. Style slender persistent: stigma 2-lobed; each lobe sometimes 2-crested or horned. Capsule narrow, 1-celled, with 2 filiform parietal placentæ, from which the valves at maturity separate.

B. formosa. *Dicentra (Dichlytra) formosa* DC. *Syst. ii*, 109. Stems and scapes from the apex of thickish and almost naked creeping rootstock, a span to a foot or more high: leaves twice or thrice ternately compound, the ultimate divisions narrow and incisely pinnatifid: flowers in compound racemes at the summit of the naked scapes: corollas ovate-cordate with rounded somewhat connivent spurs and short spreading tips to the larger

petals: crests of the inner petals little surpassing their tips: all the petals united up to above the middle.

B. Cucullaria Millsp. Bull. W. Va. Agr. Exp. Sta. ii, 327. Leaves usually 2 to each stem, long petioled, tritermately decomposed, the primary and secondary divisions petiolate, ultimate divisions laciniately pinnatifid with oblong-linear mucronulate lobes: scapes 6-10 inches high, from a kind of scaly, fleshy bulb composed of the triangular bases of former leaves; several flowered; corolla white with yellowish tips, the spurs divergent, short and rounded, not longer than the pedicel: crest of the inner petals small, semi-oval, bladderly. Along the Columbia river from below the Cascades to Idaho, and the Eastern States. Ours differs from the eastern plant in having much shorter and rounded spurs.

B. uniflora. *Dicentra uniflora*, Kell. Proc. Cal. Acad. Sci. iv, 141. Leaves ternately or somewhat pinnately divided, the 3-7 divisions pinnatifid into a few spatulate lobes: scapes 3-5 inches high, from a fascicle of narrow-fusiform and perpendicular fleshy tubers, 2-3 bracted, and 1-2 flowered: outer petals merely gibbous-saccate at base, their spatulate-linear recurving tips much longer than the body; inner petals with lamina dilated and hastate at base directly from the oblong-linear claw. On Mount Adams, Washington, to the Sierra Nevada in California, and Wyoming and Utah.

B. pauciflora, *Dicentra pauciflora* Watson Bot. Cal. ii, 429. Scapes and leaves very slender, 4-8 inches high, from running tuberiferous rootstocks: leaves small, 2-3-ternate, with narrow segments: flowers 1-3, 8-12 lines long, the short stout straight spurs not diverging: spreading or reflexed tips of the outer petals 3-4 lines long; inner petals with ligulate claw abruptly contracted at apex into a short stalk which abruptly dilates into the elongate-spatulate lamina. In the Siskiyou mountains Southern Oregon, to Tulare County, California, near perpetual snow.

CORYDALIS Vent. Cels. t. 19.

Herbs with variously decomposed alternate leaves and white, rose-colored or yellow flowers in racemes opposite the leaves or terminal. Corolla with only one of the petals spurred or gibbous and nectariferous, by tortion becoming posterior, all erect and connivent up to the short tips of the outer ones. Filaments with a nectariferous spur-like process at the base. Style mostly persistent. Capule few-many-seeded. Seeds with a concave ariliform crest. I retain *Corydalis* because no other name has been settled on for this genus.

§ 1. Perennials from thickened roots with ample leaves and many-flowered racemes. Stigma with 6 lobes or processes, one pair terminal, one medial and one basal. Capsule oval or oblong, rather few-seeded.

C. Scouleri Hook. Fl. 1, 63 t. 14. Stems simple 2-4 feet high, with 2-4 cauline leaves from a large and thickened running scaly-jointed rootstock: leaves very large, pinnately decomposed; ultimate leaflets, oblong to oblong-lanceolate, entire or the terminal one deeply 3-lobed: flowers rose-colored, peduncles, 1-2 inches long in a loose raceme; spurs stout, 2-3 times as long as the balance of the flower: pedicels strongly curved downwards after flowering, stigma 2-lobed at the base.

C. Cusickii Watson in Coult. Man. Rocky Mt. Reg. 14. Stems 2-3 feet high, from strong perennial roots, leafy; leaves bipinnately divided, the oblong oval leaflets acute at each end, half to an inch long: raceme terminal, dense; flowers white or purplish with tips of inner petals violet, an

inch or less long, the nearly straight spur fully twice as long as the rest of the flower; hood of the outer petals emarginate by the development of broad thin margins which are recurved over the narrow and undulate dorsal crest: capsule oblong, turgid, 6 lines long: seeds nearly smooth, with a conspicuous orbicular carunculate crest. Along alpine streams, Blue and Eagle creek Mountains, eastern Oregon to western Idaho.

§ 2. Biennials, mostly branched from the base, with finely dissected leaves and siliquiform capsule.

C. aurea Willd. Enum. 710. Commonly low and spreading: flowers golden yellow about half an inch long, on rather slender pedicels in a short raceme: spur barely half the length of the body when dry, 10-12-seeded. seeds turgid obtuse at margin, the shining surface obscurely reticulated. Rocky banks, eastern Oregon to Brit. Columbia, Lower Canada and northern New England (*Gray, Syn. Fl. i, 97*).

C. montana Engelm. in Gray, Pl. Fend. 8. Stems decumbent, 6-12 inches long: leaves pinnate, leaflets 5-7 parted, the divisions irregularly lacinate-toothed: flowers yellow, in short-peduncled racemes; spur shorter than the rest of the flower: capsule 4-angled, deflexed in fruit: seeds acutely margined muricate. From the Blue Mountains of Oregon to western Idaho and Mexico.

ORDER VII. CRUCIFERÆ Endl. Gen. 861.

Herbs rarely suffrutescent, with pungent watery juice, cruciform corolla tetradynamous stamens and 2-celled pod (silicle or silique) with two parietal placentæ. Flowers perfect hypogynous. Sepals 4, often colored, deciduous. Petals 4, usually with narrow claws and spreading lamina, rarely wanting. Stamens 6, two of them inserted lower down on the receptacle and shorter than the other 4. Ovary 2-celled by a partition which stretches across from the placentæ or the partition, rarely wanting. Style undivided or none: stigma entire or 2-lobed. Ovules few or numerous, camplytropous. Seeds smooth, without albumen. Cotyledons either accumbent *applied edgewise to the radical* or incumbent, *with the radical against the back of one of them* or sometimes conduplicate, *plicately folded and partly enveloping the radical*. Inflorescence racemose or spicate or somewhat corymbose and (with rare exceptions) ebracteate.

SERIES I. Pods 2-valved, dehiscent their whole length (except in *Brassica*), not compressed contrary to the partition.

TRIBE I. Fruit completely or incompletely 2-celled, regularly dehiscent, flattened parallel to a broad partition, terete or prismatic, short or long.

* Pods more or less strongly compressed parallel to the partition.

1 **Parrya**. Pods lanceolate, acuminate; valves flat, with a prominent central nerve and reticulated: seeds in 1 row in each cell, large, not winged.

2 **Cheiranthus**. Pods strongly compressed, 1-4 inches long, broadly linear, with flat 1-nerved valves or narrow and quadrangular with convex and more or less distinctly keeled valves.

** Pods globose terete or prismatic, at least not compressed parallel to the partition.

- 3 **Nasturtium.** Pods short, turgid, little compressed, nerveless.
- 4 **Roripa.** Pods terete or nearly so, with nearly or quite nerveless, thin valves.
- 5 **Barbarea.** Pods linear, elongated, somewhat tetragonal: seeds in 1 row in each cell.
- 6 **Arabis.** Pods linear with more or less 1-nerved flat valves and thin partition: seeds in 1 row in each cell, flattened and more or less winged.
* * * Pods oblong or linear, compressed parallel to the partition, sessile.
- 7 **Streptanthus.** Pods oblong to narrowly linear, compressed parallel to the partition, sessile upon the enlarged receptacle: valves flat, nerveless, seeds flat, more or less winged: cotyledons accumbent.
- 8 **Caulanthus.** Pods narrowly linear, somewhat flattened or subterete, sessile: valves 1-nerved and often reticulate-veined: cotyledons incumbent.
- 9 **Dentaria.** Pods linear, with nerveless flat valves and nerveless partition: seeds in 1 row in each cell wingless.
- 10 **Cardamine.** Pod linear with thin flat nerveless valves, and wingless seeds in 1 row in each cell.

TRIBE II. Pod a silicle, 2-celled, completely dehiscent, strongly compressed parallel to the broad partition or very turgid with broad partition and almost hemispherical valves, or didymous, or strongly obcompressed. Pubescence stellate.

* Pods strongly compressed parallel to the broad partition.

- 11 **Platyspermum.** Pods suborbicular, very strongly compressed parallel to the broad partition: seeds in 2 rows in each cell, broadly winged.
* * Pods turgid with broad partition.
- 12 **Lesquerella.** Pods subglobose: partition suborbicular: seeds flattened
* * * Pods didymous with narrow partition.
- 13 **Physaria.** Silicle didymous or obcompressed, partition narrow-elliptical: cells several-seeded.
* * * * Fruit orbicular or nearly so, 2-celled, dehiscent, 2-several-seeded: filaments often dilated and toothed or appendaged near the base.
- 14 **Psilonema.** Capsule with valves convex, pubescence stellate.
* * * * Fruit oblong elliptic or lanceolate, rarely linear, 2-celled, dehiscent, 2-several-seeded: stamens unappendaged.
- 15 **Erophila.** Flowers white: petals deeply 2-lobed or parted: pods linear to oblong, many-seeded.
- 16 **Draba.** Sepals short and broad, equal at the base: petals entire or emarginate.
- 17 **Cochlearia.** Pods (in ours) very turgid and appearing obcompressed, with distinctly 1-nerved valves.

TRIBE III. Pods longitudinally 2-celled, dehiscent, from linear to lance-oblong or elliptic, always longer than broad.

- 18 **Sophia.** Pods ascending or somewhat spreading, on slender pedicels, oblong-linear, subterete, less than an inch long.
- 19 **Erysimum.** Pods subsessile, erect, appressed to the rachis, subulate.
- 20 **Smelowskia.** Pods lanceolate to lance-oblong, more or less obcompressed with sharply keeled valves.
- 21 **Schenocrambe.** Pods slender, terete, somewhat torulose.

TRIBE IV. Fruit longitudinally 2-celled, dehiscent, elongated, terete or prismatic or compressed parallel to the partition.

- 22 **Thelypodium.** Pods slender, terete or quadrangular, often torulose, on a short thick stipe: valves 1-nerved: cotyledons incumbent.
- 23 **Stanleya.** Pods terete or subterete, on a slender elongated stipe: valves 1-nerved: cotyledons incumbent.

TRIBE V. Pods short, scarcely longer than broad, turgid or obcompressed. Cotyledons incumbent.

- 24 **Braya.** Pods oblong to linear-oblong with flattish or convex faintly-nerved but not keeled valves.
- 25 **Camelina.** Silicle obovoid, 2-celled and many-seeded, with somewhat firm strongly convex valves, and thin obovate partition.
- 26 **Subularia.** Silicle turgid, subglobose, pyriform or short fusiform, dehiscent, several-seeded: cotyledons incumbent: aquatic herbs with subulate leaves.

TRIBE VI. Pods long or short, dehiscent their whole length or the apex indehiscent. Cotyledons longitudinally conduplicate.

- 27 **Brassica.** Pods slender and longitudinally dehiscent to near the apex.

SERIES II. Pods short, dehiscent their whole length. Valves more or less obcompressed, the partition usually narrow.

TRIBE VII. Pod a 2-celled silicle, strongly obcompressed or turgid. Pubescence wholly simple or none.

- 28 **Bursa.** Pods obcordate, reversed deltoid in outline.
- 29 **Hutchinsia.** Pods elliptical, entire at the apex.
- 30 **Coronopus.** Pods more or less distinctly didymous with thickish valves, falling off as closed or nearly closed 1-seeded nutlets: terrestrial herbs but growing in wet places.
- 31 **Lepidium.** Pods strongly obcompressed; with usually 1-seeded cells: cotyledons incumbent. Terrestrial herbs.
- 32 **Thlaspi.** Pods strongly obcompressed, dehiscent; cells 2 to several seeded: cotyledons accumbent. Glabrous terrestrial herbs.

SERIES III. Pods short, [rarely long], usually crustaceous and indurated, indehiscent, 1-2-celled, with 1-2 seeds in each cell.

TRIBE IX. Pods orbicular to elliptical. Ovule suspended.

- 33 **Heterodraba.** Pods short-elliptical, twisted, not margined, very tardily dehiscent, by a very filmy partition 2-celled.
- 34 **Athymanus.** Pods orbicular, not margined, uncinat-hispid, indehiscent: ovary 1-celled, 3-4-ovuled but only one maturing.
- 35 **Thysanocarpus.** Pods orbicular to obovate, wing-margined, 1-celled indehiscent: ovary 1-ovuled: pubescence simple.

SERIES IV. Pods elongated, indehiscent, 1-celled and many-seeded, or many-celled with 1 seed in each cell.

TRIBE X. Pods elongated, terete or somewhat prismatic, often torose, multicellular and indehiscent.

- 36 **Raphanus.** Fruit an indehiscent multicellular or transversely divided pod.

Tribe 1. Arabidææ DC. Stigma when lobed prolonged over the placenta. Pods 2-celled, sometimes incompletely so, regularly dehiscent, flattened parallel to a broad partition or terete. Cotyledons accumbent (incumbent to convolute in Cheiranthus).

1 PARRYA R. Br. in Parry Voy. App. 268.

Low perennial herbs with mostly radical entire or toothed somewhat fleshy leaves, and rose-colored or purple flowers. Sepals erect, equal or the lateral ones saccate at base. Petals spatulate unguiculate. Anthers usually linear. Style short; stigma lobes connate. Pods compressed, the valves plane, 1-nerved. Seeds in 1 or 2 rows in the cells, large, somewhat compressed, orbicular. Cotyledons various.

P. Menziesii Greene Bull. Torr. Club xiii, 143. *Phœnicaulis Cheiranthoides* Nutt. *T. & G. Fl.* 1, 89. *Cheiranthus Menziesii* Watson *Bot. King*, 14. Caudex stout and branching, the branches densely clothed with the persistent petioles of former seasons: radical leaves spatulate or oblanceolate, entire, 1-4 inches long, persistent, canescent, with a dense stellate pubescence, the petioles nearly glabrous: scape-like stems several from each branch of the caudex, twice longer than the radical leaves, nearly glabrous, often leafy-bracted below: flowers large dark purple or red, to ochroleucous, in rather dense many-flowered racemes: pods spreading, on short, stout pedicels, 1-2 inches long, 1-2 lines broad, not carinate, attenuate to the slender style, glabrous few-seeded. On stony hillsides, northern California and Nevada to Brit. Columbia east of the Cascade Mountains.

Var. lanuginosa Watson in Gray's Syn. Fl. 152. Pubescence more loose and woolly. Eastern Washington.

2 CHEIRANTHUS L. Gen. n. 815.

Cheiranthus and Erysimum of authors.

Biennial or perennial herbs with narrow entire or sparingly-toothed leaves and yellow or purple flowers in simple racemes. Sepals erect, oblong to linear-oblong, equal at base or the lateral ones somewhat saccate. Petals commonly large with broad obovate blade and slender elongated claw. Stamens 6, free and unappendaged. Pods strongly compressed, broadly linear with flat 1-nerved valves or narrow and quadrangular with convex and more or less distinctly keeled valves. Seeds numerous, oblong and turgid, or suborbicular and flattened or winged. Cotyledons incumbent or accumbent or the radical very oblique.

* Petals 2-2½ lines long, yellow: pods subterete, 5-10 lines long: cotyledons incumbent or nearly so.

C. turritoides Lam. *Encycl.* ii. 716. *Erysimum cheiranthoides* L. Stem erect, subterete, simple or with few subterminal branches: leaves lanceolate, acute at each end, entire or remotely and obscurely denticulate, 1-3 inches long, thin, green on both faces, sparsely and finely pubescent: flowers small, yellow: pods obtusely angled, 5-10 lines long, on somewhat spreading and rather slender pedicels, glabrous, slenderly short-beaked. Along streams, eastern Oregon to Alaska and across the continent.

* * Petals 3-12 lines long, yellow or orange, rarely purple. Pods subterete or obviously 4-angled, not strongly compressed, 1-4 inches long; cotyledons incumbent or rarely oblique or somewhat accumbent.

C. inconspicuus Greene Pitt. iii. 134. *Erysimum parviflorum* Nutt. (1838), not Pers. (1807). Cinereous and scabrous with appressed forked hairs: stems erect, 10-18 inches high: leaves narrow, oblong-linear or lanceolate, mostly entire, the radical crowded, sometimes repand-dentate: sepals linear-oblong, acute, 3 lines long, little surpassed by the narrow sulphur-yellow petals: pedicels 2-3 lines long, spreading in fruit: pods slender, suberect, 1-2 inches long, scarcely narrowed above, tipped with a short stout style and 2-lobed stigma. Eastern Washington to Alaska, Wyoming and Minnesota.

C. elatus Greene l. c. 135. *Erysimum elatum* Nutt. Scabrous and usually caescent with appressed 2-parted hairs: stems erect from a biennial or short-lived perennial root, 1-6 feet high, usually simple, angled; leaves lanceolate to entire or repand-dentate, or the lowest pinnatifid: petals yellow or orange, 6-8 lines long, with broadly obovate suborbicular, blade the very slender claw, much exceeding the oblong or linear sepals: pods 2-5 inches long by a line wide usually sharply angled, erect or spreading on spreading pedicels 2-6 lines long; style 1-2 lines long; stigma somewhat 2-lobed: seeds oblong, brown, often sharply wing-appendaged at the apex. Common on dry hillsides, California to Brit. Columbia.

* * * Flowers large or middle-sized, pods more strongly flattened, 1-nerved or somewhat keeled.

C. occidentalis Watson Proc. Amer. Acad. xxiii, 261. *Erysimum occidentale*, Rob. Stems erect, simple or branching from near the base, 2-18 inches high, from an annual or biennial root, becoming stout, angular, finely pubescent with appressed forked hairs: narrowly linear to lance-linear, leaves attenuate to long slender petioles entire or nearly so: racemes at first short, but becoming 4-8 inches long in fruit: pedicels stout, spreading 2-4 lines long: petals light yellow, 8-10 lines long, much exceeding the pale narrowly-oblong strongly saccate calyx: pods 3-4 inches long, 1½ lines broad, rather abruptly beaked; style slender, 2 lines long; stigma small: seeds oblong, rather broadly winged: cotyledons accumbent. On sandy or gravelly banks, Klickitat county, Washington to Nevada.

C. arenicola Greene l. c. 131. *Erysimum arenicola* Watson Proc. Am. Acad. xxvi, 142. Cespitose perennial: stems several from the densely multicapital caudex, terete, 6-8 inches high: leaves very numerous, chiefly clustered at the base, oblanceolate, repandly denticulate, including the petiole 1½ inches long, 2-3 lines broad, pubescent with white appressed 2-3 pointed hairs: racemes short, rather few-flowered: pedicels spreading, a line long: sepals 4 lines long; petals unknown: pods very gradually narrowed to a point: cotyledons oblique-incumbent. Olympic Mountains Washington, 5000 feet altitude. C. V. Piper.

C. capitatus Dougl. in Hook. Fl. 1, 38. *Cheiranthus asper* Cham. & Schlecht. in *Linnaea* i, 14. Finely pubescent with appressed 2-parted or on the lowest leaves somewhat stellate hairs: stem 3-24 inches high from a perennial root, somewhat angular, stout, simple or less frequently branched, sometimes from the base: leaves oblong to spatulate or linear, attenuate below, entire or more or less deeply repand-dentate: flowers light yellow, in a many-flowered at first subcapitate but elongating raceme: petals 8-12 lines long, with broad rounded blade and slender claw: pods 1-4 inches long, 1-1½ lines broad; valves flattish, 1-nerved: style stout, ½-1 line long: stigma broad: seeds oblong, brown, margined. Common on the coast from Curry county, Oregon to California.

3 NASTURTIIUM R. Br. in Ait. Hort. Kew ed. 2, iv, 109.

Perennial herbs with lyrate compound or simple and pinnatifid or undivided leaves and white flowers. Sepals erect. Petals unguiculate. Pods short, turgid, little compressed, nerveless.

Seeds small, rounded, somewhat flattened, impressed punctate.

N. OFFICINALE R. Br. l. c. Glabrous; stems stoutish hollow rooting at the decumbent base, the branches $\frac{1}{2}$ -5 feet long: roots all fibrous: leaves pinnate, leaflets rounded or elongated the terminal one largest: petals white, exceeding the calyx: pods divaricately spreading, 6-10 lines long, acute at each end, equaling the spreading pedicels, style short and thick. Common in brooks and wet places. Introduced from Europe.

4 RORIPA Scop. Fl. Carn. 520.

Annual, biennial, or perennial herbs with yellow flowers in paniculate racemes. Commonly referred to Nasturtium. Sepals greenish yellow, ascending or spreading. Petals short-unguiculate and ascending. Pods terete or nearly so; valves thin, nearly or quite nerveless. Seeds small, turgid and wingless, in 2 rows in each cell, minutely tuberculate.

R. sinuata A. S. Hitchck. Spring Fl. Manh. 18. *Nasturtium sinuatum*, Nutt. Stems decumbent to prostrate pale green glabrous or slightly scurfy-pubescent: leaves narrowly oblong or oblanceolate, usually deep and regularly pinnatifid, the subequal oblong to deltoid segments entire or with 1 or 2 teeth: pedicels mostly divaricately spreading, slender, 2-5 lines long: pods oblong to linear, mostly 3-5 lines long acute at each end and beaked by a slender style, more or less curved. Eastern Oregon and Washington to the plains of the Saskatchewan. Minnesota and Arkansas.

Var. pubescens. *Nasturtium sinuatum* var. *pubescens* Watson in Gray Syn. Fl. i. 174. Pubescent throughout with woolly hairs: stems very slender, decumbent: racemes lax, 4-6 inches long: pedicels 3-6 lines long, very slender: ovary oblong-obovate, pubescent: style long and slender. On sandy ground Sauvie's Island Oregon, at the mouth of the Willamette river. But one plant was found: if not abnormal it is a good species.

R. Columbia. *Nasturtium Columbiae* Suksdorf in Herb. distr. 952. Low and spreading, pubescent throughout: leaves rather narrow, deeply and narrowly pinnatifid: pedicels scarcely 2 lines long: pods short-oblong, $1\frac{1}{2}$ -2 lines long, densely pubescent with short and rather fine somewhat papillose hairs. Low gravelly banks of the Columbia and Snake rivers, which are submerged most of the year.

R. palustris Bess. Enum. 27. *Nasturtium palustre* DC. Glabrous or rarely somewhat pubescent: stems erect from a biennial root, 6-18 inches high, branching: lower leaves lyrate; upper more or less deeply pinnatifid or merely toothed, the lobes narrowly to broadly oblong, dentate; pods oblong, turgid, usually obtuse. Oregon to the Sierra Nevada and the Atlantic states.

R. Pacifica. *Nasturtium terrestre* var. *occidentale* Watson, in Gray Syn. Fl. i. 148. Glabrous or the auricles of the leaves sometimes ciliate: stems stout, 1-3 feet high from a stout annual or biennial root: more or less freely branching: leaves lanceolate, the lower ones lyrate, petioled, 2-6 inches long; the oblong to ovate segments erose-dentate: pods oblong, turgid acutish at both ends or obtuse above, 4-6 lines long, equaling the spreading pedicels. On alluvial soil lower Columbia valley to Brit. Columbia.

R. sphaerocarpa Britton, Mem. Torr. club, v. 170. *Nasturtium sphaerocarpum*, Gray Pl. Fendl. 6. More or less hispid with short spreading hairs: stems erect, 1-3 feet high from a biennial or winter annual root: branched above: lower leaves lyrate with oblong or ovate, dentate segments, upper ones lanceolate, more or less pinnatifid or irregularly dentate: pods short, mostly broadly elliptical or subglobose 1-3 lines long. Oregon and Washington.

R. curvisiliqua Essey Mem. Torr. club v. 169. *Nasturtium curvisiliqua*, Nutt. Glabrous, usually erect, diffusely branched 3-12 inches high from an annual root: leaves narrowly oblong or oblanceolate pinnatifid with oblong usually toothed lobes, rarely only sinuate toothed: flowers yellow in rather dense racemes: petals a little exceeding the sepals: pods rather slender, 4-8 lines long, about equaling the pedicels, often curved. On rich, alluvial river bottoms, British Columbia to Lower California.

R. lyrata Greene Man. 20. *Nasturtium lyratum* Nutt. Stems erect or decumbent, commonly diffusely branched from the base: leaves lyrate or pinnatifid, the segments oblong-lanceolate, incisely serrate or angularly toothed: pods linear, compressed, 8-10 lines long, more than twice the length of the pedicel, slightly curved, obtuse, tipped with the very short style. On muddy banks and in wet places, Oregon and northern California.

R. polymorpha. *Nasturtium polymorphum* Nutt. T. & G. i, 74. Stems 6-10 inches high from an annual or biennial root: leaves rather narrow, deeply pinnatifid or almost entire, the segments entire, short, linear acute: flowers small; the petals scarcely longer than the calyx: pods oblong-linear compressed: stigma minute, nearly sessile. "Banks of the Oregon, Nutt." Moist places. Willamette and lower Columbia valleys.

R. tenerrima Greene Eryth. iii, 46. Glabrous: stems weak and decumbent sparingly branched 6-10 inches long from an annual root: leaves few lyrate pinnatifid, the terminal lobe acutish, rachis of the few racemes almost capillary: pods subconical to ovate-lanceolate slightly curved, the apex surmounted by a considerable beak-like style: valves and partition both very thin: seeds many in 2 rows under each valve. On moist banks, eastern California and western Nevada to Washington and Wyoming.

5 BARBAREA R. Br. in Ait f. Kew. ed. 2. iv. 109.

Glabrous erect branching biennial or perennial herbs with angled stems and entire or pinnatifid leaves. Sepals oblong, often colored: the lateral pair often saccate at base and slightly connate on the back near the apex. Petals spatulate or with obovate blade and slender claws. Stamens 6, free and unappendaged, distinctly tetradynamous. Style short: stigma bifid. Pods linear, elongated, somewhat 4-angled. Seeds in one row in each cell. Cotyledons slightly oblique.

B. vulgaris R. Br. l. c. Stems erect, 1-3 feet high, simple or corymbosely branched, somewhat angled: radical and lower caudate leaves usually pinnately parted, the terminal lobe ovate or orbicular, rounded at the apex and varying from cuneate to cordate at base, entire or with a few rounded teeth or lobes; lateral segments very variable usually oblong, entire or toothed: petioles auriculate at base: upper leaves entire or toothed, clasping at base: flowers in a short dense oblong raceme, bright yellow: petals nearly or quite twice as long as the sepals: pods ascending or suberect upon more or less spreading pedicels. Common along streams and in cultivated fields. Lower California to Alaska and across the continent.

B. stricta Andr. Bess. Enum. 72. Stems erect 1-2 feet high, leaves lyrate pinnatifid with a large rounded terminal lobe and 1-5 pairs of lateral ones: flowers pale yellow, during anthesis closely aggregate and subcorymbose: petals usually not over a third or half longer than the calyx: pods mostly appressed to the elongated rachis. Along streams etc., California to Alaska and across the continent.

6 ARABIS L. Gen. n. 818.

Annual biennial or perennial herbs, rarely suffrutescent at base with usually simple leaves, stellate or forked pubescence, and white or purple flowers in ebracteate racemes. Sepals equal or the lateral ones saccate at base. Petals entire or emarginate, usually unguiculate. Stamens 6, free and unappendaged. Pods linear compressed parallel to the partition, with flat or subconvex, more or less prominently 1-nerved valves and membranaceous partition. Stigma simple or barely 2-lobed. Seeds in 1-2 rows: elliptical or orbicular, more or less margined or winged. Cotyledons accumbent or oblique.

§ 1 *SISYMBRINA* Watson in Gray Syn. Fl. i, 159. Biennials or perennials with the pubescence, if any, wholly simple above, but forked upon the lowest leaves.

A. Nuttallii Robinson in Gray Syn. Fl. i, 160. *A. spathulata* Nutt. T. & G. Fl. i, 81, not DC. Stems slender simple, 6-10 inches high from a branching biennial or perennial rootstock, erect or ascending, glabrous above, more or less hirsute below: radical leaves spatulate-ob lanceolate, obtuse or acutish, entire, an inch or less long: cauline narrowly oblong to elliptical, sessile but not auricled: petals 2-3 lines long, white: pods short, 6-9 lines long by $\frac{1}{3}$ of a line broad, somewhat attenuate to a rather stout style: valves slightly convex, 1-nerved and faintly veined: seeds elliptical: cotyledons accumbent. On low grounds, mountains of eastern Washington and western Montana.

§ 2 *TURBITIS* Flowers whitish; pods narrow: seeds in 2 rows in the cells.

A. perfoliata Lam. Encycl. i, 219. Glaucous, stems erect, solitary, simple or sparingly branched, usually stout, 1-6 feet high from a biennial root: radical leaves spatulate, 2-4 inches long, sinuate-pinnatifid or toothed, ciliate and more or less hirsute with stellate hairs; cauline leaves entire ovate to ovate-lanceolate, clasping by the sagittate base: raceme long and strict: flowers white or stramineous: petals linear-lanceolate, 2-3 lines long, not more than twice the length of the sepals: pods strictly erect almost terete, 3-4 inches long, less than a line wide, on short pedicels: style short or none, stigma 2-lobed: seeds somewhat in 2 rows narrowly winged or wingless: cotyledons accumbent to incumbent in the same pod. On dry ridges and stony hillsides, Brit. Columbia to California and across the continent to New England and New Jersey.

§ 3 *EUARABIS* Watson in Gray Syn. Fl. i, 160 in part. Seeds orbicular or broadly elliptical, more or less wing-margined. Cotyledons strictly accumbent.

A. hirsuta Scop. Fl. Carn. ed. 2, ii, 30. More or less hirsute at least at the base with spreading simple or forked, rarely stellate hairs: stems often clustered on the crown of the biennial root or branching caudex, 6-20 inches high, simple or with slender strict branches above: radical leaves in a rosulate cluster, ovate to spatulate attenuate to a winged petiole, entire or sparsely dentate; cauline ones ovate to oblong or lanceolate sessile and partly clasping by a somewhat sagittate or cordate base: petals white, spatulate twice as long as the greenish sepals: pods strictly erect 1-2 inches long, less than a line wide on erect slender pedicels; style very short and stout or the stigma nearly sessile: seeds suborbicular, very narrowly winged. In moist places, Sierra Nevadas of California through Oregon and Washington to northern Alaska and across the continent to the

mouth of the St. Lawrence and Virginia. Eu. & Asia.

A. furcata Watson Proc. Am. Acad. xvii, 362. Stems several from a slender branching perennial rootstock, slender ascending, 10-18 inches high: lower leaves oblong-ovate, attenuate below to a stout petiole, few-toothed, 1-3 inches long; sparingly pubescent and ciliate with coarse forked hairs; cauline oblong to linear or lanceolate, scarcely auricled: flowers large in a lax few-flowered raceme; petals white broadly spatulate, 6-7 lines long, more than twice as long as the sparingly hirsute sepals: pods 10-20 lines long, less than a line broad, attenuate to a very short style, on slender pedicels 6-10 lines long: seeds oblong-elliptical, winged at the lower end. On bluffs of the Columbia river from the mouth of the Sandy to near Hood river.

A. Suksdorfii. *A. furcata* Watson l. c. in part. Stems tufted from a thick perennial root, simple, 3-8 inches high, strictly erect, lower leaves oblong-obovate 1-3 inches long, sparingly pubescent and ciliate with branched hairs, entire or few-toothed; cauline few, oblong to lanceolate: flowers middle-sized, in a strict somewhat dense raceme: petals white, spatulate 3-5 lines long: pods 6-18 lines long by less than a line broad, erect on short erect pedicels. On dry alluvial ridges Mount Adams Washington near the line of perpetual snow.

A. purpurascens Howell in Herb. Greene Pitt. i, 161. Usually livid-purple throughout: stems tufted, from a branching perennial root, simple, usually slender, 6-30 inches high, soft-pubescent with simple or forked hairs and a shorter, more branching pubescence beneath: leaves scattered but rather ample, thin sparsely pubescent: the lowest obovate-oblong attenuate below to a petiole, the cauline narrowly-oblong sessile, all with scattered coarse and salient teeth: racemes loose and few-flowered; calyx purple 2-3 lines long: petals 6-9 lines long deep rose purple: pods slender, 2 inches long less than a line wide. On rocky ridges and bluffs, northern base of the Siskiyou Mountains from Ashland to Waldo Oregon.

A. atrorubens Suksdorf in Herb. Greene Eryth. i, 223. Pale and glaucescent or the herbage becoming purplish in full maturity: stems erect, a foot or more high from a branching perennial root: radical leaves spatulate-oblong, an inch long, stellate-pubescent; cauline ones glabrous, ovate to ovate-lanceolate, sessile and auriculate-clasping, all rather remotely and coarsely serrate-toothed: raceme simple, strict, few-flowered: sepals dark red, sparsely pubescent with branching hairs: petals dark red or almost black about 4 lines long: pods suberect narrowly linear, acute, 3 inches long or more: seeds flattened, narrowly winged. Edge of brushlands on the higher part of the Klickitat hills, Klickitat county, Washington.

A. sparsiflora Nutt. T. & G. Fl. i, 81. Stems 1-3 feet high from a biennial or perennial root, sparingly pubescent below with forked or simple hairs: lower leaves numerous, entire oblanceolate, on slender petioles; cauline leaves oblong to linear-lanceolate, entire, sessile and clasping by the auricled base, acute: racemes rather few-flowered; flowers small; petals linear-oblong, bright purple, twice as long as the often colored sepals: pods 2-3 inches long, spreading or suberect on spreading pedicels: seeds narrowly winged. On dry plains, eastern Oregon and Washington to the Rocky Mountains and northern Nevada.

A. Bolanderi Watson Proc. Am. Acad. xxii, 467. More or less pubescent throughout with soft stellate hairs: stem solitary, much branched, 1-2 feet high from a biennial root: radical leaves not known; cauline lanceolate, 1-2 inches long, auriculate-clasping entire: flowers small 2-3 lines long, rose-colored: sepals and pedicels pubescent: pods mostly divaricate spreading, glabrous, straight, 6-18 lines long obtuse with a broad stigma: valves 1-nerved to the middle: seeds orbicular to elliptical narrowly winged. Yosemite Valley, Bolander; Washington, Brandegee.

A. Breweri Watson Proc. Am. Acad. xi, 123. Stems several from a branching perennial caudex 4-12 inches high, more or less villous with spreading simple or branched hairs or stellate pubescent towards the base, lower leaves narrowly oblanceolate, entire or toothed, finely stellate-pubescent, an inch long or less, the petioles often ciliate; upper cauline leaves lanceolate to narrowly oblong, sessile with a cordate base or obtusely auriculate, somewhat villous or pubescent or nearly glabrous; flowers bright rose-color or purplish to nearly white, 3-4 lines long; the pedicels and purplish calyx more or less villous: pods at length spreading and more or less arcuate $1\frac{1}{2}$ -3 inches long by a line or more broad, acute with a sessile stigma; valves 1-nerved, veined: seeds orbicular, narrowly winged. South-western Oregon to middle California.

A. Lemmoni Watson Proc. Am. Acad. xxii, 467. Stems several from a branching perennial caudex, slender, 6 inches high or less, glabrous above, hoary below with fine dense stellate pubescence: lower leaves spatulate-oblanceolate, rarely with one or two teeth, 6-9 lines long, the petioles sometimes ciliate; cauline leaves oblong-lanceolate, auriculate, mostly glabrous or nearly so: flowers 2-3 lines long, rose-colored; sepals pubescent: pods ascending or widely spreading, on short pedicels glabrous, curved 1-2 inches long by $\frac{3}{4}$ of a line broad, more or less attenuated to a sessile stigma or short style: seeds in one row, orbicular, narrowly winged. In the mountains from northern California to Mount Adams Washington, Nevada, Wyoming, Montana and Brit. Columbia.

A. Koehleri (In honor of R. Koehler of the S. P. R. R., who has shown me many favors while botanizing in Oregon). Stems slender, 3-6 inches high from a perennial much branched woody caudex: lower leaves densely rosulate at the ends of the branching caudex, persistent, linear-lanceolate to spatulate, narrowed below but scarcely petioled, 6-12 lines long entire, canescent with stellate pubescence; cauline leaves only one or two, broadly subulate, auriculate: racemes few-flowered; flowers scarlet 4-6 lines long: pods 2-3 inches long, a line broad, often arcuate, erect on slender pedicels; style very short or none: seeds small, narrowly winged. On cliffs, etc., in the Coast Mountains of Douglas county, Oregon and along the Umpqua river at Roseburg, flowering early.

A. Lyallii Watson Proc. Am. Acad. xi, 122. Glabrous throughout or sometimes stellate-pubescent below: stems several or many from a branched perennial caudex, 2-10 inches high: lower leaves spatulate to linear-oblanceolate, usually 6-12 lines long, sometimes 2-3 inches long: the cauline narrowly lanceolate to oblong, sometimes scarcely auricled: flowers rose-color, 2-3 lines long; sepals glabrous: pods erect or ascending, straight or nearly so, 1-2 inches long by $\frac{2}{3}$ -1 line broad, narrowed to a short style or sessile stigma; valves 1-nerved, at least to the middle, veined: seeds orbicular narrowly winged in 1 row. On the highest peaks of the Cascade Mountains from Brit. Columbia to California, Montana and Utah.

A. microphylla Nutt. T. & G. Fl. i, 82. Stems slender, 2-6 inches high from a slender branching perennial caudex, somewhat hirsute at base with spreading hairs or nearly glabrate: lower leaves stellate pubescent, linear, acutish, 4-6 lines long; cauline leaves few, sessile linear-lanceolate to narrowly oblong: racemes few-flowered: flowers pale rose-color to pink, 2-3 lines long: pods only 2-6 at the ends of the filiform branches, erect, 1-2 inches long by $\frac{1}{2}$ - $\frac{3}{4}$ of a line wide: seeds small, slightly winged. On rocky banks, eastern Oregon to Wyoming and Utah.

A. Cusickii Watson Proc. Am. Acad. xvii, 363. Villous-hirsute with scattered spreading mostly simple hairs. Stems usually several from a biennial (?) root, 6-10 inches high, simple hirsute or glabrate above: radical leaves linear-oblanceolate, hirsute and ciliate, 8-12 lines long; the up-

per ones linear-oblong and clasping but not auriculate, all entire or sparingly toothed: petals white with purple veins, linear spatulate, about 3 lines long, twice as long as the sparingly pubescent sepals and exceeding the pedicels: pods ascending, falcate 2-3 inches long by a line, broad acuminate, stigma sessile: seeds acutely margined. On high rocky ridges, Klickitat county to Spokane county, Washington and Union county Oregon.

A. platysperma Gray Proc. Am. Acad. vi, 519. Glaucous, sometimes wholly glabrous: stems erect or ascending from a branching perennial root-stock, 2-12 inches high, simple or branched: lower leaves oblanceolate, about an inch long; the upper oblong to linear-lanceolate, sessile: petals rose-colored or nearly white 2-3 lines long: pods erect or a little spreading, 1-2½ inches long by 1½-2½ lines wide, attenuate to a short stout style; valves distinctly veined, 1-nerved toward the base: seeds orbicular, broadly winged. From Mount Hood Oregon to the San Bernardino and Sierra Nevada Mountains.

A. Howellii Watson Proc. Am. Acad. xxv, 124. Glabrous; stems 1-4 inches high from a much-branched caespitose caudex: lower leaves glaucous, entire, linear-oblanceolate, an inch long, often sparsely ciliate towards the base; the few cauline narrowly oblong obtusish, sessile somewhat clasping but not auriculate at base: flowers few, pale to bright pink, 3-4 lines long: pods erect 1-2 inches long by 2 lines broad acuminate; stigma sessile: seeds orbicular, broadly winged. On Ashland Butte, Siskiyou Mountains, Oregon.

§ 4 PENDULA Flowers nodding, usually pale. Pods usually pendulous. Seeds in 1-2 rows in the cells.

A. suffrutescens Watson Proc. Am. Acad. xvii, 362. Glabrous throughout or sparingly stellate pubescent below: stems several from a branching woody perennial caudex, 8-12 inches high: lower leaves narrowly oblanceolate, acute, about an inch long: the cauline more oblong and sessile or shortly auriculate-clasping: racemes few-flowered; sepals purple, 3 lines long: pods 1-2½ inches long by 1½-2 lines wide, attenuate to a short style, straight, pendant, on reflexed pedicels 4-6 lines long: seeds orbicular winged. On dry rocky ridges, Mount Adams Washington to the bluffs of Snake river in Oregon and the Siskiyou Mountains near the northern line of California.

A. retrofracta Graham Edinb. New Phil. Journ. 1829, 344. Stems erect from a biennial root, 1-3 feet high, simple or branching above, glabrous and often somewhat glaucous above, minutely pubescent below with reflexed simple or forked hairs: leaves narrowly lanceolate to linear, the lower ones attenuate below to a winged petiole, rather coarsely serrate-dentate, an inch or two long, densely pubescent with stellate hairs; the upper ones linear, sessile deeply sagittate entire 1½-3 inches long: racemes few to many-flowered; flowers nodding on spreading tomentose pedicels: petals spatulate, pale to bright purple, 3-4 lines long, twice as long as the pubescent calyx: pods linear, 2-3 inches long by half a line wide and with the pedicels strongly refracted: seeds obovate, narrowly winged, along streams, eastern Oregon and Washington to the Rocky Mountains and Brit. Columbia.

A. secunda Howell Eryth. iii, 33. Stems several from a branching woody base 10-18 inches high, stellate-pubescent: lower leaves lanceolate, about an inch long, narrowed below to a winged petiole, entire, acute; cauline leaves linear, revolute, sessile, distinctly auricled 6-12 lines long: racemes many-flowered, strictly secund: pods 1-2 inches long, less than a line wide on filiform pedicels 2-3 lines long that are all deflexed one way forming a secund spike; seeds small, narrowly winged, in 1 row. On dry ridges Mount Adams, Washington.

A. Columbiana Macoun Cat. Canada Pl. ii, 304. Winter annual: almost smooth or pubescent below with branching hairs: lower leaves slightly toothed and tapering into a petiole; cauline sessile and often clasping: flowers white: pods exactly sickle-shaped, 3-4 inches long. Common on the lower slopes of mountains, northern Washington to Brit. Columbia.

A. canescens T. & G. Fl. i, 83. Finely stellate-pubescent throughout: stems one to several from a perennial or biennial root, 2-8 inches high; simple or branched: lower leaves linear-oblongeolate, an inch long or less; cauline leaves linear, clasping but hardly auriculate: flowers small 2 lines or less long, pale: pods pendulous, pubescent or glabrate, 1-1½ inches long by less than a line broad, on pedicels 1-3 lines long; valves 1-nerved to the middle: seeds small, orbicular, winged, in 1 or 2 rows. On dry plains, Blue Mountains and Harney valley Oregon, to the Rocky Mountains and Brit. Columbia.

A. arcuata Gray Proc. Am. Acad. vi, 187 (?). More or less stellate-pubescent or hirsute: stems erect, 6 inches to 2 feet or more high from a perennial woody caudex, simple or branched; lower leaves spatulate, entire or denticulate acute, 1-2 inches long; cauline oblong-lanceolate, sagittate and clasping at base 6-12 lines long or more; racemes rather few-flowered; flowers pale nodding; petals 3-4 lines long, white or purple, twice as long as the sepals: pods 1-4 inches long by a line or more broad erect and slightly curved or spreading and strongly falcate. On rocky ridges and dry plains, eastern Oregon and Washington to southwestern Oregon.

A. subpinnatifida Watson Proc. Am. Acad. xx, 353. Canescent with a very fine and dense stellate pubescence: stems 1 to several from a branching somewhat woody base: lower leaves crowded and persistent, linear-oblongeolate, entire or sparingly toothed, 9-12 lines long; upper ones lanceolate, coarsely and subpinnatifidly toothed: flowers pale pink, 3-6 lines long; pods strongly reflexed, on pedicels 2-5 lines long, 1½-3 inches long, 1-1½ lines broad, more or less attenuate to the short style, pubescent, slightly curved; valves 1-nerved to the middle and veined; seeds in one row, as broad as the partition, winged. On dry rocky ridges, southwestern Oregon and adjacent California to northwestern Nevada.

7 STREPTANTHUS Nutt. Jour. Acad. Philad. v, 134, t. 7.

Caulescent branching herbs with entire or toothed, or rarely pinnatifid leaves and purple white or yellowish flowers. Sepals ovate or oblong usually colored, equal at base (rarely one or both pair saccate), commonly connivent. Petals often without a dilated blade, more or less twisted or undulate; the claw channelled. Stamens 6, the longer pair often connate below. Anthers more or less elongated, sagittate at base. Pods sessile upon the enlarged receptacle, oblong to narrowly linear compressed to subterete: valves 1-nerved; partition hyaline: stigma simple. Seeds flat, margined or winged. Cotyledons accumbent. Ours all of

§ **EUKLISIA** T. & G. Fl. i, 67. Petals narrow, the blade but little if any broader than the claw, undulate crisped. Calyx closed or with spreading tips.

S. orbiculatus Greene Fl. Francis. 258. Glabrous and glaucous: stems erect from an annual or biennial root, 6-18 inches high, diffusely branched from the base: lowest leaves round obovate, very obtuse or even truncate, crenately or more remotely and repandly toothed, abruptly narrowed to a petiole as long as the blade: middle cauline obovate-spatulate, auricled and clasping; uppermost orbicular, mostly entire, obtuse, sepals purple,

—3 lines long, acute but not acuminate at length petaloid-dilated undulate and whitish at the recurved tips: stamens in 3 unequal pairs, the upper part much the longest: torus dilated: pods 2 inches long, falcate, on ascending pedicels strongly torulose; seeds wingless, though sometimes distinctly but very narrowly margined. On dry rocky ridges of the Siskiyou Mountains to the Sierra Nevadas.

S. glandulosus Hook Ic. t. 40 (?). Sparsely setose-pubescent below, smooth above: stems erect from an annual root, 1-2 feet high, branching: lowest leaves broadly oval or obovate, nearly sessile, dentate; cauline leaves ovate, clasping by a broad base, the uppermost lanceolate and acuminate, entire or denticulate: flowers purple; sepals acuminate 2-3 lines long, somewhat pubescent or glabrate; the purple petals a half longer: one pair of filaments connate below: pods $1\frac{1}{2}$ - $2\frac{1}{2}$ inches long, less than a line wide, erect or ascending: seeds margined. Base of the Siskiyou Mountains near Waldo, Oregon.

S. longirostris Watson Proc. Am. Acad. xxv, 127. *Arabis longirostris* Watson Bot. King 17, t. 2, Brewer and Watson Bot. Cal. i, 31. Glabrous and glaucous: stems erect 1-4 feet high from an annual root, branching from the base, radical leaves ovate-spatulate, entire or sparingly toothed: flowers spreading or reflexed purplish or white 2-3 lines long: sepals linear, not closed over the ovary 2 lines long, the lower pair saccate at base, but little shorter than the narrow petals: pods 1-2 inches long by a line broad, straight attenuate to a slender style, pendulous on short reflexed pedicels: seeds elliptical, winged. In alkaline or sandy localities, Wallula, Washington to Lower California and Utah.

S. Howellii Watson Proc. Am. Acad. xx, 353. Glabrous and glaucous: the stout leafy simple stem 6-30 inches high from a perennial somewhat fleshy root: lower leaves obovate-spatulate, 1-6 inches long coarsely repand-dentate; the upper ones narrowly spatulate, entire not clasping: racemes elongated: pedicels 3-10 lines long not spreading: sepals purple, ovate, acute, 3 lines long more or less saccate; the dark purple petals but little longer: filaments all distinct: pods 2-3 inches long by $1\frac{1}{3}$ -2 lines broad, erect or spreading on stout pedicels: seeds oblong, winged. Southern Oregon near Waldo, and on Stein's mountain, southeastern Oregon.

8 CAULANTHUS Watson Bot. King, 27.

Stout perennial herbs with mostly pinnatifid leaves and dull-colored flowers in long loose racemes. Sepals large, nearly equally saccate at base. Petals but little longer than the sepals, undulate-cripsed, the blade only a somewhat dilated rhomboidal extension of the broad claw. Anthers linear sagittate. Stigma 2-lobed or slightly emarginate. Pods sessile or with a short and thick stipe, terete, elongated; valves convexed, more or less distinctly 1-nerved. Seeds in one row oblong flattened emarginate or scarcely margined. Cotyledons more or less incumbent.

C. hastatus Watson Bot. King 28, t. 3. Glabrous, stems stout, 3-5 feet high from a perennial root: simple or somewhat branched: leaves very variable, radical ones lyrate or entire the terminal leaflet much the largest, ovate, acute, hastate or truncate at base; cauline leaves ovate-oblong, entire, hastate, rounded or cuneate at base: flowers greenish-yellow, in a loose virgate raceme, reflexed, sepals narrow-lanceolate, distinct: petals equaling the sepals, sublaciniately toothed laterally: pods linear, subterete, obtuse, spreading. On shaded slopes in the Blue Mountains of Oregon to the Wahsatch and Uintah Mountains of Utah.

C. pilosus Watson Bot. King, 27. Pilosely hispid: stems 2-4 feet high from a biennial root, stout erect branched leaves petioled lyrate-pinnatifid, the lobes sparingly angular-toothed: flowers greenish white on spreading pedicels, the oblong petals narrowed above, 4 lines long: pods slender 3-5 inches long by less than a line in diameter, flexuous, widely spreading or recurved. In sandy soil in "sage brush," etc., southeastern Oregon to Nevada and California.

C. crassicaulis Watson l. c. Glabrous: stem simple, erect, 1-3 feet high, very thick, fistulous: leaves chiefly clustered at or near the base, oblanceolate in outline, lyrate-toothed or pinnatifid, 2-5 inches long; cauline leaves few, much reduced, linear or somewhat hastate: flowers subsessile, large: sepals oblong-lanceolate 5-6 lines long, more or less pubescent, usually densely so, often velvety: pods ascending, slender, terete 4-5 inches long terminated by the conspicuous stigma. On dry foothills and rocky slopes Idaho to Utah and southern California.

9 DENTARIA Tourn. Inst. 225, t. 110; L. Gen. No. 540.

Sepals equal at base, erect or nearly so. Petals much longer with slender claw and ovate blade. Pods linear, straight with stout firm nerveless flat valves that do not separate elastically, and nerveless partition. Stigma short, capitate or rarely 2-lobed. Seeds in one row, wingless; cotyledons often thick more or less unequal and somewhat oblique, petiolate. Low, usually glabrous perennials with commonly simple stems, variously lobed leaves and comparatively large campanulate flowers in very early spring.

D. tenella Pursh Fl. ii, 439. Stems slender 3-10 inches high from an irregular branching or tuberiferous rootstock: radical leaves shallowly 3-5 lobed or coarsely toothed, 6-18 lines long, the petioles often bearing bulblets on their underground portion: cauline leaves 1-2, sessile, deeply 3-lobed or 3-foliolate with linear or linear-lanceolate entire obtuse segments, 6-12 lines long; racemes few-flowered, terminal and sometimes axillary: flowers rose-purple: pods 1-2 inches long by a line broad, attenuate to a slender style and a broad distinctly 2-lobed stigma. Very common in woods, western Oregon and Washington, flowering in very early spring.

D. sinuata Greene Pitt. iii, 123. *Cardamine sinuata* Greene Eryth. i, 148. Stems 6-18 inches high from tuberous roots, simple or sparingly branched: radical leaf simple from round-reniform to almost orbicular, cordate at base 2-3 inches broad, sinuately lobed, the 9-15 lobes obtuse or almost truncate, conspicuously mucronate; cauline leaves 2 or 3, divided 3-5 more or less cuneate leaflets which are lobed or coarsely toothed at the apex: racemes lax, few-flowered: flowers large, rose-purple; pods 2-3 inches long, conspicuously rostrate. Among the "Redwoods" near Crescent City, California, no doubt in adjacent Oregon.

D. pulcherrima Greene l. c. *Cardamine pulcherrima*, Greene l. c. Stoutish, stems 4-8 inches high from a rather slender horizontal root; herbage glabrous, somewhat succulent: radical leaf palmately 3-5-lobed-parted-or-divided, with entire lobes or divisions; cauline leaves 1 or 2, when solitary situated near the inflorescence, digitately 3-5 parted into oblong-linear or lanceolate segments an inch long more or less: racemes short, few-flowered; petals 6-10 lines long, lilac-purple veined with dark purple. In shaded places, eastern Oregon and Washington near The Dalles.

D. quercetorum Greene l. c. *Cardamine quercetorum*, Howell, Eryth. iii, 33. Glabrous: stems slender, 6-12 inches high from a branching scaly root: radical leaf 3-5-foliolate; leaflets elliptical, coarsely dentate, 1-2 inches

long petiolulate; cauline leaves 1-4, mostly 3-5-lobed or-parted, with oblong-lanceolate acute, mostly entire divisions: racemes densely many-flowered: petals rose-purple, half inch long: fruit not known. Under small oaks along the creek, Silverton, Oregon.

D. gemmata. *Cardamine Gemmata* Greene Pitt. i, 162. Stems rather stout, 3-8 inches high from a round or oblong tuber 4-10 lines in diameter: radical leaves ternate, the leaflets broad and somewhat quadrate, coarsely toothed; cauline leaves 1-3, pinnately divided into 5-7 linear-oblong mucronate, entire or toothed segments: racemes short, several-flowered; petals purple, 5-8 lines long. In wet places, eastern base of the Coast Mountains near Waldo Oregon, flowering in very early spring; often in January to March.

D. California Nutt. T. & G. Fl. i 88. *Cardamine paucisecta* Benth. Pl. Hartw. 297. Smooth or slightly pubescent: stems stoutish, 6-18 inches high from small deep-seated tubers, simple or branched; lower leaves simple or trifoliolate, the leaflets petiolulate, suborbicular, cuneate to subcordate at base, sinuate or coarsely toothed; cauline leaves 2-4, mostly short-petioled, pinnately 3-5-foliolate, rarely simple or lobed; leaflets mostly petiolulate, ovate to lanceolate or linear, entire or toothed, 1-3 inches long, flowers white or rose-color: pods 1-2½ inches long: seeds oblong; cotyledons thick, the radical decidedly oblique, cleft to the middle. Along streams, southwestern Oregon to southern California.

10 CARDAMINE Tourn. Inst. 224, t. 109, L. Gen. n. 812.

Annual or perennial herbs of moist or wet places with simple or pinnate leaves and mostly small flowers in elongated racemes. Sepals equal at base erect or more or less spreading. Petals obovate to narrowly spatulate. Pods linear, with somewhat thickened margins merely beaked or pointed above. Valves flat, nerveless, opening elastically from the base. Seeds in 1 row, wingless. Cotyledons accumbent or slightly overlapping the radical, more or less petiolate.

C. bellidifolia L. Sp. ii. 654. Glabrous perennial: caudex much branched, somewhat fleshy, stems very short, tufted: lower leaves ovate or elliptical, sometimes subcordate usually obtuse, obscurely 3-lobed, or rarely with one or two lateral teeth, 1-6 lines long: on long slender petioles: peduncles 3-24 lines long: flowers few, white or pinkish; sepals white, oblong, a line long; petals spatulate, narrowed below to a slender claw, very obtuse or truncate above twice as long as the sepals: pods erect, 6-15 lines long, on pedicels 2-3 lines long; style very short and stout, radical cleft to the middle. On Mount Shasta and Lassen's Peak California to Crater Lake Oregon and Alaska.

C. Lyallii Watson Proc. Am. Acad. xxii, 466. Glabrous: rootstock creeping; stems erect, simple or branched 4-18 inches high: leaves 4-8, petioled undivided, reniform to cordate, the margin sinuate, 1-3 inches broad: the upper triangular, cordate, subacuminate: racemes pedunculate; flowers white, 3-4 lines long: pods erect on spreading pedicels 10-12 lines long, rather shortly attenuate to a very short style: radical cleft to the middle. Along brooks in the Cascade and Sierra Nevada Mountains.

C. callosicrenata Piper Bot. Gaz. xxi, 488. "Perfectly glabrous throughout; stems erect, purplish below, shining above, coarsely striate, leaves all similar and pinnately trifoliolate, or some of the radical rarely simple; terminal leaflet orbicular, 2-5 lines long and nearly as broad, closely crenate or the uppermost lobed, the crenations tipped with a short blunt cal-

lous point; lateral leaflets ovate, entire, mostly obtuse, 10-13 lines long: raceme ample: flowers white: pods 25-30 lines long, erect on widely spreading pedicels: style stout: seeds light brown, about 20 in each pod. In springy places, Spokane July 2nd and Sept. 27, 1896." *C. V. Piper*.

C. Brewerii Watson Proc. Am. Acad. x, 339. Glabrous or slightly pubescent at base: stems erect or decumbent at base, a foot or more high from slender running rootstocks; radical leaves simple or with a pair of small lateral leaflets, round-cordate, entire or coarsely sinuate-toothed, the cauline with rounded and sinuate or lobed leaflets, the upper more oblong or lanceolate: petals 2 lines long white: pods 8-15 lines long, obtuse or scarcely beaked with the short style, ascending on pedicels 2-4 lines long: radical, scarcely cleft. In the mountains and along the coast, Brit. Columbia to California and Nevada.

C. angulata Hook. Fl. i, 44. Glabrous or sparsely hirsute: stems rather slender, simple, 1-2 feet high from long running rootstocks: leaves all 3-foliolate or sometimes 5-foliolate; leaflets triangular-ovate to oblong, usually cuneate at base and coarsely 3-5 toothed or the lateral ones entire, the terminal ones not greatly larger than the lateral, about an inch long exceeding the petioles: raceme short, few-flowered: petals white, 5-7 lines long: pods about an inch long attenuate to the stout style, spreading on divaricate pedicels. In damp woods, Oregon to Brit. Columbia.

C. occidentalis. *C. pratensis* var *occidentali* Watson in Gray Syn. Fl. i, 158. Minutely hirsute below: stems slender, 4-10 inches high from small oblong tubers, paniculately branched: leaves mostly radical, pinnate; leaflets 3-5 pairs, obovate or oblong to linear, 1-4 lines long sparingly dentate, the terminal one the largest: racemes short, several-flowered; petals white, a line long, but little longer than the sepals: pods filiform an inch long by less than half a line wide, abruptly contracted to the sessile stigma, the length erect on spreading pedicels: seeds minute, oblong. In open wet places about the mouth of the Willamette river.

C. pratensis L. Spec. ii, 656. Glabrous or somewhat pubescent below: stems erect from a fibrous-rooted tuber, 10-16 inches high: leaves pinnately 7-13 foliolate; leaflets mostly entire, often petiolulate, those of the radical leaves roundish, of the cauline oblong to linear: flowers white, usually in a broad corymb, 2-6 lines long: pods 2-15 lines long by a line wide, tipped with a short thick style. In wet places, Willamette valley, Oregon to Alaska and the northeastern states and Labrador.

C. parviflora L. Syst. Nat. ed. 10, 1131. Very slender, glabrous or sparingly pubescent stem simple, erect or nearly so, 6-18 inches high from a fascicle of delicate fibrous roots: leaves pinnately parted into several pairs of small leaflets, those of the lower leaves oblong to suborbicular, of the upper linear: flowers small; petals oblong-cuneiform, longer than the ovate obtuse sepals: pods about an inch long, erect upon spreading pedicels. In damp woods, Oregon to the New England states.

C. Pennsylvania Muhl. in Willd. Spec. iii, 486 Nearly or quite glabrous: stems a foot or two high from a fascicle of slender fibrous roots, leafy and branching: leaves pinnately 3-15 foliolate; leaflets of the lower leaves roundish or short-oblong; of the upper oblong with rounded apex and narrowed base commonly more or less decurrent upon the rachis, usually half inch or more long and 1-3 lines broad: petals white, a line or two long: pods suberect upon ascending pedicels. California to Alaska and across the continent to the Atlantic states.

C. oligosperma Nutt. T. & G. Fl. i, 85. Hirsute to nearly glabrous: stems slender, 3-12 inches high from an annual fibrous root, leaves all pinnate; leaflets 3-5 pairs, roundish, 1-6 lines in diameter, obtusely 3-5-

lobed, petiolate: petals 1-1½ lines long, twice longer than the sepals: pods few, somewhat corymbed at the end of the branches, 5-9 lines long by half a line erect: style very short. In upland forests central California to Vancouver Island west of the Cascade Mountains.

Tribe II. Alyssineæ, DC. Fruit short, orbicular elliptical or short-oblong, rarely more elongated lanceolate or linear, always more or less compressed parallel to the partition, 1-2-celled and 1-many-seeded. Valves flat or moderately convex. Cotyledons accumbent or very rarely incumbent.

* *Pods strongly compressed parallel to the broad partition.*

2 PLATYSPERMUM Hook. Fl. i, 68 t. 18 fig. B.

Small winter annuals with simple or pinnatifid leaves and small white solitary flowers on simple scapes. Sepals broad, equal, erect. Petals obovate, entire or retuse. Pods sessile orbicular strongly compressed, with flat nerveless and hyaline partition. Stigma sessile, simple. Seeds 4-6 in each cell, in 2 rows reticulated orbicular and broadly winged. Cotyledons accumbent.

P. scapigerum Hook l. c. Leaves lyrate pinnatifid with few lobes or reduced to a single rhombic or ovate toothed, or entire blade upon a slender petiole: scapes at length 3-6 inches long ascending: flowers about a line long; petals narrowly obovate to linear-spatulate, short unguiculate, not exceeding the erect sepals: pods orbicular to oblong or obovate 3-4 lines long. Common in moist places Brit. Columbia to California, chiefly east of the Cascade Mountains.

** *Pods very turgid: partition broad, nerved from the top to the middle.*

12 LESQUERELLA Watson Proc. Am. Acad. xxiii, 249.

VESICARIA of authors us to the American plants.

Low caulescent annual or perennial herbs with stellate, often dense or white-lepidote pubescence, entire or repand-dentate leaves and mostly yellow flowers. Petals spatulate to oblong-obovate entire. Filaments filiform or rarely dilated: anthers sagittate. Stigma flat, capitate entire or lobed. Pods more or less turgid, rounded or ovate or short-oblong with nerveless valves; and a hyaline partition nerved from the apex to the middle, several to many-seeded, sessile or stipitate. Seeds rounded, flat, wingless or rarely narrowly margined. Cotyledons accumbent.

L. occidentalis Watson l. c. 251. Canescent with a dense, appressed, scurfy, obscurely stellate, silvery pubescence: stems many from a fleshy branching caudex, decumbent, 4-12 inches long or more: lower leaves oblanceolate, attenuate at base, 1-4 inches long including the petiole, mostly coarsely sinuate-dentate; cauline leaves spatulate-oblanceolate, mostly entire: petals spatulate, 3-5 lines long; style very slender about 2 lines long: pods compressed-globose, acutish, 2-4 lines long sessile upon a more or less flexuous pedicel 4-8 lines long. Sandy or stony hillsides, Washington to northern California east of the Cascade Mountains.

L. Douglasii Watson l. c. 118. Canescent throughout with fine appressed pubescence: stems usually simple, from a simple caudex: leaves ovate to oblanceolate or linear mostly entire: petals spatulate, 3-4 lines long: pods obovate, very obtuse, erect on spreading pedicels; cells 2-ovuled. On the mountains of eastern Oregon and Washington.

* * * *Pods didymous with narrow nerveless partition.*

12 PHYSARIA Gray Gen. Ill. i, 162.

Low stellately canescent perennial herbs with mostly entire leaves and yellow flowers. Petals spatulate to oblong, entire. Filaments filiform. Anthers sagittate. Pods didymous: with a short narrow partition: cells inflated, nearly globular, membranaceous, nerveless, several-seeded. Seeds not winged. Cotyledons accumbent.

* Cells of the pods much inflated and longer than the partition.

P. didymocarpa Gray l. c. Very canescent, and lepidote with dense white stellate pubescence: radical leaves petiolate, with roundish toothed angled or entire blade, or oblanceolate and more or less sinuately-toothed below: cauline leaves mostly entire, spatulate; racemes dense: pedicels becoming 6-7 lines long spreading or ascending: sepals lanceolate, shorter than the rather pale yellow petals: pods strongly didymous, rather deeply notched above entire or more or less cordate at base, becoming 6-8 lines broad; valves subglobose, with no demarcation between the dorsal and lateral surfaces; walls papery. Eastern Oregon to Brit. Columbia and Nevada.

* * Cells more or less compressed and but little exceeding the partition.

P. Geyeri Gray l. c. Whitish with dense stellate tomentum: radical leaves with short, broadly ovate, entire, obtusely pointed blade narrowed below to long channeled petioles; cauline leaves small, spatulate: racemes rather dense, 1-2 inches long: pedicels spreading or curved, ascending, 3 lines long: pods small for the genus, broadly and shallowly obovate, narrowed towards the base; cells $2\frac{1}{2}$ -3 lines long at dehiscence; partition ovate much exceeded by the persistent style. Sandy soil and volcanic ashes, upper Spokane valley, Washington.

P. Oregona Watson Pr c. Am. Acad. xvii, 363. Canescent: stems several from the large woody root, 4-6 inches high: leaves oblanceolate-spatulate, the lower few-toothed below; the upper entire: pods obcompressed 5-10 lines broad, round-reniform; the narrowly linear partition 3-4 lines long; the flattened obtusely rounded cells 3-4 seeded: style very short. Gulches, Union county, Oregon. *Cusick*.

* * * * *Pods orbicular or nearly so. Filaments often dilated or appendaged near the base.*

14 PSILONEMA C. A. Meyer in Ledeb. Fl. Alt. iii, 50.

Low stellate-pubescent herbs with mostly simple leaves and rather small flowers in slender racemes. Sepals equal. Petals white or yellow, cuneate. Filaments unappendaged. Pods oval or orbicular, compressed with convex nerveless valves, 2-celled, with 2 seeds in each cell. Cotyledons accumbent.

P. calycinum C. A. Meyer Bull. Acad. St. Pet. vii, 132. Stellate pubescent: stems branching from near the base, the branches mostly simple, decumbent at base 6-12 inches long: leaves entire, linear-spatulate 6-12

lines long: flowers small, in slender racemes, the white or pale yellow petals but little exceeding the short sepals: pods orbicular, with a thin margin, slightly emarginate, $1\frac{1}{2}$ lines in diameter, a little exceeding the persistent sepals, pubescent, 4-8 seeded, on spreading pedicels a line long: style half a line long. A native of southern Europe sparingly introduced at Seattle Washington and the eastern states.

* * * * * *Pods oblong elliptical or oblanceolate rarely linear 2-several-seeded. Stamens unappendaged.*

16 EROPHILA DC. Syst. ii, 356.

Stellate-pubescent scapose winter-annual with entire or coarsely toothed leaves and white flowers in very early spring. Sepals equal at base. Petals 2-lobed or 2-parted. Style short or none. Pods oblong, compressed, with membranaceous convex 1-nerved valves. Seeds numerous in 2 rows in each cell.

E. VULGARIS DC. l. c. *Draba verna* L. Sp. ii, 642. Scapes naked, 1-6 inches high, filiform: leaves lanceolate, somewhat toothed: pods glabrous, round-oval to oblong, 1-4 lines long, shorter than the spreading pedicels: stigma nearly sessile. Introduced from Europe. Well established at Vancouver Washington.

17 DRABA Dill. Cat. Pl. Giss. App. 122. L. Gen. n. 800.

Low annual or perennial herbs with entire or toothed leaves and white or yellow flowers. Sepals short and broad, equal at the base. Petals commonly obovate, entire (rarely bifid). Filaments mostly flattened, without teeth at the base. Anthers rounded or oval. Style short, or slender and somewhat elongated. Stigma simple or very slightly lobed. Pod oval to oblong or linear, flat, dehiscent. Seeds few-many, in 2 rows, wingless. Cotyledons accumbent or rarely incumbent.

§ 1 DRABELLA, DC. Syst. ii, 332. 351. Stellate-pubescent or more or less villous short caulescent and more or less leafy-stemmed winter-annuals with ascending or spreading pedicels, entire or emarginate petals and smooth seeds.

* Flowers white: pedicels clustered or approximate at the end of the stem or branches. Early spring species.

D. Caroliniana Walt. Fl. Car. 174. Scape-like stems very slender, often branched. 1-3 inches high, smooth; leaves obovate to oblanceolate, obtuse, mostly entire, hispid with simple or branched hairs: pedicels very short: pods clustered at the end of the stems, linear, 4-6 lines long, 20-30-seeded, glabrous; stigma sessile. Under "Sage-brush" Umatilla Oregon to Ontario New England and Carolina.

D. micrantha Nutt. T. & G. Fl. i, 109. *D. Caroliniana* var. *micrantha* Gray Man. 72. Stems leafy and hispid below, naked and smooth above: leaves cuneate-obovate, hispid, entire: pods hispid, linear, much longer than the pedicels. Open plains and rocky places, Klickitat Washington to Illinois and Texas.

** Pedicels more remotely racemose. Flowers very small, white. Stigma sessile or nearly so.

D. brachycarpa, Nutt. T. & G. Fl. i, 108. Pubescent with minute appressed stellate hairs: stems simple or branched, $\frac{1}{2}$ -2 inches high, from

an annual root, leafy radical leaves ovate to ovate-oblong, petioled, 5-7 lines long; upper ones oblong-lanceolate to linear; racemes many-flowered, strict, elongated in fruit: petals obovate, very slightly emarginate: pods narrowly oblong, glabrous, 1-2 lines long, about the length of the pedicels; valves marked with a median nerve and obscurely veined; cells 4-6 seeded.

Wet places. Willamette Valley (near Coburg) Oregon, and Missouri to Virginia, Louisiana and Georgia.

* * * High mountain and northern species with entire or few-toothed leaves and small yellow flowers. Stigma sessile.

D. nemorosa, L. sp. ii, 643. Pubescent with white branching hairs: stem slender, 4-8 inches high, branching from near the base, leafy: leaves ovate to lanceolate, sparsely toothed: petals emarginate small, yellow: pods narrowly oblong, half the length of the spreading pedicels, minutely pubescent. On moist grassy slopes, Oregon to the Arctic Circle and the Great Lakes.

D. lutea, Gilib. Fl. Lithuania, iv, 46. *D. nemorosa* var. *leiocarpa* Lindb. Sparingly hirsute: stems very slender, often nearly or quite leafless: pedicels coarsely exceeding or even shorter than the glabrous pods. In moist places and river banks, valley of the Columbia.

D. stenoloba, Ledeb. Fl. Ross. i. 152. Stems slender, simple, or branching below, villous towards the base: leaves mostly subrosulate, oblong-lanceolate or oblanceolate, mostly entire, usually more or less villous and ciliate: pods linear, acute, glabrous, 4-7 lines long, equaling or exceeding the spreading pedicels. Subalpine, from the Sierra Nevadas to Colorado and Oregon, and northwestward to Unalaska.

§ 3 DRABÆA Lindb. Linnæa xiii, 318. Perennials with branching leafy-tufted caudex, and soft flat not carinate leaves.

* Scapose. Leaves entire, less than 6 lines long. Flowers yellow.

D. Howellii, Watson, Proc. Am. Acad. xx, 354. Minutely stellate-pubescent throughout: loosely cespitose: scapose stems about 3 inches high: leaves rosulate, broadly spatulate, entire or rarely obtusely toothed, 3-5 lines long: petals oblanceolate, obtuse, 3-4 lines long, much exceeding the oval yellow sepals: pods pubescent, oblong, acute, 3-4 lines long, beaked with the slender style. On high rocky ridges of the Siskiyou Mountains near Preston peak.

D. Lemmoni Watson, Bot. Cal. ii, 430. Leaves crowded at the summit of the stout branched caudex, broadly oblanceolate, obtuse or obtusish, 2 to 4 lines long with long branching hairs on the margins and loosely scattered over the surface: scapes and corymbed pedicels pubescent with spreading hairs: flowers nearly 2 lines long: pods ovate-lanceolate, beaked with a very short thick style, sparingly hairy, 3 lines long, rather exceeding the pedicels. Peaks of the Sierra Nevadas to the Wallowa Mountains in eastern Oregon.

D. ventosa, Gray, Am. Nat. viii, 212. Cespitose, the slender branches of the caudex more or less densely leafy: leaves oblong-lanceolate, obtuse or acutish, densely stellate-pubescent or glabrate: petals 1-3 lines long, much exceeding the broad obtuse stellate-pubescent or glabrate sepals: pods ovate to oblong-lanceolate, densely pubescent or glabrate, on ascending pedicels: style short and slender. Stein Mountain southeastern Oregon to northwestern Wyoming, Utah and Nevada.

* * Scapes rarely with a single leaf: leaves entire or rarely few-toothed: flowers white.

D. lævipes DC. Syst. ii, 346. Caudex with numerous slender matted

branches: leaves oblanceolate, obtuse or acutish, entire, with a stout midnerve, canescent with short dense stellate pubescence; scapes very slender, pubescent; pods few, on smooth pedicels, 4-8 lines long, glabrous: style short and stout; stigma 2-lobed. On Mount Adams Washington to the Rocky Mountains and Brit. Columbia.

* * * Caulescent: stem few-many-leaved; leaves entire few-toothed: flowers yellow.

D. aureola Watson Bot. Cal. ii, 430. Rather densely stellate-pubescent throughout: caudex simple or branched: stem simple, $\frac{1}{2}$ -4 inches high: leaves numerous, 4-6 lines long, oblanceolate, obtuse, entire; the cauline oblong: racemes short and dense: calyx glabrous: pods broadly oblong, obtuse, pubescent, on short spreading pedicels: style short and stout. On the high peaks of the Cascade and Sierra Nevada Mountains.

§ 4 AIZOPSIS DC. Syst. ii, 332. Leaves linear, entire, becoming rigid with reflexed margins, and carinate by the prominent midnerve. Densely cespitose and scapose perennials.

D. glabella Adams Mem. Soc. Nat. Mosc. v. 106. Alpine or subalpine: leaves linear or linear-oblanceolate, more or less densely stellate-pubescent, sometimes ciliate at base, pods ovate to ovate oblong, acute, usually finely pubescent, 1-4 lines long: style $\frac{1}{4}$ - $\frac{1}{2}$ line long. In the high mountains of California and eastern Oregon to the Arctic Circle and the Rocky Mt's

D. densifolia Nutt. T. & G. Fl. i, 104 Densely cespitose in somewhat globose tufts: leaves closely imbricated, short and rigid, strongly ciliate, glabrous or hirsute with nearly simple hairs: scapes naked, hirsute: pods ovate, pubescent, 4-6-seeded; the valves only moderately convex: style about $\frac{1}{2}$ the length of the pod. Alpine, Idaho to California, Nevada and Utah.

D. Douglasii Gray Proc. Am. Acad. vii, 328. *Braya Oregonensis* Gray l. c. xvii, 199. Densely cespitose, $\frac{1}{2}$ -2 inches high, very leafy: leaves oblanceolate to linear-spatulate, acute, somewhat rigid, ciliate, sessile, 4-6 lines long: peduncles scarcely exceeding the leaves: pods ovate, subterete, acute at each end, attenuate upwards to the long slender style, pubescent: ovules only 2, rarely 4, in each cell, pendent from near the apex of the cell: seeds very large. On the high hills in wet gravelly places, Klickitat Co. Wash. to California.

17 COCHLEARIA Tourn. Inst. 215, t. 101, L. Gen. n. 803.

Low glabrous and somewhat succulent herbs with mostly entire leaves and small white flowers. Sepals short and broad, rounded at the apex: petals obovate or cuneate very short unguiculate. Stamens straight, free. Style slender, sometimes very short. Stigma simple or nearly so. Pods subglobose to short oblong often somewhat obcompressed, very turgid: valves distinctly 1-nerved. Seeds 2-several, in 2 rows in each cell. Cotyledons accumbent.

C. Anglica L. Syst. Nat. ed. 10, 1128 & spec. ed 2, ii, 903. (?) Radical leaves long-petioled, ovate or suborbicular rounded at the base or slightly and broadly cordate, subentire; lower cauline similar, short petioled, the middle and upper ones ovate-oblong sparingly and bluntly toothed, sessile by a more or less auriculate base: pods subglobose reticulated with prominent veins. Shores of bogs, etc., Oregon to Alaska.

Tribe III. Sisymbriæ DC. *Pods longitudinally dehiscent their whole length, 1-celled, linear to oblong. Seeds in 1 row, not mar-*

gined. Cotyledons plane, incumbent.

18 SOPHIA L. Syst. ed. 1 Adams Fam. ii, 417.

SISYMBRIUM of authors as to our plants.

Erect branching annuals with pinnately multifid leaves and small yellow flowers. Pubescence branched. Sepals oblong to linear, usually spreading. Stamens 6, free and unappendaged. Pods ascending or somewhat spreading, on slender pedicels oblong-linear, subterete, less than an inch long. Style short or none. Stigma entire.

S. pinnata *Erysimum pinnatum* Walt. (1788). *Sisymbrium canescens* Nutt. (1818). Canescently pubescent: stems 6-30 inches high: leaves 1-2-pinnatifid, the segments toothed or pinnatifid: petals equaling the sepals, a line long or less: pods oblong or linear-oblong, nearly or quite a line broad, 3-6 lines long, acute at each end, shorter than the slender spreading pedicels: seeds ovate-oblong, $\frac{1}{3}$ line long, in 2 rows in each cell. Eastern Oregon and Washington to southern California, Florida and Brit. Columbia.

S. incisa Greene Pitt. iii, 95. *Sisymbrium incisum* Engelm. Pubescence short, more or less glandular: stems 1-4 feet high: leaves pinnate, the segments from linear to oblong, pinnatifid or sometimes entire: petals about $1\frac{1}{2}$ lines long: pods nearly linear, often $\frac{1}{4}$ inch long, usually pointed at each end and 8-12 seeded, sometimes much shorter and few-seeded. Valley of the Snake River to Nevada and Colorado.

S. Hartwegiana Greene l. c. *Sisymbrium Hartwegianum* Fourn. Slender, subglabrous or finely glandular-puberulent: leaves pinnate; leaflets lanceolate or narrowly oblong, obtuse and obtusely or acutely toothed: pods $1\frac{1}{2}$ -3 lines long, erect on ascending or erect pedicels as long: seeds sometimes imperfectly biseriata. Eastern Oregon and Washington to California, Colorado and British Columbia.

S. longipedicellata. *Sisymbrium longipedicellatum* Fourn. Slender, 6-8 inches high, nearly or quite glabrous: lower leaves 1-2-pinnatifid, the upper pinnate with few elongated linear nearly or quite entire segments: fruiting racemes lax: pods 5-7 lines long, erect on slender spreading or ascending pedicels 6-10 lines long. Brit. Columbia to Oregon and Nevada. Not common east of the Cascades.

19 ERYSIMUM Tourn. Inst. 228 t. 111, L. Gen. 548.

Pods sessile, erect, appressed to the rachis, subulate, tapering almost from base to apex. Flowers small and inconspicuous, yellow. Stigma slightly 2-lobed. Pubescence of simple hairs. Leaves pinnatifid.

E. OFFICINALE L. Sp. ii, 660. *Sisymbrium officinale* Scop. Annual or biennial, erect, rigid, divaricately branching: leaves runcinate-pinnatifid, the lowest 3-6 inches long: pods subterete, half an inch long, a line wide, sessile, closely appressed, in a long raceme. Common in waste places. Naturalized from Europe.

20 SMELOWSKIA C. A. Meyer in Ledeb. Fl. Alt. iii, 165.

Low caespitose perennials with pinnatifid or bipinnatifid leaves and small flowers in terminal racemes. Pubescence simple or stellate. Sepals oblong, subequal, somewhat spreading. Petals entire, obovate or spatulate, longer than the sepals. Stamens 6,

unappended. Anthers oblong, slightly sagittate at base. Pods lanceolate or lance-oblong, more or less obcompressed, with sharply keeled valves, few-seeded. Stigma sessile.

S. calycina C. A. Meyer l. c. 170. Densely white tomentose to nearly glabrous; caespitose, the thick branching rootstock thickly covered with the sheathing bases of dead leaves, stems erect, 2-6 inches high: leaves mostly linear to oblong, entire or sparingly lobed: calyx villous, persistent: petals 2 lines long, a half longer than the sepals: pods 3-6 lines long a line wide attenuate to each end and beaked with the short style and broad stigma, ascending, on spreading pedicels: seeds 2-8, a line long. California to the Arctic coast, east to the Rocky Mountains.

S. Fremonti Watson Proc. Am. Acad. xi, 123. Pubescent with short spreading scattered hairs, the branching woody base with a few remnants of old leaves: stems 2-4 inches high: leaves less than half an inch long, pinnate with 1-3 pairs of linear leaflets, which are strongly nerved and somewhat revolute: sepals smooth, ovate to broadly oblong, less than a line long, deciduous: the white petals twice longer: pods 2-6 lines long somewhat obcompressed, obtuse at base and scarcely attenuate above, beaked with the short thick style, valves faintly nerved: seeds small, 10 or more in each cell; cotyledons obliquely incumbent. Southeastern Oregon to northern California.

21 SCHÆNOCRAMBE Greene Pitt. iii, 127.

Glaucous perennial herbs, the stems from horizontal branching rootstocks, often sparingly leafy and the whole plant of a reedy aspect. Sepals equal at base. Petals yellow, the limb small in proportion to the long and broad claw (this much as in *Streptanthus*). Pods slender terete, somewhat torulose, the valves nerveless or faintly 1-nerved. Stigma entire.

S. linifolia Greene l. c. *Sisymbrium linifolium* Nutt. Stems numerous slender, branching, erect, 1-2 feet high: lowest leaves somewhat spatulate, often coarsely few-toothed; cauline oblong-linear to narrowly linear, obtuse, entire, 1-2 inches long: racemes rather few-flowered, lax in fruit: flowers 2-3 lines long: fruiting pedicels 4-5 lines long the slender pods about 1½ inches long, ascending or suberect: seeds elongated, scarcely compressed. On clayey bluffs and banks, Oregon and Washington to Montana and Wyoming.

Tribe IV. Stanleyæ. Pods longitudinally 2-celled dehiscent their whole length, terete or prismatic, borne upon a more or less manifest stipe. Stigma mostly circular in outline, sessile. Cotyledons incumbent.

22 THELYPODIUM Endl. Gen. 876.

Mostly coarse and succulent biennial or annual herbs with entire or pinnatifid leaves and white purple or rarely yellow flowers in usually dense elongated racemes. Sepals equal or the lateral pair saccate at base, at length somewhat spreading. Petals plane, long and narrow or with a well developed blade. Stamens 6, well exerted; filaments long and slender; anthers narrowly linear, sagittate at base curved or coiled. Stigma usually small. Pods slender, terete or quadrangular, often torulose, borne upon a short thick stipe. Seeds in 1 row somewhat compressed.

Cotyledons more or less oblique.

T. Howellii Watson Proc. Am. Acad. xxi, 445. Glabrous and glaucous but the base of the stem and the radical leaves villous with spreading hairs: stems erect, slender, sparingly branched or simple, 6-18 inches high from an annual or biennial root: radical leaves numerous in a rosulate tuft, oblanceolate, obtusish, coarsely toothed or pinnatifid, narrowed at the base, an inch or two long; cauline leaves linear-lanceolate attenuate, sagittate, auriculate erect and usually appressed, 6-12 lines long: racemes rather short and loose, the flowers scattered and ascending on short pedicels; sepals oblong 2-3 lines long the lower pair distinctly saccate at base: petals narrow, crisp twice as long as the sepals: pods ascending 12-15 lines long, slender beaked. In grassy meadows Harney valley Oregon and at Camp Polk on the eastern base of the Cascade Mountains.

T. eucosmum Robinson in Gray Syn. Fl. i, 175. Glabrous, stems ascending from an annual or biennial root 6-18 inches high, freely branching: lower leaves ovate, long petioled; cauline leaves oblong or lanceolate entire spreading, 1-3 inches long: racemes very-many-flowered; flowers deep purple usually horizontal on spreading pedicels 2-3 lines long: petals spatulate 4 lines long: pods arcuate ascending 1-2 inches long: mature fruit not known. On moist slopes of the Blue Mountains at Baker City, R. D. Nevius, and near Canyon City Oregon, *Howell*.

T. flexuosum Robinson l. c. Stems slender weak and subdecumbent, flexuous, nearly naked above: radical leaves numerous lanceolate, including the slender petiole 3-6 inches long: cauline leaves distant, all or at least the upper much reduced, linear-oblong or lance-linear with narrow acutish auricles: racemes rather loose and somewhat few-flowered; flowers usually horizontal on short pedicels; petals spatulate, 3-4 lines long, usually pale: pods arcuate ascending 1-3 inches long. In alkaline soil among "Sage brush," etc. Harney valley southeastern Oregon, *Howell*, to Nevada and California.

T. Nuttallii Watson Bot. King, 26. Glabrous and glaucous: stems stout, branching above, 3-5 feet high: leaves all entire the radical ones ovate, petioled, often 6-8 inches long and half as broad; cauline leaves lanceolate, sagittate-clasping: flowers rather large nearly erect, on pedicels 3-6 lines long: petals ovate-oblong, the claw exceeding the sepals, purple 6-8 lines long: pods 2-3 inches long, nearly erect upon the spreading pedicels, subterete, more or less torulose acuminate with the rather long style. Eastern Washington and Oregon to Idaho, Utah, Nevada and Arizona.

T. integrifolium Endl. Gen. 876. Glabrous: stout, 2-6 feet high, branching at the summit: radical leaves large oblong-elliptical, long-petioled; cauline leaves mostly narrowly lanceolate 1-2 inches long sessile not auriculate, ascending, the uppermost linear: flowers crowded and almost corymbose at the end of the branches: sepals $1\frac{2}{3}$ - $2\frac{1}{4}$ lines long: petals spatulate-obovate, pale rose-color: fruiting racemes short and crowded: pods 6-15 lines long, somewhat torulose acuminate with the slender style, curved upwards on divaricate, commonly thickened and rigid pedicels 1-5 lines long. On plains, Washington to southern California, Colorado and Nebraska.

T. laciniatum Endl. l. c. Glabrous: stems stout erect 1-6 feet high, simple or branched; leaves all petioled 1-6 inches or more long, lanceolate to broadly oblong, laciniately pinnatifid or coarsely and equally sinuate-toothed: racemes long and crowded: sepals narrowly lanceolate, acuminate 3-4 lines long, about half as long as the linear-spatulate petals: anthers long-exserted: pods 2-3 inches long pointed with the slender style, distinctly stipitate, erect on short stout divaricately spreading pedicels. Among rocks, etc., at the base of cliffs along the Columbia river in Oregon and Washington to California and Nevada.

T. lasiophyllum Greene Bull. Torr. club xiii, 142. *Sisymbrium reflexum* Nutt. Proc. Acad. Philad. iii, 26. Erect annual, hispid below, often smoothish above: leaves oblanceolate or oblong in outline irregularly sinuate-toothed or pinnatifid with spreading acute or obtuse entire or toothed segments $1\frac{1}{2}$ -6 inches long, petioled, or the upper sessile by a narrow base: flowers small, roseate or yellowish white; sepals oblong, little more than half as long as the spatulate-oblong petals: fruiting pedicels $\frac{3}{4}$ - $1\frac{1}{4}$ lines long, curved: pods usually deflexed, slender, slightly curved, attenuate at apex; stigma entire. Sandy and rocky soil, eastern Washington to California and Utah.

23. STANLEYA Nutt. Gen. ii, 21.

Stout biennial or perennial herbs with entire or few-toothed leaves and white to yellow flowers in elongated many-flowered racemes. Calyx long, cylindrical or clavate in bud, at length spreading. Petals long and narrow, slender-clawed; stamens 6, free. Anthers linear, not sagittate, spreading. Stigma sessile entire. Pods terete, or subterete, borne on a slender stipe; valves slender, 1-nerved. Seeds oblong, in 1 row. Cotyledons incumbent.

S. viridiflora Nutt. T. & G. Fl. i, 98. Glabrous: stems stout, mostly simple erect or somewhat decumbent, 1-4 feet high, angulate: leaves thickish, the lower ones ovate to oblanceolate sometimes a little angled or runcinately 1-2-toothed or even pinnatifid at the base, attenuate below into long flat winged and often somewhat toothed petioles; middle cauline lanceolate-hastate, acute, entire gradually reduced upwards: racemes long, usually simple; pedicels stoutish 3-4 lines long, spreading: buds becoming 7 lines long and scattered before opening by the rapid growth of the axis flowers greenish, pods very narrow, 3-4 inches long, on stipes 6-10 lines long. Oregon and Nevada to Wyoming and Montana.

S. confertiflora. *S. viridiflora* var. *confertiflora*, Robinson in Gray Syn. Fl. i, 178. Glabrous: stems usually simple, terete 1-3 feet high: leaves obovate or lanceolate, usually entire, upper ones clasping and sagittate: racemes densely many-flowered, buds 4-5 lines long densely packed together until they open: sepals and petals linear, white: pods narrow, 8-12 lines long, stipes more than half as long as the pods, on slender divaricate pedicels 6-8 lines long. On alkaline plains at the base of Stein's Mountain, southeastern Oregon.

Tribe V. Camelinae Pods short, scarcely longer than broad, or obcompressed orbicular-obovate to elliptical or linear-oblong. Cotyledons accumbent.

24 BRAYA Sternb. & Hoppe Regensb. Denkschr. i, pt. 1, 65.

Perennial herbs from a usually thickish single root having a multicapital caudex, chiefly tufted, entire or merely dentate leaves and white or purplish flowers in a globular head. Sepals short, rounded at apex, equal at base. Petals exerted, entire, short-clawed. Stamens 6, free and unappendaged. Anthers short-ovate. Style short, persistent. Stigma more or less distinctly 2-lobed. Pods oblong to linear-oblong, with flattish or convex faintly 1-nerved not keeled valves. Cotyledons incumbent.

B. humilis Robinson in Gray Syn. Fl. i, 141. *Sisymbrium humile*, C. A. Meyer in Ledeb. Fl. Alt. iii, 137. Pubescent throughout with branched

hairs; root single, not strongly thickened: stems several, spreading-ascending simple or branched leafy, 2-10 inches high, terete, slender wiry: leaves linear-oblong or spatulate, subentire to shallowly sinuate pinnatifid, chiefly basal, the cauline rather small and remote: flowers small, white or purplish: pods linear, terete, more or less torulose, erect, 5-9 lines long; partition nerveless. Alaska to Oregon and Willoughby Mountain Vermont.

25 CAMELINA Crantz Fl, Aust. i, 17.

Erect annuals with sagittate-clasping entire or dentate to pinnatifid leaves and pale yellow or white flowers. Sepals short-oblong, obtuse thin-margined, subequal at base, more or less colored, often villous. Petals spatulate or obovate, unguiculate. Stamens 6, free and unappendaged. Style slender: stigma simple. Pods obovoid 2-celled, many-seeded, with a broad thin obovoid persistent partition and somewhat firm strongly convex valves. Seeds in 2 rows in the cells wingless. Cotyledons incumbent.

C. SATIVA Crantz l. c. Stems simple or sparingly branched above 1-4 feet high leafy, nearly glabrous or somewhat hirsute: leaves erect entire or nearly so: flowers rather small, light yellow: fruiting pedicels spreading, pods obovate, becoming 3-4 lines long three-fourths as broad, glabrous, margined, finely reticulate and slightly ribbed upon the faces. An introduced weed becoming common from Seattle Washington, to California and across the continent.

26 SUBULARIA L. Gen. n. 799.

Dwarf stemless aquatic herbs with tufted subulate leaves and few minute white flowers. Pods small, ovoid, slightly compressed contrary to the partition. Style none, valves convex, 1-nerved. Seeds several in each cell, not margined. Cotyledons incumbent.

S. aquatica L. Sp. ii, 642. Stems slender, 1-3 inches high, from slender running rootstocks with numerous fibrous rootlets; leaves subulate, usually shorter than the scape: flowers scattered, less than a line long, the petals not exerted: pods $1\frac{1}{2}$ lines long, about equaling the pedicels, obtuse. Edge of ponds, etc., Vancouver Island to California, Wyoming, Maine, New Hampshire and Canada.

Tribe VI. Brassicæ, DC. Pods elongated, terete or somewhat prismatic, often torulose, usually partially or wholly dehiscent by 2 valves, 2-celled with a longitudinal membranous partition. Seeds in 1 or 2 rows in the cells. Cotyledons conduplicate. Petals well developed.

12 BRASSICA Tourn. Inst. 218 t. 106 L. Gen. n. 820.

Coarse erect annual or biennial herbs of European or Asiatic origin with usually (at least the lowest) leaves lyrate and comparatively large yellow flowers. Sepals equal, or one pair often saccate at base. Anthers long, sagittate at base. Pods linear, nearly terete or somewhat 4-sided, pointed with a conical beak not stipitate, with 1-3 nerved valves. Seeds in 1 row globose, not, margined.

HUTCHINSIA.

B. CAMPESTRIS L. Sp. ii, 666. Annual or sometimes biennial, smooth, 2-3 feet high: lower leaves more or less glaucous pinnately divided with a large terminal lobe, the upper leaves oblong or lanceolate with a broad clasping auriculate base: flowers 3-4 lines long: pods nearly terete 2 inches long or more, 2 lines wide, ascending on spreading pedicels; the stout beak 8-10 lines long. Cultivated fields, etc.,

B. NIGRA Koch in Roehl. Deutschl. Fl. ed. 3, iv, 713. Glabrous or with some scattered spreading hairs, annual, branching. $\frac{1}{2}$ -12 feet high: leaves all petioled, the lower lyrate with the terminal segment very large and deeply lobed; upper leaves lobed or entire: petals 3-4 lines long twice the length of the yellowish sepals: pods closely appressed, 4 angled, 6-9 lines long, sharply beaked with the long style; seeds dark brown. In cultivated fields. Introduced from Europe.

Tribe VII Lipidinea DC. Pods short, 2-celled, strongly obcompressed, dehiscent. Cotyledons accumbent or incumbent. Pubescence wholly simple.

28 **BURSA** Weber in Wigg. Fl. Hols. 27, (1780).

Low annual with oblong or oblanceolate leaves, small white flowers in elongated racemes, and cuneate-obcordate pods. Sepals ovate, obtuse, thin-margined, not saccate at base. Petals small, spatulate. Stamens free and unappendaged. Style almost none. Pods obcordate, the valves carinate, strongly compressed contrary to the narrow, thin and nerveless partition. Cotyledons incumbent.

B. BURSA-PASTORIS Weber l. c. More or less hirsute at base, otherwise glabrous: stems 6-18 inches high, branching: radical leaves mostly runcinate-pinnatifid, 1-6 inches long; cauline lanceolate, auricled at base, toothed or entire: pods cuneate-triangular or truncate-emarginate above, 1-2 lines long and broad: pedicels widely spreading: seeds numerous. Common everywhere. Introduced from Europe.

29 **HUTCHINSIA** R. Br. Hort. Kew iv, 85.

Small annuals with pinnatifid leaves and small white flowers in terminal racemes. Sepals ovate or oblong, obtuse, not saccate at base, at length spreading. Petals small. Stamens free and unappendaged. Stigma sessile. Pods ovate or elliptical. Valves membranaceous, but little compressed contrary to the partition, somewhat tumid, slightly carinate, wingless: cells many-seeded. Cotyledons incumbent.

H. procumbens Desv. Jour. Bot. iii, 168. *Capsella divaricata* W. Low, weak and spreading, very minutely stellate-pubescent or glabrous throughout: leaves thin, small, spatulate or lanceolate, the lower commonly with a few blunt teeth or more or less deeply pinnatifid: stems nearly filiform, flexuous: flowers minute: sepals ovate-elliptic, obtuse, thin-margined, about equaled by the narrow white petals: pods elliptic-oblong 1-2 lines long: entire at the apex. In moist saline places, eastern Oregon and Washington to California, Brit. Columbia and Wyoming.

30 **CORONOPUS** Ruellius.

Diffuse prostrate heavy-scented annuals with pinnatifid leaves and small greenish flowers. Sepals equal at base, oval, spreading, often fugacious. Stamens free and unappendaged, all 6 present,

or only 4 or 2. Anthers short, somewhat didymous. Stigma sessile, nearly or quite simple. Pods more or less distinctly didymous, the valves thickish, often sculptured or tuberculate falling off as 1-seeded closed or nearly closed nutlets. Embryo folded above the base of the incumbent cotyledons.

C. *DIYYMUS* Smith Fl. Britt. ii, 691. Annual or biennial: stems numerous and slender: leaves short an inch or less long pinnately parted with 7-9 lanceolate entire or sparingly toothed segments: flowers very small, greenish white: petals minute or none: pods small, $1-1\frac{1}{3}$ lines broad notched at both ends, thus appearing transversely 2-lobed; valves turgid and finely wrinkled. In moist soil and ditches, California to Vancouver Island near the coast, and along the Atlantic seaboard. Introduced from Europe.

C. *RUELLII* All. Ped. n. 634. Annual or biennial: stems rather stout: leaves an inch or more long pinnatifid with narrow lanceolate entire or sparingly toothed segments: pods flattened $1\frac{1}{2}$ -2 lines broad, not notched above nor divided into 2 lobes, strongly roughened and somewhat crested by radiating prominences. Roadsides and rubbish heaps, Portland Oregon, and the Atlantic States. Introduced from Europe.

31 *LEPIDIUM* Tourn. Inst. 215, t. 109. L. Gen. n. 801.

Low herbs with small pinnatifid leaves and small white or yellow flowers in terminal racemes. Sepals short, ovate or elliptic-oblong, obtuse, equal at base, more or less spreading. Petals entire, rounded at the apex: sometimes abortive or none. Stamens free, unappendaged, all 6 present or by abortion only 4 or 2 present, these representing the two larger pair. Style slender and more or less elongated, or none. Pods orbicular or ovate, emarginate or deeply notched at the apex, strongly compressed contrary to the narrow partition. Valves acutely carinate; the cells 1-seeded. Seeds not winged. Cotyledons incumbent or rarely accumbent.

§ 1 Style slender, sometimes rather short but distinctly developed and persistent. Cotyledons incumbent.

L. montanum Nutt. T. & G. Fl. i, 116. Puberulent or nearly glabrous: stems several from a perennial, somewhat ligneous root, 8-15 inches long, decumbent and spreading in a somewhat circular manner: radical leaves more or less bipinnatifid with short-oblong acute segments; uppermost leaves trifid or linear and entire: petals nearly twice as long as the oval oblong sepals: style conspicuous: pods a line broad elliptical, slightly emarginate, wingless or obscurely winged above, with short acutish teeth. Plains and mountain valleys, Washington to California and the Rocky Mountains.

L. integrifolia Nutt. l. c. Glabrous or puberulent: stems several from a single stout root, branching from the base: leaves oblong, oblanceolate or spatulate, acute or apiculate, thickish, 1-2 inches long, $2\frac{1}{2}$ - $3\frac{1}{2}$ lines broad, entire: racemes single and terminal, or more commonly several, 1-2 inches long: pedicels spreading, 3-4 lines long: petals obovate, white, about twice the length of the broad membranaceous sepals, indistinctly and broadly clawed, deciduous with the sepals: stamens 2: capsule ovate-oblong $1\frac{1}{2}$ -2 lines long, barely retuse inconspicuously reticulated when quite ripe. Southeastern Washington to the Rocky Mountains.

L. CAMPESTRE R. Br. in Ait. f. Kew ed. 2, iv, 88. Pubescent: stems erect, simple and very leafy up to the inflorescence, a foot or more high:

leaves oblong, obtuse, denticulate, erect, the lower ones narrowed to slender petioles; the upper sessile by a long sagittate-clasping base: pedicel horizontally spreading, a little shorter than the thickish, papillose capsule: petals white: anthers yellow: style slightly exerted from the narrow-notch. In wet places, Waldo Oregon and across the continent. Introduced from Europe.

§ 2 Stigma sessile or subsessile. Pods emarginate or retuse at the apex. Cotyledons (in ours) incumbent.

L. Menziesii DC. Syst. ii, 539. More or less pubescent: stems slender 2-12 inches high from an annual or biennial long slender perpendicular root, simple, or branched above: radical leaves pinnately parted, petiolate, pubescent or somewhat hirsute; segments lanceolate, acutish; cauline leaves merely toothed, the upper linear and entire: racemes 1-several, not contracted near the summit; pedicels slender early spreading, longer than the pods: petals 4, white, exceeding the sepals: stamens 2-4: pods orbicular retuse glabrous about $1\frac{1}{2}$ lines in diameter: seeds narrowly winged on one edge. Cliffs and sandy or rocky banks, Oregon to Brit. Columbia near the coast, not common.

L. occidentale Howell Eryth. iii, 32. Stems erect 3-12 inches high from an annual root pubescent below with short simple white hairs, puberulent above, freely branching: leaves 1-3 inches long, the lower pinnatifid with obovate to oblanceolate segments, gradually reduced upwards to linear bracts: petals white, obovate, narrowed below to a short claw, rounded at the apex longer than the obovate sepals: stamens 4, about equaling the petals: pods orbicular, $1\frac{1}{2}$ lines broad, on long slender divaricate pedicels: style very short: seeds obovate, retuse below, narrowly winged on the outer edge. On rocky hillsides, Umpqua valley, Oregon and on cliffs of Cape Foulweather. Doubtless at other places along the coast.

L. medium Greene Eryth. iii, 36. *L. intermedium* Gray Pl. Wright, not A. Richard. Glabrous or puberulent: stems erect, branched 6-18 inches high, from a rather stout annual root: lower leaves 1-2 inches long, toothed or pinnatifid; the upper often entire or but sparingly toothed, oblanceolate or linear: petals wanting, stamens 2; style very short: pods rounded 1- $1\frac{1}{2}$ lines broad, with short and obtuse teeth: pedicels spreading, 3 lines long. Sandy places and hillsides, California to Brit. Columbia and Utah, east of the Cascade Mountains.

L. apetalum Willd. Sp. iii, 439. Stems erect 1-2 feet high, slender, odorless; leaves somewhat narrow, dull green, the radical ones more or less incisely toothed or pinnatifid; segments usually acutish: flowers closely aggregate, the pedicels remaining nearly erect in flower, but in fruit regularly and widely spreading, thus making the racemes appear as if contracted just below the summit: petals wanting: stamens 2: pods glabrous, orbicular, retuse on short pedicels. Eastern Oregon to Texas and the New England States.

L. lasiocarpum Nutt. T. & G. Fl. i, 115. Hispidly pubescent: stems decumbent branching from or near the base: lower leaves pinnately parted, segments usually rather broad, obtuse or rounded, sparingly toothed or entire: racemes several: pedicels distinctly flattened, horizontally spreading, 1- $1\frac{1}{2}$ lines long: sepals broadly oblong usually purple, with thin white margins: petals minute or none: pods suborbicular, thin margined near the apex, hispid pubescent upon both faces, or at least upon the edge. Southern California to Texas and Colorado. Introduced upon R. R. ballast in Oregon, *Henderson*.

L. nitidum Nutt. l. c. 116 Glabrous or somewhat pubescent: stems simple or branched, 3-16 inches high: leaves pinnately cut into linear acuminate segments, the uppermost often entire: pedicels flat, 1-2 lines long:

petals small: pods in a loose raceme, spreading, glabrous and shining, round, 1-2 lines broad, acutely margined, the teeth short and obtuse: seeds often ash-color. On dry hillsides, Washington to California.

* * Low annuals: pedicels flat: petals often wanting: stamens 2-4: style none: pods reticulated, the apex produced into 2 distinct teeth.

L. reticulatum. Minutely hispid; stems erect, sparingly branched, 1-2 inches high, from a slender perpendicular annual root: leaves pinnatifid, with linear entire or toothed segments, including the dilated base of the petiole 6-12 lines long: pedicels approximate, a line long, thin-edged, erect: sepals oblong, very acute, with hyaline borders, persistent: stamens 2: pods glabrous, reticulated, elliptical, a line long, the short obtuse teeth somewhat connivent: seeds oblong-obovate, narrowly margined on the outer edge. Roadsides, southwestern Oregon. Rare.

L. dictyotum Gray Proc. Am. Acad. vii, 329. Pubescent throughout with short spreading hairs, or the leaves glabrous: stems 1-3 inches high, ascending, slender and branching: leaves narrowly linear, 1-2 inches long, entire or pinnatifid with a few linear lobes: sepals scarious-margined, not persistent: petals white, but little exceeding the sepals sometimes wanting stamens 4: pods rounded, a line broad, the short acutish teeth connivent, finely reticulated and pubescent, exceeding the thick erect pedicels. In sandy saline places under "Sage brush", eastern Washington to California.

L. acutidens. *L. dictyotum* var. *acutidens* Gray Proc. Am. Acad. xii, 54.

Sparingly pubescent with short spreading hairs: stems 3-10 inches long, erect and nearly simple, or decumbent and much branched from the base: leaves linear, 1-3 inches long, entire or sparingly pinnatifid: pods ovate, 2 lines or more broad, deeply notched above, with 2 acuminate divergent teeth, equalling or shorter than the erect or outwardly curved pedicels. In alkaline soil, eastern Oregon to California.

L. Oregonum Howell P. C. Pl. Coll. 1887. Finely more or less hispidulous: stems erect, simple or with a few ascending branches, 3-8 inches high: leaves linear, entire or with a few linear attenuate segments: sepals promptly deciduous pods round-ovate, $1\frac{3}{4}$ lines broad, not reticulated or very faintly so, smooth, the rather prominent teeth divergent. Roadsides, southwestern Oregon near Woodville.

L. oxycarpum T. & G. Fl. i, 116. Nearly or quite smooth: stems slender, branched from the base; branches ascending, 4-6 inches long, loosely floriferous more than half their length: leaves linear, acute, subentire or pinnatifid with a few narrow acute teeth: pedicels comparatively slender, widely spreading or deflexed, $1\frac{3}{4}$ lines long: flowers small, apetalous; sepals very unequal, half line long: stamens 2: pods suborbicular, glabrate, finely reticulated, $1\frac{1}{4}$ lines broad, tipped with 2 very short widely divergent teeth. In saline soil, central California to Brit. Columbia.

32 THLASPI L. Gen. n. 802.

Low glabrous herbs with simple stems entire or toothed leaves and white or pinkish flowers. Sepals short-oval, obtuse, thin-margined, erect or slightly spreading. Petals obovate or oblanceolate, entire. Stamens free and unappended: anthers short. Style slender or sometimes none. Stigma small, entire or slightly emarginate. Pods cuneate-obovate or oblanceolate, compressed contrary to the partition, few-seeded: valves acutely carinate or winged. Seeds somewhat turgid, not margined. Cotyledons accumbent.

T. alpestre L. Sp. ed. 2, ii. 903 (?) Stems simple, or branched from the base, from a quite simple or branched perennial rootstock, 1-15 inches high: radical leaves rosulate, elliptical to spatulate, attenuate to a slender petiole, 6-12 lines long or more, entire or sparingly toothed; cauline ovate to oblong, entire, acuminate, clasping at base, 3-6 lines long: flowers 2-3 lines long, crowded in a somewhat capitate cluster; sepals purplish, thin-margined; petals white, or pale purple, 3-4 lines long: peduncle at length elongated: pedicels spreading, in fruit, 2-4 lines long: pods obovate to cuneate-oblong, 3-4 lines long, emarginate or truncate or rounded at the apex 4-8-seeded; style a line long. In mountainous districts, California to Brit. Columbia and the Rocky Mountains.

Tribe VIII. Isatedæ DC. Pods short, rarely elongated, indehiscent, inarticulate, usually crustaceous or osseous, 1-celled, 1-rarely 2-seeded. Pedicels usually slender, recurved in fruit. Cotyledons accumbent.

33 HETERODRABA Greene, Bull. Cal. Acad. i. 71.

Slender annual with long horizontal and nearly prostrate branches. Sepals equal at base. Petals minute or wanting. Stigma sessile. Pod short-elliptical, twisted, very tardily if at all dehiscent, by a very filmy partition 2-celled: valves flat, nerveless. Seeds 3-5 in each cell, in two rows. Cotyledons accumbent.

H. unilateralis Greene l. c. 27 *Draba unilateralis* M. E. Jones Bull. Torr. Club, ix, 124. Hirsute-pubescent with branching hairs: leaves obovate, with cuneate base, 6-12 lines long, sparingly toothed towards the apex, branches from a few inches to more than a foot long, spreading horizontally: flowering and fruiting throughout their whole length: pods 2 lines long, 1½ lines wide, with some stout straight hairs besides the stellate pubescence in maturity twisted: pedicels scarcely a line long, stout and deflexed. In open moist places, southern Oregon, near Ashland and California.

34 ATHYSANUS Greene, l. c. 72.

Slender annual with rosulate usually toothed leaves and small white flowers in long racemes. Sepals equal at base. Petals small or none. Style very short. Pods orbicular, not margined, indehiscent, flat, nerveless, 1-celled, 1-seeded. Cotyledons accumbent.

A. pusillus Greene l. c. *Thysanocarpus pusillus* Hook. Inc. t. 42. Hirsute-tomentose with stellate hairs; stems very slender, branching from near the base, the filiform branches 3-12 inches long: lower leaves broadly oblanceolate, entire or remotely denticulate, 3-12 lines long, short-petioled; cauline similar, but smaller, often entire, sessile but not clasping: flowers barely a line broad, the late ones apetalous: pods orbicular, less than a line broad, hirsute with hooked hairs; pedicels 1-2 lines long, at length reflexed. Common on dry hillsides and rocky banks, southern California to Brit. Columbia: flowering in very early spring.

35 THYSANOCARPUS Hook. Fl. i, 69, t. 18. f. A.

Slender erect sparingly branched annuals with minute white or rose-color flowers on slender pedicels in elongated racemes. Sepals equal at base. Petals minute. Stamens 6, subequal, free, unappendaged, with slender filaments and short anthers. Pods orbicular, wing-margined, much compressed, plano-convex,

indehiscent, 1-celled, 1-seeded. Seeds pendulous, somewhat flattened, margined. Cotyledons accumbent to oblique-incumbent.

T. curvipes Hook l. c. Somewhat hirsute at base, glabrous above, 6-25 inches high: radical leaves, oblanceolate, 1-3 inches long pinnatifid or sinuately toothed: upper ones lanceolate to linear, sagittate-auriculate and clasping at base, entire or sparingly toothed: pods rounded to obovate or ovate, densely tomentose or glabrous 2-4 lines broad including the entire or crenate, veined and often perforated wing, emarginate at the summit and tipped by the short purple style, usually colored; pedicels 2-4 lines long, at length recurved. Common on dry hillsides Washington to California, Arizona and Idaho. Flowering in early spring.

T. radicans Benth. Pl. Hartw. 297. Stems 6-18 inches high simple or with a few simple, elongated ascending branches, glabrous: lowest leaves runcinately toothed or pinnatifid; the cauline ones ovate-lanceolate and auriculate-clasping: racemes long, loosely flowered: pedicels usually ascending but nodding near the apex, 4-8 lines long: petals purple, exceeding the sepals; pods rounded, 4-5 lines in diameter, tomentose or quite smooth, scarcely emarginate with a broad entire translucent wing conspicuously marked by radiating nerves: style short. Southern Oregon (Umpqua valley) to Central California.

Tribe IX. Raphanæ DC. Pods indehiscent, transversely separated into 1-few-seeded joints. Seeds globose. Cotyledons conduplicate.

36 **RAPHANUS** Tourn. Inst. 229 t. 114 L. Gen. n. 882.

Coarse annual or biennial herbs with pinnatifid leaves and white or purple flowers. Sepals erect, the lateral somewhat saccate. Petals large, unguiculate. Stamens 6, unappendaged, attenuate to a slender or rather stout beak, indehiscent transversely divided by several false partitions, seeds globular, pendulous.

R. SATIVUS L. Sp. ii 669. Stems stout and branching 1-4 feet high from a straight thick annual root: leaves lyrate pinnatifid, hirsute: petals white to purple 6-8 lines long: pods terete 4-6 lines in diameter, gradually narrowed to an elongated beak, usually 2-3-seeded. Escaped from cultivation, Washington to California.

ORDER VIII. CAPPARIDACEÆ Endl. Gen. 889.

Herbs or shrubs with alternate leaves without stipules and perfect hypogynous flowers. Sepals or lobes of the calyx 4. Petals 4, rarely 5-8 or none, usually unguiculate, more or less unequal. Stamens. in ours, 6-12, rarely 4. Ovary often stipitate, composed of two united carpels with two parietal placenta. Styles united into one, often filiform, sometimes short or almost none: stigma often discoid or subcapitate. Fruit one-celled, in ours a two-valved pod-shaped capsule. Seeds campylotropous, reniform, without albumen. Embryo curved. Cotyledons foliaceous, somewhat incumbent.

1 **Jacksonia**. Stamens 8-32: flowers whitish or pinkish: pods elongated, dehiscent from the top downward.

2 **Cleome**. Stamens 6: flowers yellow or purplish: pods oblong or linear, dehiscent from the base upward.

1 JACKSONIA Raf. Med. Repos. v, 352.
POLANISIA Raf. Journ. de Phys. 98. (1819).

Annual, ill-scented and mostly glandular herbs, with simple or 3-9 foliolate petioled leaves, and yellowish, rose-color or white flowers in leafy-bracted racemes. Sepals 4 deciduous, lanceolate, sometimes connate at base. Petals on claws or sessile, equal or unequal, torus small depressed. Stamens 8-32 inserted below the torus. Pods erect on spreading pedicels, membranaceous, very shortly stipitate, elongated, compressed or cylindrical, many-seeded, dehiscent from the top downward. Seeds round-reniform; rugose or reticulated.

J. trachysperma Greene Pitt. ii, 175. Glandular-pubescent, erect 6-24 inches high: leaves 3-foliolate, leaflets lanceolate $\frac{1}{2}$ -2 inches long, acute, about equalling the petioles, nearly sessile: floral bracts mostly simple, ovate to lanceolate, shortly petioled petals 3-5 lines long, with slender claws as long as the sepals, and an emarginate blade: stamens 12-19, filaments exserted: style 2-3 lines long: pods 1-2 $\frac{1}{4}$ inches long, very rarely on a short slender stipe: seeds finely pitted and often warty. Oregon and Idaho to Brit. Columbia, Kansas and southward to New Mexico and Texas.

2. CLEOME L. Syst. Nat. ed. 1.

Erect branching annuals; with palmately 3-8 foliolate leaves and yellow or purple flowers, in bracteate racemes. Sepals 4, sometimes united at base. Petals with claws or sessile. Stamens 6, upon the small torus. Pods linear to oblong, stipitate, many-seeded: style short or none. Pods pendant on spreading pedicels, dehiscent from the base upward. Seeds globose-reniform to ovate. Ours all of

§ EUCLEOME Gray Syn. Fl. i, 183. Torus little or not at all columnar below the stamens, but commonly thickened, and bearing a glandular projection behind the ovary: this in all our species raised on a slender stipe or carpophore. *Cleome* Endl.

* Calyx 4-cleft, tardily deciduous, petals indistinctly if at all unguiculate.

C. serrulata Pursh. Fl. ii, 441. *C. integrifolia* T. & G. Fl. i, 122. Somewhat glaucous, 2-3 feet high, widely branching; leaves 3-foliolate; leaflets oblong to lanceolate, or the uppermost linear, entire, submucronate: racemes sometimes nearly a foot long: flowers large, showy, reddish-purple, rarely white: sepals united to the middle, persistent; segments triangular-acuminate: petals with very short claws, stamens equal: pods oblong-linear, compressed, much longer than the stipe. On watercourses, from the Columbia river to Colorado, New Mexico and Dakota.

C. lutea Hook. Fl. i, 70, t. 25. Glabrous or slightly pubescent; 1-3 feet high: leaves 5-foliolate: leaflets linear to oblong-lanceolate, 1-2 inches long acute, short-petiolulate, equalling the petioles; flowers bright yellow: sepals ovate-lanceolate, acuminate, glabrous; petals broadly lanceolate, very short clawed, 3-4 lines long: pod 9-15 lines long, about 2 lines broad, torulose, equalling or longer than the stipe. On sandy banks along the Columbia river, and from Wyoming to Colorado and Nevada.

* * Sepals distinct to the base, deciduous. Petals not distinctly unguiculate.

C. platycarpa Torr. Bot. Wilkes 235, t. 2. Pubescent and glandular: 1-2 feet high: leaves 3-foliolate; leaflets broadly oblong to lanceolate, 6-8 lines long: flowers very showy, bright yellow: sepals linear-setaceous, villous: petals broadly lanceolate, without claws: pods elliptical, 8-10 lines long, stipe about as long as the pod, equalling the pedicels; style slender, about 2 lines long. Hillsides, John Day valley, Oregon to northern California and western Nevada.

ORDER IX. VIOLACEÆ S. F. Gray Nat. Arr. ii, 667.

Sepals 5, persistent, imbricated in the bud. Petals 5, alternate with the petals hypogynous, on short claws, commonly unequal. Stamens 5, alternate with the petals, inserted on the torus: anthers adnate, introrse 2-celled, opening longitudinally: filaments broad, elongated beyond the anthers, ovary 1-celled, 3-valved, with 3 parietal placenta, several ovuled. Style usually declined with an oblique cucullate stigma. Seeds anatropous with a straight embryo in the axis of fleshy albumen. Ours are low herbs with watery somewhat acid juice, alternate leaves with persistent stipules and axillary flowers.

1 VIOLA Tourn. Inst. 419, t. 236 L. Gen. n. 1007.

Perennial or annual herbs with alternate stipulate leaves and mostly one-flowered axillary 2-bracteolate peduncles. Early flowers usually showy and often infertile, the later ones often cleistogamous and more fertile. Sepals more or less auricled at base. Petals unequal, the lower one produced at base into a nectariferous sac or spur, the others of about equal length. Filaments very short or none: anthers connivent but distinct, at most lightly coherent, the two anterior each with a dorsal appendage or spur projecting into the spur or sac of the lower petal. Style often flexuous below, enlarged upward. Capsule usually ovoid, crustaceous or coriaceous: valves several-seeded. Seeds obovoid or globular, smooth.

Ours are all perennial with part or all of the stipules more or less scarious, never emulating the blade of the leaf. The two upper petals turned backward, and the lateral ones turned forward, toward the lower one, or merely spreading.

* Strictly acaulescent, the leaves and scapes directly from rootstocks: gibbous-clavate with inflexed or truncate and beardless summit and an introrsely beaked or short-pointed small proper stigma.

+ Rootstock thick and comparatively short, never filiform or producing runners or stolons: spur of the corolla only saccate: cleistogamous flowers abundant and short peduncled.

V. cognata Greene Pitt. iii, 145. *V. cucullata* of authors as to our plants. Acaulescent; rootstocks short and thick: leaves long-petioled, smooth or more or less pubescent, slightly fleshy, cordate with a broad sinus, the earliest often reniform and the later acute or acuminate, crenately toothed: scapes 2-10 inches high, about equalling the leaves: petals 5-8 lines long, blue or violet, all villous at base, the three lower very strongly so: spur only saccate: style smooth; stigma small, beaked or

short-pointed. In moist places, eastern Oregon and Washington to Brit Columbia and the Rocky Mountains.

+ + Rootstock thickish and creeping, commonly sending off leafy and floriferous stolons or runners above ground: leaves round-cordate and merely crenulate: lateral petals usually bearded: spur short and saccate.

V. Langsdorffii Fisch. in DC. Prod. i, 296. Glabrous or nearly so: stems weak and declined or ascending 1-12 inches long from a creeping scaly rootstock: leaves reniform to cordate, crenately serrate, the lower ones on petioles that about equal the stems; stipules lanceolate, acuminate, 6-10 lines long: flowers usually pale blue, 9-12 lines long with short saccate spur, lateral petals white with a small bearded spot near the base: stigma small, rounded. In marshes along the coast from Crescent City, California to Alaska.

+ + + Rootstock long and filiform extensively creeping underground: plants low or small: spur saccate.

++ Corolla blue or purple.

V. palustris L. Sp. ii, 934 (?). Wholly glabrous: rootstock long and filiform, extensively creeping underground; leaves round-cordate with a broad sinus and rounded summit, 1-2 inches in diameter, obscurely crenate, scapes 2-4 inches high, much longer than the leaves: flowers pale lilac to white, lateral petals sparsely if at all bearded 3-4 lines long, spur short and rounded. In marshes of the high mountains, California to Alaska and east to the New England States and Labrador, Europe and northern Asia.

++ ++ Corolla always white, mostly with purple lines on the lower petal; stigma as if truncate and margined, and antrorsely short-pointed.

= Leaves round-cordate or reniform, on slender marginless petioles.

V. blanda Willd. Hort. Berol. t. 24. Glabrous or nearly so: stems very short or none, from slender creeping rootstocks with numerous fibrous rootlets: leaves thin, crenulate, from ovate-cordate to round-reniform, 6-18 lines broad, on slender petioles as long: scapes 1-3 inches high: sepals a line long, from oblong to almost ovate-lanceolate scarious-margined: petals white, oblong 3-4 lines long, usually all beardless, the lower ones conspicuously dark-veiny; spur short, saccate, rounded. In wet places in the mountains from California to Alaska and the Atlantic States.

V. Macloskeyi F. E. Lloyd Eryth. iii, 74. Whole plant glabrous: rootstock slender, creeping, bearing three or four leaves and at length a few runners: leaves reniform with a shallow sinus; the lamina slightly decumbent down the slender petiole, the margin obscurely crenate-serrate: stipules ovate acute: peduncles 1-3 inches long: petals white, very thin and translucent, the spur very short and saccate; lateral petals bearded. Springy places in the Cascade Mountains about Mt. Hood.

= = Leaves from linear to spatulate or ovate or subcordate, the base decurrent into a margined petiole: sometimes leafy along summer stolons.

V. occidentalis. *V. primulæfolia* var. *occidentalis* Gray Bot. Gaz. xi 255. Glabrous throughout: rootstock short, not creeping but propagating by long filiform runners: leaves ovate to spatulate-oblong, attenuate at base to a long slender petiole, obscurely crenate: scapes 3-6 inches high not exceeding the leaves: petals white the lower ones veined with purple, lateral ones bearded, 4-6 lines long, spur saccate, stigma truncate, margined and antrorsely short-pointed. In marshes, eastern base of the Coast

Mountains near the Oregon and California line.

* * Subcaulescent by leafy stolons, or caulescent with 2-3 leaved stems. Stigma terminal beardless and beakless.

+ Leaves undivided, at most only cuneate toothed.

V. sarmentosa Dougl. in Hook. Fl. i, 80. Sparingly pubescent: stems weak and decumbent: multiplying by long filiform rootstocks: leaves rounded-cordate, reniform or sometimes ovate, $\frac{1}{2}$ - $1\frac{1}{2}$ inches broad, finely crenate, usually punctate with numerous dark dots: peduncles mostly exceeding the leaves: flowers yellow, lateral petals with a bunch of long scales at the base of the blade; spur short and saccate. In open forests, Brit. Columbia to California.

V. orbiculata Geyer Hook. Lond. Jour. Bot. vi, 73. Rootstock short and thick, with few fibrous rootlets: stems at first very short with a pair of scarious acutely triangular stipules at the base of the peduncles, at length sarmentose with a few small leaves and bearing cleistogamous flowers: leaves mostly basal, orbicular to oblong, cordate with deep narrow sinus, crenulate, 1-2 inches broad, glabrous below, pubescent with short stout appressed scattered hairs above, sepals oblong to nearly lanceolate; petals yellow, the lower one purple veined, spurs short and saccate: stigma beakless, bearded on the sides. In open forests, Cascade Mountains in Oregon to Idaho and Alaska.

V. purpurea Kell. Proc. Cal. Acad. i, 56. More or less pubescent with more or less spreading hairs, stems clustered from branching perpendicular root 2-6 inches long: leaves semi-orbicular to ovate or lanceolate, cuneate or truncate at base 6-12 lines long, entire or coarsely crenate, often purple-veined: peduncles but little longer than the leaves: petals 4-6 lines long, light yellow more or less tinged with dark purple outside: capsule globular, pubescent. On dry open hillsides, Oregon to California.

+ + Leaves 3-parted, with more or less lobed or cleft segments.

V. Sheltonii Torr. Pacif. R. R. Rep. iv, 67, t. 2. Glabrous or nearly so: leaves round-reniform to cordate in outline, 3-parted, the divisions lobed and cleft into linear or oblong segments: peduncles shorter than the leaves: petals yellow veined with purple. Wooded mountains, southwestern Oregon to California.

* * * Subcaulescent, first flowering from the ground, from erect or ascending rootstocks, not stoloniferous or creeping: stipules partly and variably adnate: corolla mostly yellow with short saccate spur: stigma beakless, sometimes with a short lip, concave, mostly orbicular, antros-terminal or slightly oblique at the large and gibbous clavate summit of the style; bearded below its margin on each side by a tuft or sometimes by nearly a ring of stiff and reflexed spreading bristles.

+ Leaves undivided, round ovate or subcordate to lanceolate: lateral petals either slightly bearded or beardless.

V. Nuttallii Pursh Fl. i, 174. Glabrous or the leaf margins finely and densely ciliate, root thick, perpendicular; stems scarcely any, leaves lanceolate, nearly entire, attenuate to a long petiole, stipules lanceolate; spur very short and saccate: pubescence of the depressed beakless stigma minute. Plains of the Blue Mountains of Oregon to the Rocky Mountains and Kansas.

V. præmorsa Dougl. Bot. Reg. t. 1254. Canescent with short spreading hairs, stems short, from thick, perpendicular branching roots: leaves from nearly orbicular to lanceolate, densely pubescent below, sparingly so or quite smooth above, irregularly crenate toothed, 6-30 lines long, gradually or abruptly contracted to a slender petiole: stipules scarious, lanceolate acuminate entire: scapes longer than the leaves, pubescent: sepals linear 4-5 lines long, often minutely ciliate: petals bright yellow, obovate

6-8 lines long not bearded: stigma short-apiculate, minutely bearded: capsule oval, sparingly pubescent or glabrous. On open plains about Oregon City and near Vancouver Washington.

+ + Leaves finely dissected, subterranean shoots commonly sending up their scapiform peduncles from under the ground.

+ + Petals beardless, essentially yellow.

V. Douglasii Steud. Nom. ii, 771. *V. chrysantha* Hook. not Schrader. More or less pubescent with short spreading hairs: leaves bipinnatifid with narrow oblong or linear segments; peduncles equalling or exceeding the leaves, 2-5 inches long: petals 5-9 lines long bright yellow, the upper brown-purple on the outside, the others veined: capsule acute 5 lines long. In dry soil, southern Oregon to California.

+ + Lateral petals bearded: upper deep violet-purple or blue; lower pale or yellow.

V. Beckwithii T. & G. Pac. R. Rep. ii, 119, t. 1. Pubescent or puberulent, leaves palmately about thrice 3-parted into linear or spatulate-linear acutish or obtuse lobes, the primary divisions petiolulate: peduncles about equalling the leaves: upper petals deep violet purple, the others light, blue or bluish with yellow base, lateral ones short, bearded. California and Nevada to southern Oregon.

V. Hallii Gray Proc. Am. Acad. viii, 377. Glabrous: leaves subpinnately or pedately about twice parted into lanceolate or linear lobes, their tips obtuse or acutish and callous apiculate: peduncles surpassing the leaves: upper petals deep violet, the others yellow or cream-color 6-8 lines long. Gravelly prairies from Salem Oregon, to northern California.

V. trinervata Howell in Gray Syn. Fl. i, 201. Glabrous: leaves pedately parted, the few divisions lanceolate to almost ovate acute or apiculate at maturity almost coriaceous strongly 3-nerved, the lateral nerves intermarginal, peduncles longer than the leaves: upper petals dark blue, the others pale blue to white, with a yellow base. Klickitat county, Washington.

* * * * Caulescent, the few to several-leaved stems erect from short or creeping rootstocks: no stolons nor radical flowers: spur short and saccate: lateral petals commonly scantily papillose-bearded: stigma beakless, bearded or pubescent at the sides.

+ Petals yellow; stems usually naked at base and few-leaved above.

V. lobata Benth. Pl. Hartw. 298. Finely pubescent or glabrous: stems 3-12 inches high from an erect rootstock: leaves reniform to broadly cuneate in outline 1-4 inches broad shortly petioled more or less deeply palmately cleft into 5-9 narrowly oblong to lanceolate lobes, the central lobe usually more elongated, sometimes only coarsely toothed: peduncles not longer than the leaves: petals 6-8 lines long, yellow, the upper brownish purple outside: capsule 5-6 lines long, acute. Southwestern Oregon to southern California.

V. Brooksii Kell. Cal. Hort. ix, 281. *V. lobata* var. *integrifolia* Watson Bot. Cal. i, 57. Minutely pubescent: stems erect, 4-8 inches high, few-leaved: leaves deltoid or rhombic-ovate, often long-acuminate, crenate-serrate, 1-3 inches broad: stipules lanceolate, acute, minutely ciliate, entire or lacerate: flowers few, sepals linear, little if at all auricled: petals yellow 5-6 lines long. In dry open forests southwestern Oregon and California.

V. Canadensis L Sp. ii, 936. Glabrous or slightly pubescent: stems erect leafy, 6-12 inches high from branching, ascending rootstocks, leaves cordate and mostly acuminate, denticulate-serrate; stipules small, narrow, entire, scarious: petals usually pale violet outside, white with yellow

lowish base and some purple stripes within, the lateral ones with some papillose hairs near the base; spur short and saccate: stigma beakless, bearded on the sides: capsule oval glabrous. Moist woods, Idaho, *Sandberg* (N. 213), to the northern Atlantic States and Canada.

V. glabella Nutt. T. & G. Fl. i, 142. Minutely pubescent or glabrous: stems slender from a short fleshy horizontal rhizoma, naked or sparingly leafy below 5-12 inches high: radical leaves on long petioles the upper shortly petioled, reniform-cordate to cordate, acute crenately toothed or crenulate 1-4 inches broad; flowers bright yellow petals 4-8 lines long: capsule ovate-oblong 3-5 lines long, abruptly beaked. In forests, Alaska to northern California.

V. ocellata T. & G. Fl. i, 142. Pubescent: stems slender 6-12 inches high from somewhat creeping rootstocks: leaves on very long petioles cordate-triangular crenately toothed, seldom acuminate: stipules lanceolate somewhat ciliate: peduncles shorter than the leaves: sepals linear: petals oblong lanceolate the upper ones violet or with a deep violet spot on the upper face; lower ones white or with some yellow and purple veins; spur very short: stigma strongly bearded on each side. Southern Oregon to middle California.

V. cuneata Watson Proc. Am. Acad. xiv, 290. Glabrous: stems slender and somewhat trailing, 3-12 inches long, from a long running rootstock; leaves rhombic-ovate, acute attenuate into a slender petiole somewhat crenately toothed above: peduncles not exceeding the leaves: upper petals deep purple, the others purple and white, 4-6 lines long. Southwestern Oregon and adjacent California among underbrush.

* * * * * Caulescent, from more or less creeping rootstocks, or at first flowering nearly acaulescent, erect or spreading: leaves cordate, undivided: corolla from blue to white with projecting, oblong to cylindrical spur: style moderately thickened upward, beardless.

V. adunca Smith in Bos. Cycl. xxxviii. *V. canina* var. *adunca* Gray. Puberulent or nearly glabrous, usually 3-11 inches high, at length sending out runners that bear cleistogamous flowers: leaves ovate, more or less cordate at base, $\frac{1}{2}$ - $1\frac{1}{2}$ inches long obscurely crenate: peduncles usually longer than the leaves: flowers violet or purple to white: petals 6-8 lines long the lateral ones bearded, spur as long as the sepals, rather slender, hooked or curved. Common from Brit. Columbia to California, east to the Rocky Mountains.

V. puberula. *V. canina* var. *puberula* Watson in Gray Man. ed. 6, 81. Finely puberulent throughout: low, 2 inches high: leaves shallowly or often not at all cordate, mostly small: peduncles but little exceeding the leaves, flowers small, light blue: spurs cylindraceous, more than half the length of the petals. In moist places, Oregon and Washington to the Atlantic States.

V. Howellii Gray Proc. Am. Acad. xxii, 308. Stems slender, few-leaved 4-12 inches long: leaves round-reniform to broadly cordate, repandentate and ciliate an inch or more wide, on long slender petioles: peduncles equalling or surpassing the leaves: flowers large, pale blue or violet; spur about half as long as the sepals, straight and blunt. In forests near Portland, Oregon.

ORDER X. POLYGALÆÆ Endl. Gen. 1077.

Herbs or shrubs with entire leaves and no stipules. Sepals 5, distinct, usually persistent, very irregular, three of them exterior and smaller; the two lateral or inner ones larger and usually petal-like: imbricated in the bud. Petals hypogynous, irregular; deciduous; usually only 3; of which one is larger

than the rest, the others alternate with the inner sepals. Stamens 6-8 hypogynous: filaments combined into a tube which is split on the upper side and more or less connate with the claws of the petals. Fruit loculicidal or indehiscent. Seeds anatropous with a crustaceous testa. Embryo straight in fleshy albumen.

1 POLYGALA Tourn. L. Gen. n. 851.

Sepals persistent; the wings large and petal-like. Petals 3, their claws coherent with the staminal tube, the lowest one keeled. Ovary 2-celled, ovules solitary in each cell, pendulous. Capsule 2-celled, flattened contrary to the narrow partition, elliptical, obovate, or obcordate. Seeds carunculate, with copious albumen. Herbs shrubby at base, with simple entire leaves and racemose or spicate flowers.

P. Californica Nutt. T. & G. Fl. i, 671. *P. cucullata* Benth. Stems slender from a woody base, 2-8 inches high: leaves oblong-lanceolate or sometimes ovate-elliptical $\frac{1}{2}$ -1 inch long on very short petioles: flowers rose-color on pedicels 1-3 lines long, without bracts: sepals glabrous or nearly so, the outer $2\frac{1}{2}$ lines long, rounded-saccate at base; the wings rather broadly spatulate 4-6 lines long: lateral petals linear-lanceolate, somewhat ciliate, about equalling the keel: fruit mostly from apetalous, flowers near the root; capsule glabrous, broadly ovate $2\frac{1}{2}$ -3 lines long, re-tuse above, nearly sessile, narrowly margined: seeds 2 lines long somewhat pubescent; the caruncle vesicular and wrinkled, calyptra-like, half the length of the seed. Southwestern Oregon and California.

ORDER XI. CARYOPHYLLACEÆ Juss.

Herbs sometimes suffrutescent at base with bland and inert juice, regular and mostly perfect flowers, persistent calyx, its parts and the petals 4 or 5 and imbricated, or the petals sometimes convolute, in the bud, stamens twice as many, or as many and alternate with them or rarely fewer than the petals, ovary 1-celled with a free central placenta bearing few to several campylotropous ovules, the reniform seeds with a slender embryo coiled around the outside of farinaceous albumen. Stems usually swollen at the nodes. Leaves often united at the base by a transverse line, in one group with interposed scarious stipules. Petals sometimes wanting. Stamens mostly hypogynous around an annular disk, sometimes perigynous by its cohesion with the base of the calyx. Styles 2-5 mostly distinct and with the stigma running down the inner face. Fruit a capsule, opening by valves or by teeth at the summit. Flowers terminal, or in the forks, or in cymes.

TRIBE I. Sepals united into a 4- or 5-toothed or lobed calyx. Petals commonly with an appendage on the base of the blade within, narrowed below into a conspicuous claw; these and the stamens borne on the stipe of the ovary. Styles distinct. Capsule dehiscent at the summit by as many or twice as many teeth as styles. Flowers comparatively large, perfect, or not infrequently

polygamous.

1. **Saponaria.** Calyx 5-angled becoming 5-winged: its teeth short, not foliaceous: styles 2, capsule 4-5 valved.
2. **Silene.** Calyx commonly 9-nerved, styles 3: capsule opening by as many or twice as many teeth.
3. **Lychnis.** Calyx 10-nerved, styles 4 or 5, alternate with the petals when of the same number: capsule opening by as many or twice as many teeth: perennials.
4. **Agrostemma.** Styles 5 opposite the petals: calyx-teeth conspicuously prolonged into foliaceous appendages.

TRIBE II. Sepals free or slightly united at the very base. Petals unappendaged, more or less narrowed below but not to a distinct claw, inserted with the stamens on the margin of the disk at the base of the sessile ovary, not rarely inconspicuous or none.

* Stipules none.

+ Capsule cylindric more or less elongated, often curved, dehiscent by twice as many teeth as there are carpels.

5. **Cerastium.** Capsule cylindric dehiscent with twice as many equal teeth as styles: petals emarginate or bifid; styles 5, rarely 3 or 4.

+ + Capsule ovoid or oblong, relatively short, dehiscent by as many or twice as many teeth as there are styles.

+ + Styles usually fewer than the sepals, when of the same number opposite them.

6. **Alsine.** Capsule globose to oblong, with as many valves as styles, petals bifid or 2-parted: styles 3, rarely 2, 4 or 5.
7. **Arenaria.** Sepals 5, petals as many, entire or emarginate rarely wanting: styles 3, 4 or 5.

+ + Styles as many as the sepals and alternate with them.

8. **Alsinella.** Capsule globose with as many entire valves as styles: sepals 4 or 5, petals entire as many as the sepals or wanting.

* * Stipules present scarious or setiform: petals undivided.

+ Petals conspicuous, styles distinct.

9. **Spergula.** Styles 5, alternate with the sepals and with the entire valves of the capsule.
10. **Tissa.** Styles and valves of the capsule 3, very rarely 5.

Tribe I. Sileneæ DC. Sepals united into a 4- or 5-toothed or -lobed calyx. Petals unguiculate, often scale-bearing or appendaged at the junction of the blade and claw, inserted with the stamens on the stipe of the ovary. Stipules none. Flowers usually showy, perfect or polygamous.

1 SAPONARIA L. Gen. n. 564.

Smooth branching herbs with entire leaves and showy pink or white flowers in terminal clusters or panicles, blooming in summer. Calyx tubular or obovoid, 5-toothed, terete, with numerous faint veins or conspicuously 5-angled. Petals 5. Stamens 10.

Styles 2. Capsule 1-celled or imperfectly 2-4-celled, at base, dehiscent by 4 short teeth. Seeds laterally attached. Embryo curved.

S. VACCARIA L. Sp. 409. Stem solitary from an annual root, erect, 1-4 feet high, widely branching above: leaves ovate to oblong-lanceolate, sessile and somewhat connate at base; flowers in a broad corymb; calyx ovoid, with 5 sharp herbaceous angles, the intervening parts white and scarious; petals rose-color, without appendages. Common in cultivated grounds. Introduced from Europe.

S. OFFICINALE L. Sp. 408. Stems numerous from a perennial root, 1-2 feet high, stout: leaves ovate-lanceolate, acute, narrowed at the base, 2-3 inches long, 3-ribbed: flowers clustered at the ends of the short branches, often double; calyx tubular, terete, with numerous faint nerves; petals white or pink, appendaged at the junction of the claws and obovate retuse blade. Roadsides and R. R. embankments. Introduced from Europe.

2 SILENE L. Gen. n. 567.

Annual or perennial herbs with mostly linear entire opposite leaves and white or red flowers in paniculate racemes: (rarely solitary or cymose). Calyx tubular more or less inflated, cylindrical-clavate to campanulate, 5-toothed, 10-nerved. Petals 5, with slender claws, which are usually crowned with scales at their junction with the mostly 2 to many-cleft blade. Stamens 10. Style 3. Ovary stipitate. Capsule dehiscent by 6, rarely 3 short teeth. Seeds opaque, tuberculate or echinate, attached by the margin: embryo peripheral.

* Annuals, mostly introduced.

+ Inflorescence simply racemose or subspicate; pedicels solitary.

S. GALLICA L. Sp. 417. Stems hirsute with white jointed hairs: leaves spatulate, mucronate, hirsute-pubescent on both sides 8-18 lines long: racemes terminal one-sided, 2-4 inches long: flowers more or less pedicellate: calyx 10-nerved, villous-hirsute, slender, subcylindric in anthesis, becoming in fruit broadly ovoid with contracted orifice and short narrow spreading teeth: petals usually little exceeding the calyx; the blade obovate, somewhat bifid, toothed or entire. Along the coast from Brit. Columbia to Lower California.

VAR. *QUINQUEVULNERA*, Koch. Syn. Fl. Germ. et. Helv. 100. Petals more showy, subentire, deep crimson with a white or pink border. With the typical form.

+ + Inflorescence cymose or paniculate, not distinctly racemose.

+ + Smooth or nearly so, a part of the upper internodes glutinous.

S. antirrhina L. Sp. 419. Stems slender, 6-36 high: leaves oblong-lanceolate or linear, commonly acute: flowers small in a compound cyme, on long filiform pedicels: calyx oblong-cylindric, smooth, in fruit ovoid with short teeth; petals obcordate, about equalling the calyx-teeth expanding only at night or in cloudy weather; scales minute: ovary scarcely stiped. On dry hillsides, California to Brit. Columbia and across the continent.

* * Very low and densely matted subcaulescent perennials.

S. acaulis L. Sp. ed. 2, 603. Closely cespitose, an inch or two high: leaves linear, crowded on the branching caudex: flowers small, 2-3 lines in diameter, subsessile or raised on naked curved peduncles: calyx narrowly campanulate glabrous, the teeth short and rounded: petals purplish or white, minutely appendaged, obcordate, exserted: flowers dioecious by abortion. Arctic America to the Cascade and Rocky Mountains.

* * * Caulescent perennials.

+ Flowers large rather few: calyx cylindrical or clavate: petals 5-7 lines long, 4-several-cleft: stems leafy: seedcoat more or less roughened but firm.

S. Californica Durand Pl. Pratt. 83. Glandular-pubescent or puberulent: stems several from the simple root, $\frac{1}{4}$ -4 feet high, lax, leafy, simple, or branched above: leaves oblanceolate to ovate 1-4 inches long, acute or acuminate: flowers large, deep scarlet, few at the ends of the branches: pedicels short, the lower deflected in fruit: calyx 7-10 lines long: petals deeply parted with bifid segments, the lobes 2-3 toothed or entire; scales oblong-lanceolate: capsule ovate 6 lines long rather shortly stipitate. California, reaches the southwest corner of Oregon.

S. Hookeri Nutt. T. & G. Fl. i, 193. White-tomentose, especially above: stems leafy 3-10 inches high, from a deep perpendicular root: leaves spatulate or lanceolate, acute, an inch or so long, attenuate below to a winged petiole: flowers large and showy, on erect pedicels 1-2 inches long; calyx oblong-clavate, 8-10 lines long: petals pale pink, twice longer than the calyx, the broad claw not auricled, the cuneate blade 1-6 parted with lanceolate or linear entire or bifid segments; scales lanceolate, decurrent upon the claw, ovary roundish, nearly sessile. Prairies and wooded hillsides, Willamette valley to California.

+ + Flowers smaller, 6-8 lines in diameter.

+ + Flowers borne in the forks of the branches forming a leafy inflorescence.

S. campanulata Watson Proc. Am. Acad. x. 341. Finely glandular pubescent: root thick, simple, caudex branching, somewhat woody: stem 6-10 inches high, simple or dichotomously branched at the summit; leaves lanceolate, 1-1½ inches long, acute or acuminate; flowers solitary or few, on short deflexed pedicels; calyx campanulate, 5-6 lines long, the teeth broad, obtuse or acutish, and finely net-veined; petals pale flesh-color, 9 lines long, with pubescent scarcely auriculate claws, the limb 4-parted nearly to the base, the lobes bifid to the middle, or the lateral ones entire or notched; appendages oblong, fleshy, entire; filaments pubescent, exerted; ovary suborbicular, shortly stipitate. In mountains of southern Oregon and northern California.

S. Greenii. *S. campanulata* var. *Greenii* Watson in Robinson Proc. Am. Acad. xxviii, 137. Pubescent and viscid-glandular throughout: root simple; rootstock branching: stems slender declined or ascending: leaves ovate: calyx green, open campanulate, deeply toothed: petals rather broad, cleft into 4 or more greenish or yellow segments: capsule globular. In the mountains from the Cow Creek country to northern California.

S. Menziesii Hook. Fl. i, 90 t, 30. *S. stellarioides* Nutt. T. & G. i, 193. Finely glandular-pubescent: stems weak, dichotomously branched above: leaves ovate-lanceolate, acuminate at each end: flowers small: calyx 2-4 lines long: petals 2-cleft commonly unappendaged: capsule ovate-oblong, 2 lines or less broad. Common from Vancouver Island to southern California and the Rocky Mountains and New Mexico.

+ + Flowers few, rather small, white or nearly so, nodding, borne in a lax naked panicle: petals cleft into 4 or more narrowly linear almost filiform segments; styles long exerted.

S. longistylis Engelm. in Herb. Watson Proc. Am. Acad. xxii 469. Cespitose with a slender much-branched caudex: finely pubescent throughout, with very short spreading subglandular hairs: stems slender, 6-12 inches high: leaves linear-lanceolate or oblanceolate, acute an inch long or less, mostly radical, the cauline only 1 or 2 pairs: calyx ovate cylindrical soon becoming ovoid, the teeth broad ovate, petals white, the narrow claw scarcely auricled and very pubescent, the blade cleft nearly to the base,

into four linear or filiform segments; appendages linear, entire: stamens and style long exerted, capsule subsessile: seeds small, dark red. Siskiyou Mountains, near Ashland, Oregon, to Scott's Mountain, California.

+ + + Flowers scattered or variously paniculate: style included or somewhat exerted: capsule distinctly stipitate: calyx cylindrical or in fruit clavate or obovate, usually distinctly contracted about the stipe of the capsule.

S. Oregona Watson Proc. Am. Acad. x, 343. Viscidly pubescent: stems strict, erect, simple, few to several from a deep perpendicular root 1-2 inches long: flowers in an open dichotomous panicle, somewhat nodding, upon slender pedicels 3-6 lines long: petals white, 10 lines long, the narrow limb parted to the base and the lobes deeply bifid with filiform segments, the narrow naked claw with the auricles produced upward into lanceolate teeth: scales linear entire: ovary oblong, long stipitate. Oregon and Washington in mountainous districts.

S. montana Watson l. c. 343. Finely pubescent: stems erect from a more or less decumbent base 4-14 inches high: linear-lanceolate or narrowly oblanceolate, acuminate 1-2½ inches long mostly radical; the cauline 3-4 pairs, inflorescence varying from subspicate to paniculate; flowers rarely solitary: calyx 6-9 lines long: petals greenish white to rose-color 2-4 lines longer than the calyx, stamens and style about equalling the petals: ovary long-stipitate: capsule acutish. Near Carson City, Nevada, to Mariposa, Cal. Specimens collected in the Siskiyou Mountains near the Oregon line are doubtfully referred to this species.

S. Gormanii. Finely puberulent with minute crisp hairs, glandular above; stems slender, simple, 1-2 feet high: leaves lanceolate to linear, the lower ones narrowed below to a long slender petiole, acute or acuminate: flowers rather few, erect, in a strict elongated panicle, or sometimes contracted to a several-flowered cyme, pedicels very unequal 3-12 lines long, slender; calyx oblong-cylindrical, 6-8 lines long, truncate at base, somewhat costate with 10 green ribs, the intervening spaces scarious; the subulate teeth very acute; petals well exerted; the blade 3-parted with deeply 2-lobed segments: stamens and styles well exerted: capsule oval, abruptly contracted below to a short stipe. In forests, Hunt's Ranch, Jackson Co. Oregon, 4400 feet elevation: Aug. 13th, 1896: *M. W. Gorman*.

+ + + ++ Calyx oblong, campanulate, or rarely obovate, rather loosely surrounding the ovary sometimes narrowed downward, but not distinctly contracted about the stipe.

S. Suksdorfii Robinson Bot. Gaz. xvi 44 t. 6. Low, densely matted: stems 2-5 inches high, simple, 1-3 flowered, minutely pubescent below, glandular above: stem leaves about 2 pairs, linear 3-7 lines long, a line wide: radical leaves numerous, crowded, similar or somewhat spatulate: calyx broadly cylindrical or campanulate seldom exceeding 5 lines in length; nerves conspicuous, simple below, anastomosing above, petals white, little exceeding the calyx; shallowly bifid, lobes entire: appendages oblong, retuse: stipe of capsule 1½ lines long. On the snowy peaks, Washington to California.

S. Lyallii Watson l. c. xxviii, 144. Glabrous excepting the inflorescence which is subglandular-puberulent: stems slender ascending: leaves linear-oblanceolate, 1-2 inches long, the lower attenuate to a slender petiole: flowers in dichotomous few-flowered cymes, the slender pedicels 3-4 lines long, not deflexed; calyx 4 lines long, campanulate, net-veined above, the teeth obtuse, broadly triangular; petals 7 lines long, brownish purple, with an oblong shortly bifid limb, oblong entire appendages, and naked scarcely auricled claw; anthers purple, included; styles very short; ovary small, narrowly oblong. Cascade Mountains lat. 49 *Lyall* to California.

"This doubtful species is to be distinguished from some forms of *S. Douglasii* only by its smaller flowers, more leafy habit and darker petals." Robinson Proc. Am. Acad. xxviii, 144.

S. Douglasii Hook Fl. i, 88. Finely puberulent throughout and rarely somewhat glandular above: stems numerous erect or ascending from a branching decumbent rootstock, slender 6-15 inches high, simple few-flowered: leaves narrowly oblanceolate to linear, an inch or two long: flowers erect on slender pedicels: calyx oblong-cylindric, often somewhat inflated, 5-7 lines long: petals 8-10 lines long, with broad obtuse lobes, a narrow auricled claw and narrow scales: claws, filaments and stipe of the ovary, more or less villous: capsule oblong-ovate equalling the calyx, rather long stipitate seeds strongly tubercled on the back. Rocky places and cliffs, Washington to California and the Rocky Mountains.

Var. viscida Robinson Proc. Am. Acad. xxviii, 144. Glandular-viscid especially above: stems erect, rigid, mostly simple from a branched, slightly woody base: calyx broadly oblong or almost campanulate relatively short: leaves narrowly lanceolate to linear-oblong, thickish. Washington to Brit. Columbia.

S. macrocalyx. *S. Douglasii* var. *macrocalyx* Robinson Proc. Am. Acad. xxviii, 145. Puberulent or nearly smooth scarcely viscid: stems; several from the fleshy root, rather stout 1-2 feet high: leaves narrowly lanceolate to linear, attenuate to each end: flowers mostly in 3-flowered long-peduncled cymes: calyx long-cylindrical, 8-10 lines long, 3-5 lines in diameter, the ends of the teeth surrounded by an obtuse inflexed membrane: petals pink or purplish, 2 lobed: segments obtuse: claw auricled, appendages oblong, obtuse. On dry ridges, Mount Adams Washington to the Humboldt Mountains in Nevada.

S. Columbiana. *S. Douglasii* var. *brachycalyx* Robinson l. c. Smooth or puberulent, but not viscid: root thick and branching: stems many from the much branched caudex, slender, erect, or decumbent at base, 1-2 feet high: leaves distant, spreading, narrowly oblanceolate the lower ones attenuate at both ends, 2-4 inches long: flowers borne in 1-5 flowered long-peduncled cymes: calyx campanulate: 6-10 lines long, in fruit 4-6 lines in diameter, strongly 10-nerved, the intervening spaces scarious, the short triangular teeth scarious margined: petals white or pale pink 2-lobed reticulate veined, the blade half as long as the calyx, the claw conspicuously auricled, the prominent scales oblong, shallowly 2-lobed: capsule ovoid, 5-6 lines long on a stout stipe half as long: seeds dark brown with a prominent pectinate border. On cliffs and rocky banks along the lower Columbia and Willamette rivers.

S. monantha Watson l. c. x, 340. Glabrous: stems very weak, elongated, ascending, branched: leaves narrowly oblanceolate $1\frac{1}{2}$ -3 inches long, acuminate, shortly ciliate at base: flowers terminal on elongated peduncles, not reflexed: calyx 6 lines long, slightly puberulent: petals 9 lines long, the naked claw very narrowly auricled, limb bifid with broad rounded lobes: scales lanceolate entire, half as long as the limb: filaments naked; style short: ovary oblong, rather long-stipitate. Collected by Kellogg & Harford near the Cascades of the Columbia: not since found.

S. Macounii Watson l. c. xxvi, 124. Stems very slender from a slender branching rootstock a foot high, minutely pubescent, glandular above: leaves linear-oblanceolate, 3 inches long or less: flowers few, on pedicels 6-12 lines long: calyx inflated, oblong-campanulate, 4-5 lines long, with short obtuse teeth: petals little exerted, with a broadly auricled glabrous claw and large thin quadrate and nearly entire appendages the flabelliform bifid blade with a linear tooth on each side: capsule equalling the calyx, oblong-ovate, on a stipe $1\frac{1}{2}$ lines long. Washington to Brit. Columbia.

S. multicaule Nutt. T. & G. Fl. i, 192. Grayish tomentulose: stems numerous, erect, rigid, about a foot high: leaves linear-oblancoelate: rather acute: flowers in threes, few, on shortish peduncles: calyx ovate-cylindrical, slightly inflated with obtuse teeth: petals bifid: seeds brown, margined with a scaly crest. Eastern Oregon and Washington to Montana and Idaho.

S. scaposa Robinson Proc. Am. Acad. xxviii, 145. Finely puberulent, somewhat viscid above: stems erect, subsimple almost naked 12-18 inches high, rather rigid: radical leaves thickish, oblanceolate, acute, 3-nerved, somewhat glaucous 2-3 inches long. 3-5 lines broad, cauline leaves reduced to 1-2 pairs of distant bracts: inflorescence a narrow rigid panicle: flowers small erect: calyx oblong or elliptical in outline, with simple green nerves: petals white scarcely exceeding the calyx; the blade short, retuse, the claw with somewhat saccate auricles: appendages short, obtuse: ovary shortly stiped. Blue Mountains of Oregon, *Nevius*; Cold Camp, Oregon, *Howell*.

+ + + + + Inflorescence subspicate or forming an elongated thyrse: styles included or moderately exerted.

S. Scouleri Hook. Fl. i, 88. More or less pubescent and glandular, especially above: stems stout, erect, few or solitary from deep perpendicular roots, 1-4 feet high, leaves oblanceolate 2-6 inches long: flowers somewhat crowded in the axils of the bracts: calyx oblong clavate: petals bifid, the lobes oblong emarginate; the claws with acute auricles woolly-ciliate as well as the filaments; scales obtuse; capsule ovate-oblong 3-4 times longer than the stipe. Oregon and Washington, east to the Rocky Mountains.

S. Spauldingii Watson l. c. x, 344, Viscidly tomentose: stems erect, stout, a foot high or more, simple or branched, very leafy: leaves lanceolate to oblong-lanceolate, 1-2 inches long, acutish; flowers in a short-strict, racemose panicle, nodding or erect: calyx oblong-cylindric, 7-8 lines long; petals scarcely exerted, the broad auricled claw naked, the limb very short and triangular, notched at the apex and with four small lanceolate scales at the base; filaments and style included: ovary oblong, shortly stipitate. Eastern Oregon and Idaho.

2 LYCHNIS Tourn. Inst. i, 333 t. 175, L. Gen. n. 584.

Erect herbs with the aspect of *Silene*. Calyx ovoid, obovate, or clavate, 5-toothed, 10-nerved, usually inflated, its teeth short and not foliaceous. Petals with or without appendages; the blade entire or variously lobed or cleft. Stamens 10. Styles 5, rarely 4, alternating with the petals when of the same number. Ovary 1-celled or divided at the base into 4 or 5 partial cells. Capsule dehiscent by as many or twice as many teeth as styles. Seeds laterally attached: embryo curved.

L. Drummondii Watson Bot. King 37. Finely glandular pubescent above: stems several from thick rootstock, strict and rather stout a foot or two high: leaves narrowly oblanceolate 2-3 inches long, erect: flowers few, on stout strictly erect often elongated pedicels: calyx cylindrical becoming oblong-ovate, 5-6 lines long, with short acutish teeth: petals rarely slightly exerted, white or purple, the narrow emarginate blade narrower than the auricled claw, scales minute, capsule nearly sessile. Eastern Oregon to Colorado.

L. Coronaria Desr. in Lam. Dict. iii, 643, Densely woolly-tomentose throughout: stems 1-3 feet high: leaves oval or oblong: calyx ovoid, its teeth filiform, twisted, the alternating ribs more prominent: petals large, light crimson. Escaped from gardens, in several places from Seattle

Washington to California.

4 AGROSTEMMA L. Gen. n. 379.

Erect annuals or biennials with linear leaves and showy, usually red, flowers. Calyx ovoid; with 10 strong ribs, its lobes conspicuously prolonged into foliaceous appendages. Petals 5, unappendaged. Stamens 10. Styles 5, opposite the petals. Capsule 1-celled. Seeds laterally attached: embryo curved.

A. GITHAGO L. Sp. 435. *Lychnis Githago Scop.* Hirsute annual: stems 1-6 feet high, dichotomously branched: leaves linear: flowers on long peduncles: calyx cylindrical campanulate, with very long teeth, coriaceous: petals large, purple, the blade obcordate; scales none, capsule sessile. Cultivated fields.

Tribe. II. *Alsineæ DC.* Sepals free or slightly united at the very base. Petals more or less contracted at base, but not unguiculate, unappendaged, inserted on the outside of the hypogynous or more or less perigynous disk. Flowers mostly small; styles distinct to the base. Ovary sessile.

* *Stipules none: petals entire or 2-lobed.*

5 CERASTIUM L. Gen. n. 585.

Low herbs with white flowers in terminal bracteate dichotomous cymes. Sepals 5, not carinate. Petals 5, emarginate orbifid. Stamens 10. Styles 5, rarely 3 or 4. Capsule cylindrical or cylindrical-conic, often incurved, 1-celled, many-seeded, dehiscent by twice as many teeth as styles. Seeds subreniform-globose, usually granulate.

* Viscid pubescent annuals.

C. longipedunculatum Muhl. Cat. 46 *C. nutans Raf. Prec. Dec. 36.* Erect, usually branching from the base, 4-10 inches high: leaves narrowly oblong or linear-lanceolate, acute, clasping $\frac{1}{2}$ -1 $\frac{1}{2}$ inches long: cymes often many-flowered; pedicels often nodding or deflexed in fruit; calyx $1\frac{1}{3}$ -2 lines long, the petals slightly longer: capsule 4-6 lines long curved. Sandy river bottoms, eastern Oregon to the Atlantic.

C. viscosum L. Sp. 437. Suberect, 3-12 inches high, dichotomously branched above, leaves ovate or obovate or oblong-ovate 6-12 lines long: flowers in close clusters on very short pedicels: sepals 4, lanceolate, acuminate, with narrow scarious margins $1\frac{1}{2}$ -2 lines long: petals notched with rounded lobes, about equalling the sepals: capsule narrow, at length much exerted. Throughout temperate North America in cultivated fields, etc.

** Perennials.

C. vulgatum L. Sp. ed. 2, 627. Prostrate and rooting at the nodes or suberect, 4-12 inches high; pubescent with spreading hairs: leaves spatulate or oblanceolate to broadly lanceolate, 6-15 lines long: flowers in clusters at the ends of the branches, on slender pedicels 1-2 lines long: sepals lanceolate acute with scarious tips, 2-8 lines long: petals oblong 2-toothed, about equalling the sepals. Common everywhere, introduced from Europe.

C. pilosum Ledeb. Mem. Acad. Petr. v, 539 (?). Erect, rather stout, more or less densely pilose, glandular-pubescent above, leaves oblong-lanceolate 6-12 lines long, 1-6 lines broad, acute, almost sheathing at base: flowers large, few: calyx 3-4 lines long, the petals half longer: capsule 6-10 lines long, the slender teeth at length circinate. Alaska and Siberia to

California.

C. arvense L. Sp. 438. More or less pubescent with reflexed hairs: cespitose: stems erect, rather slender, 3-16 inches high: leaves linear or linear-lanceolate 6-18 lines long, acute, clasping, those of the stem distant: bracts small: cyme few-flowered, usually narrow: pedicels half to an inch or more long: calyx 2-3 lines long, lanceolate,

Var. angustifolium Fenzl in Ledeb. Fl. Ross. i, 413 (?) Stems pubescent, hoary or glandular: leaves elongated, linear or narrowly linear-lanceolate, attenuate at base; those of the stem approximate: lobes of the petals oblong-ovate. Oregon.

C. alpinum L. Sp. 438. Densely silky-hirsute: stems weak, decumbent and matted: leaves elliptic-ovate, 4-6 lines long: flowers few, on more or less elongated pedicels; petals bifid, twice the length of the rather obtuse scarious-margined and hairy sepals: capsule nearly twice as long as the calyx. Wyoming to Alaska, perhaps in Idaho.

6 ALSINE L. (not Wahl. Fl. Lap. 127.)

Low spreading herbs, usually preferring shaded or moist places, with mostly 4-angled stems, flat, rarely acerose; leaves and small white flowers in cymes or solitary. Sepals 5, rarely 4, somewhat united at base. Petals as many, rarely wanting, always more or less deeply 2-cleft, often divided almost to the base, thus appearing as 10, often perigynous. Stamens 10, or by abortion 3-8, styles 3, sometimes 2, 4 or 5, opposite to as many sepals. Capsule globose to oblong, 1-celled, dehiscent to below the middle with twice as many membranous valves as styles. Seeds numerous, reniform-globose or laterally compressed.

§ 1 MYOSOTON Monch Method. 225, (as genus). Styles 5, alternate with the sepals. Leaves ovate, acute.

A. AQUATICA. *Stellaria aquatica* Scop. Perennial: stems strongly angled and somewhat pubescent: leaves large ovate or ovate-lanceolate, acute, the upper sessile, cordate; the lower petiolate: pedicels glandular-viscid deflexed in fruit: petals $1\frac{1}{3}$ -2 times as long as the campanulate glandular-pubescent calyx: styles 5, alternate with the sepals: seeds numerous dark-colored tuberculately roughened. At Nanaimo, Brit. Columbia, perhaps Washington; introduced from Europe.

§ 2 EUSTELLARIA Fenzl. Styles 3 or 4.

* Petals deeply 2-parted, sometimes minute or wanting: segments narrow.

+ Lower leaves contracted to slender petioles.

A. media L. Sp. i. 272. *Stellaria media* Cyr. Char. Comm. 36. Glabrous or nearly so: stems weak and spreading, rooting at the lower joints, marked by a pubescent line: leaves ovate to oblong-ovate, 3-9 lines long on hairy petioles or the uppermost sessile: pedicels slender, 4-6 lines long, deflexed in fruit: bracts foliaceous: petals oblong, deeply divided, shorter than the pubescent sepals: stamens 3-10: capsule oblong-ovate 2-3 lines long, equalling or exceeding the calyx. A common weed in shady places and cultivated grounds. Said to be introduced from Europe.

A. nitens Greene Bot. Bay. Reg. 33. *Stellaria nitens* Nutt. T. & G. Fl. i. 185. Smooth and shining, often hairy at base: stems slender, 3-8 inches high erect or spreading, dichotomously branched with the flowers in the forks: leaves lanceolate, 3-6 lines long, acute, the lower shortly petiolate: bracts small and scarious: pedicels not deflexed in fruit: petals narrow,

acuminate, 3-nerved, 2 lines long, twice longer than the deeply lobed petals which are sometimes wanting: capsule oblong, shorter than the sepals. Common in moist open places, Washington to California, east to Utah.

+ + Leaves all sessile or subsessile, sometimes narrow but not acerose.

+ + Bracts small and scarious.

= Flowers small: petals minute or none.

A. baicalensis Coville Contr. Nat. Herb. iv, 70. *Stellaria umbellata* Turcz. Glabrous, stems very slender, ascending from slender rootstocks, which are clothed with orbicular scale-like, colorless bracts: leaves spreading, elliptical or oblong-lanceolate, acute at each end, 4-8 lines long: flowers in a simple or compound open umbel-like few-rayed cyme: pedicels elongated: sepals ovate-lanceolate, 1-nerved, 1-2½ lines long: petals none: mature capsule twice longer than the calyx. Rocky Mountains to Union county, Oregon, *Cusick*.

= = Flowers of medium size: petals equalling or exceeding the calyx.

a Seeds essentially smooth.

A. longifolia Britton Mem. Torr. Club v. 150. *Stellaria longifolia* Muhl. Stems sharply 4-angled, commonly 8 inches or more in height: leaves linear or linear-oblong, somewhat narrowed at each end, thickish, often ciliate toward the base; the larger ones 1-2 inches long: flowers rather numerous in a lateral long-peduncled open cyme; pedicels spreading, horizontal or deflexed: petals and capsule exceeding the sepals: seeds smooth. Idaho to Canada and Maryland. (Europe and Asia).

A. longipes Coville Contr. Nat. Herb. iv, 70. *Stellaria longipes* Goldie. Smooth and shining or glaucous, erect or ascending, 2-18 inches high: leaves linear to linear-lanceolate, 6-12 lines long, 1-1½ lines wide acute, rather rigid and usually ascending: flowers few, on long slender erect pedicels: sepals scarcely nerved 1½-2½ lines long: petals about equalling the calyx: mature capsule longer than the calyx. About springs etc., eastern Washington to California, east to the Atlantic.

b Seeds distinctly rugose-roughened under a lens.

A. GRAMINEA L. Sp. 422. Stems ascending, smooth and shining 1-2½ feet high, sharply 4-angled; internodes usually elongated: leaves sessile, lanceolate or linear-lanceolate, thickish, attenuate, furrowed above and with midrib prominent beneath, inflorescence a broad terminal pedunculate cyme, often with one or two smaller cymes at its base; pedicels elongated spreading or deflexed: capsule exceeding the calyx: seeds rugose, roughened. Introduced from Europe.

A. uliginosa Britton l. c. *Stellaria uliginosa* Murr. Low, weak, diffuse: stems numerous, leafy: leaves lanceolate or elliptical-lanceolate, 6-8 lines long: seeds rugose roughened. Mount Rainier, *Piper*, to the Eastern States.

+ + Bracts more or less foliaceous.

A. brachypetala. *Stellaria brachypetala* Bong. *S. alpestris* Fries *S. corollina* Fenzl. Glabrous: stems weak and slender, usually erect, 6-20 inches high dichotomously branched above: leaves lanceolate, attenuate, the middle cauline the largest, 1-2 inches long, 1-nerved: pedicels in the forks of the dichotomous branches, slender, spreading, 8-12 lines long: sepals lanceolate, acute, scarious margined about a line long: petals shorter than the sepals, 2-parted, the segments lanceolate, acute: capsule oblong-ovoid exceeding the sepals, seeds smooth. In wet places, Oregon to Alaska and the Eastern States.

+ + Bracts foliaceous.

A. borealis Britton Mem. Torr. Club v, 149. *Stellaria borealis* Bigel. Glabrous: stems usually weak, erect or spreading, branching $\frac{1}{2}$ -2 feet high: leaves linear-lanceolate to ovate-oblong, $\frac{1}{2}$ -2 inches long, 1-5 lines wide, acute. flowers in dichotomous cymes: sepals ovate to lanceolate, a line long or more: petals 2-parted, shorter than the calyx, 2-5 or wanting: capsule ovate $1\frac{1}{2}$ -2 lines long, on spreading or deflexed peduncles: seeds smooth. Along streams, Oregon, etc., to the Atlantic.

A. humifusa. *Stellaria humifusa* Rottb. Low, densely matted, smooth: stems prostrate or ascending, angulate, shining: leaves elliptic-ovate or oblong, acutish, 2-5 lines long, marcescent: bracts foliaceous: peduncles axillary, 4-7 lines long: sepals ovate-oblong acute, narrowly margined, petals somewhat exceeding the calyx: seeds smooth.

A. crispa Holzinger Contr. Nat. Herb. iii, 116. *Stellaria crispa* Cham. & Schlecht. Glabrous: stems very slender, weak and decumbent, 6-12 inches long, simple or sparingly branched: leaves thin, ovate to oblong-ovate, acuminate, commonly crisp on the edges, 4-6 lines long: pedicels solitary, 3-10 lines long: sepals scarious-margined, lanceolate, acute, $1\frac{1}{2}$ -2 lines long, 3-nerved: petals when present, deeply cleft, with linear acute lobes: capsule acute, longer than the calyx.

A. obtusa. *Stellaria obtusa* Engelm. Bot. Gaz. vii, 5. Smooth: stems weak, nearly simple, 2-6 inches long: leaves thin, ovate to broadly lanceolate, acute, 3-10 lines long: flowers solitary, appearing axillary: sepals ovate obtuse, hardly at all scarious on the margins: petals none: capsule $1\frac{1}{4}$ - $1\frac{1}{2}$ times as long as the calyx, obtuse: seed brown, covered with minute lighter colored oblong tubercles with fringed edges. In wet places on mountains, Blue Mountains, Oregon to British Columbia and Colorado.

A. Simcoeii. Pubescent throughout with spreading hairs: densely cespitose: stems filiform erect, simple or sparingly branched, 4-8 inches high: leaves oblong to elliptical, acute, 4-6 lines long, 1-nerved: pedicels solitary, filiform, 10-12 lines long: sepals oblong, acutish, broadly margined, less than a line long: petals 2-parted; segments oblong, about half as long as the calyx; capsule and seeds not seen. In springs on top of the Simcoe Mountains, Washington.

* * Petals retuse or shortly bifid, divided but $\frac{1}{4}$ - $\frac{1}{2}$ the way to the base, commonly considerably exceeding the calyx.

A. Jamesii Holzinger l. c. *Stellaria Jamesii* Torr. Viscid above: stems strongly angled, rather stout and ascending, branched, 1-2 feet high: leaves linear to ovate-lanceolate, attenuate, 1-3 inches long, 2-9 lines wide, acuminate, dark green: pedicels spreading, rather short, at length deflexed: sepals oblong, acute, 2-3 lines long, the bifid petals mostly twice longer: capsule ovate shorter than the calyx: seeds smooth. Woodlands and creek bottoms, northern California to Washington, Colorado, New Mexico and Arizona.

7 ARENARIA L. Gen. n. 569.

Mostly low, often tufted annual or perennial herbs with sessile subulate and more or less rigid leaves without stipules and small white flowers in paniculate or capitate cymes in spring and summer. Sepals 5, rarely 4. Petals as many as sepals, rarely wanting, entire or emarginate. Stamens twice as many as petals. Styles 3, rarely 2, 4 or 5, opposite as many sepals. Capsule globose or short-oblong, dehiscent into as many 2-cleft valves as styles, few to many-seeded. Seeds laterally compressed or reniform-globose.

§ 1 *Mœhringia* Fenzl. in Endl. Gen. 968. Seeds at least when young provided with a spongy appendage at the hilum.

A. lateriflora L. Sp. 423. Minutely pubescent: stems erect, slender, 4-12 inches high, simple or branched: leaves oblong or oval obtuse, 5-6 lines long, punctate, hairy on the margin and midrib: peduncles lateral and terminal, 2-flowered, one of the pedicels bibracteolate near the middle: sepals oblong-ovate obtuse, $1\frac{1}{3}$ lines long: petals oblong, obtuse, twice longer than the sepals. In damp shady places, western Oregon to the Atlantic Coast.

A. macrophylla Hook. Fl. i, 102 t. 37. Stems ascending 3-8 inches high, mostly simple, leafy, puberulent above: leaves 3-4 pairs, narrowly lanceolate, acute at each end, 1-2 inches long, thin, bright green, the upper largest: flowers few on slender pedicels; sepals ovate-oblong, acuminate, $1\frac{1}{2}$ - $2\frac{1}{3}$ lines long, 1-nerved: petals obovate, longer or shorter than the sepals: capsule ovoid, nearly equalling the calyx: seeds rather large, smooth. Open forests, Brit. Columbia to California, east to the Rocky Mountains.

§ 2 *Ammadenia* B. & H. Gen. i, 151. Flowers axillary. Sepals united at base; styles 3-5: ovary more or less 3-5 celled, disk conspicuous 10-lobed and glanduliferous: capsule globose, somewhat baccate. Seeds not appendaged.

A. peploides L. Sp. 423. Glabrous perennial: stems 6-8 inches high, stout, angled: leaves thick, ovate or obovate 1-nerved, shortly pointed, clasping at the broad base: sepals ovate-lanceolate, acuminate, $3\frac{1}{2}$ lines long, about equalling the petals. Sandy seashore from the Columbia river northwards and on the northern Atlantic Coast, (northern Europe and Asia).

A. sitchensis Dietr. Syn. Pl. ii, 1565. *A. peploides* var. *major*. Hook. l. c. 102. Glabrous and succulent: 6-12 inches high from thick creeping rootstocks: leaves oblong to short-spatulate, obtuse or acute, short-apiculate, fleshy, with narrow, scarious, crenulate margins: flowers axillary, on short peduncles: lobes of the calyx lanceolate-ovate, acute, about a line long: petals oblong, narrowed below to a short claw about half as long as the lobes of the calyx, sometimes wanting. Salt marshes, coast of Oregon to Alaska.

§ 3 *Merckia* B. & H. Gen. i, 151. Styles 3-5. Ovary 3-5-celled: capsule large, depressed-globose, somewhat inflated: many-seeded, seeds not appendaged.

A. physodes Fisch. in DC. Prod. i, 413. Cespiteous perennial: stems weak, decumbent, 3-6 inches long: leaves ovate, cuspidately pointed 4-6 lines long: flowers solitary at the summit of the stem or becoming lateral: sepals lance-oblong, acute, 3 lines long equalling or slightly exceeding the petals: capsule 4 lines in diameter. Brit. Columbia to northern Alaska, perhaps northern Washington.

§ 4 *Euarenaria* Robinson l. c. 219. Styles normally 3, capsule ovoid, dehiscent by 3 2-toothed or parted valves: seeds not appendaged.

* Leaves ovate elliptic or linear, not acerose.

A. serpyllifolia L. Sp. 423. Diffuse, 3-10 inches high, retrorsely pubescent: leaves ovate, acute, minutely ciliate: sepals lanceolate, acuminate hairy 3-5 nerved, nearly twice the length of the petals: capsule ovate, as long as the sepals. Fields and roadsides, western Oregon and Washington, also in the Atlantic States.

VAR. *tenuior* Koch. Synop. 117. More delicate, leaves reduced: flowers

smaller, in a nearly naked racemose panicle, capsule more oblong. Portland, Oregon and vicinity, (Europe).

* * Leaves very narrowly linear commonly acerose, often rigid and pungent.

+ Sepals broadly ovate obtusish, sometimes apiculate: flowers not densely aggregate.

A. capillaris Poir. in Lam. Encycl. vi. 380. Leaves chiefly grouped at the base in fascicles upon a multicapital caudex, $\frac{1}{2}$ - $2\frac{1}{2}$ inches long, somewhat pungent, little spreading; the cauline few pairs, much reduced: stems 4-8 inches in height: petals obovate, considerably exceeding the short obtuse sepals. Idaho to the Rocky Mountains.

A. formosa Fisch, in DC. Prodr. i, 402. More or less glandular-pubescent above, erect, 3-12 inches high: leaves linear subulate, half to two inches long, pungent: the cauline few, short and erect: flowers few in an open cyme; bracts small, lanceolate: sepals ovate, acute, 1-2 lines long, 3-nerved, membranously margined: petals half longer: capsule somewhat exceeding the calyx. In the higher mountains from Brit. Columbia to California.

A. aculeata Watson Bot. King 40. Leaves fascicled at the ends of numerous barren shoots, glaucous, rigid, subulate and aculeate: stems nearly naked, somewhat scabrous above: flowers few, on long slender erect pedicels: sepals ovate acute: capsule becoming twice longer than the calyx, splitting into 3 2-toothed valves: seeds smooth. High hills, south-east Oregon to Nevada.

+ + Sepals ovate or ovate-lanceolate acuminate, shorter than the petals.

A. congesta T. & G. Fl. i, 178. Smooth, glaucous, 4-12 inches high: leaves very narrowly subulate, scabrous on the margin, often pungent, the lower 1-3 inches long; cauline 6-12 lines long: flowers in 1-3 dense subumbellate fascicles, with large dilated membranaceous bracts: sepals ovate-oblong, strongly concave with scarious margins, 1-3 lines long, acute: petals narrowly oblong, nearly twice as long as the calyx: capsule equalling the calyx. In the mountains from Washington to California, Nevada and Colorado.

+ + + Sepals lanceolate to lance-linear attenuate, equalling or exceeding the petals.

++ Flowers cymose, not densely aggregated.

A. Burkei. *A. Fendleri* var. *subcongesta* Watson Bot. King 40. Stems several from a more or less ligneous caudex, smooth or glandular, 4-6 inches high, many-leaved at base: leaves setaceous somewhat flattened, glabrous: flowers more or less clustered upon short pedicels or the lateral ones sessile: bracts broad and scarious: petals but little exceeding the ovate acuminate scarious sepals. On bleak hilltops, eastern Oregon and Nevada to Brit. Columbia and the Rocky Mountains.

A. Fendleri Gray Pl. Fendl. 13. Stems simple, 6-15 inches high glabrous below, more or less glandular-pubescent above, imbricately many-leaved at base, leaves long, erect setaceous somewhat flattened scarious-serulate glabrous: cymes strict, few-flowered: pedicels slender: sepals glandular pubescent, ovate lanceolate, cuspidate-acuminate, green with a broad scarious margin, nearly equalling the white obovate petals: capsule about equalling the calyx. New Mexico, etc., to eastern Oregon.

++ ++ Flowers densely fascicled at the end of the stem.

A. Franklinii Dougl. in Hook. Fl. i, 101 t. 35. A span or less in height: branches erect, fastigiate, numerous fragile: leaves smooth subulate-setaceous, very pungent, an inch long: flowers fascicled: sepals subulate scarious,

broadly 1-nerved, about equalling the oblong obtuse petals: flowers on short pedicels in dense fascicles, crowded with bracts similar to the leaves. On sandy banks along the Columbia river.

§ 5. *ALSINE* Wahl. (as genus, not Linn.). Capsule ovoid, 3-valved; valves entire; seeds not strophiolate: matted perennials or delicate annuals, usually with narrow linear subulate or acrose leaves.

* Palustrine perennial with weak elongated stems, narrow linear or lance-linear leaves and axillary long-peduncled flowers.

A. paludicola Robinson l. c. 298. Glabrous, flaccid: stems several, subsimple, procumbent, rooting at the lower joint, sulcate, shining, leafy throughout: leaves uniform, flat, 1-nerved, acute, spreading, $\frac{3}{4}$ - $1\frac{1}{2}$ inches long, 1-3 lines in breadth, often punctate, somewhat connate, slightly scabrous upon the margins: peduncles solitary in the axils, 1-2 inches long, spreading or somewhat deflexed: sepals nerveless not at all indurated, acutish, about half the length of the obovate petals. In swamps along the Coast, San Francisco to Seattle, Washington.

** Terrestrial annuals: sepals neither indurated nor very strongly nerved.

= Seeds much flattened, and margined.

A. Douglasii T. & G. Fl. i, 674. Sparingly pubescent with spreading hairs or glabrous, slender, much branched, 3-10 inches high: leaves filiform, half to an inch or more long: flowers rather large on long filiform pedicels: sepals oblong-ovate obtusish or acute, obscurely 3-nerved, $1\frac{1}{2}$ lines long: petals obovate, 2- $2\frac{1}{2}$ lines long: capsule globose, equalling the calyx: seeds large, flat, smooth, acutely margined. Dry hillsides, southwestern Oregon and California.

+ + Seeds not flattened nor winged.

A. Howellii Watson Proc. Am. Acad. xx, 354. Glandular hispid but the internodes usually glabrous: widely branching, 6-12 inches high: leaves thick, narrowly lanceolate or linear, with base 6-9 lines long, blunt, spreading: flowers small on slender pedicels: sepals a line long, nerveless: petals twice longer, narrowly oblong: capsule ovate, a little exceeding the sepals: seeds black, turgid, with several rows of minute tubercles along the rounded margins. On dry foothills, eastern base of the Coast Mountains in Josephine county, Oregon.

A. California Brewer in Bol. Cat. 6, Brew. & Wats. Bot. Cal. i, 69. Glabrous, very slender, 2-6 inches high: leaves lanceolate, 1-2 lines long, obtusish: flowers small on slender pedicels: sepals oblong-ovate, acute, 3-nerved, 1-2 lines long: petals spatulate, 2-3 lines long: capsule oblong: seeds small, sharply muriculate. Moist places, southwestern Oregon and California.

A. pusilla Watson l. c. xvii, 367. Very slender, an inch or two high; glabrous: leaves lanceolate, thick and bluntish, a line or two long: sepals lanceolate, acute, obscurely 1-nerved: petals very small or wanting: capsule oblong-ovate, not exceeding the sepals: seeds turgid and smooth. Near The Dalles, eastern Oregon and Washington, in dry prairies: also on the plains about Yreka, northern California.

** Annuals or loosely matted perennials: sepals lanceolate, acuminate or attenuate, strongly 3-5 nerved.

A. tenella Nutt. T. & G. Fl. i, 179. Slender, 2-4 inches high, smooth, leaves filiform-subulate, acute: peduncles minutely glandular: sepals ovate-lanceolate, acute, 3-nerved $1\frac{1}{2}$ lines long: petals oblong, 2- $2\frac{1}{2}$ lines long:

capsule but little longer than the sepals: seeds turgid minutely rugose tuberculate. On rocks, Columbia river below the Cascades.

A. stricta Michx. Fl. i, 274. Diffusely cespitose, glabrous, branching from the base: stems 3-15 inches high: leaves subulate-setaceous, 1-3-nerved, many, fascicled in the axils: petals oblong-obovate twice the length of the rigid, ovate, very acute 3-ribbed sepals: capsule about as long as the calyx. On rocks and sandy ridges, Columbia river below the Cascades: also on the Atlantic coast.

* * * Closely tufted perennials: sepals acuminate but not strongly nerved, except in *A. propinqua*.

A. propinqua Richardson in Franklin Journ. 738. *A. verna* var. *hirta* Watson Bot. King 41. Closely tufted: stems, peduncles and calyx finely glandular-pubescent: leaves nearly or quite smooth: stems tufted, numerous, slender, ascending or erect, 1-5 inches high, 1-several-flowered; leaves linear-subulate, flat, obtuse, 3-nerved, usually erect, not squarrose: peduncles filiform: sepals ovate-oblong, acutish to acuminate, $1\frac{2}{3}$ -2 lines long exceeding the obovate or oblanceolate petals: capsule surpassing the sepals. On the highest mountains, Oregon to Alaska and the Rocky Mountains.

A. Nuttallii Pax in Engler, Jahresb. xviii. 30. *A. pungens* Nutt in T. & G. Fl. i, 179 (not of Clem.). Pubescent throughout: extensively cespitose stems numerous 2-4 inches high. leaves linear-subulate, half to two inches long, pungent, crowded: flowers in an open cyme, leafy bracted: sepals lanceolate, acuminate, pungent 1-3 lines long 3-nerved: petals about equalling the calyx: the capsule shorter: seeds very few, smooth. In mountainous districts, California and Nevada to Oregon and Colorado.

* * * * Densely cespitose perennials with acicular or subulate leaves and oblong or linear-oblong, very obtuse sepals.

+ Petals oblong or narrowly obovate.

A. Sajanensis Willd. in Schlecht. Berl. Mag. Natf. (1816) 200. Glabrous, or the inflorescence glandular: stems simple, usually 1-flowered: leaves linear subulate, obtuse thickish, 3-nerved: petals obtuse, about half longer than the oblong sepals. Alpine, Mounts Hood, and Adams to the Rocky Mountains and Alaska.

+ + Petals broadly obovate, much exceeding the calyx.

A. arctica Stev. in D. C. Prodr. i. 404. Stems 1-3 inches high, often scarcely exceeding the leaves: leaves linear-subulate, obtuse fleshy, minutely ciliate; peduncles glandular-pubescent 1-rarely 2 or 3 flowered; petals about twice longer than the very obtuse 1-nerved sepals. Arctic Coast, perhaps on our northern border.

8 ALSINELLA Dill.

SAGINA L. Gen. n. 176.

Low herbs with subulate or filiform leaves without stipules, and small terminal usually long-peduncled flowers. Sepals 4-5, Petals as many as sepals, entire or slightly emarginate, often minute or wanting. Stamens as many as petals, rarely twice as many or fewer. Ovary 1-celled, many-ovuled. Styles as many as sepals and alternate with them. Capsule dehiscent to the base by as many entire valves as sepals and alternate with them.

A. occidentalis Greene Fl. Francis. 125. *Sagina occidentalis* Watson. Annual: glabrous or nearly so: diffusely branched from the base: stems very slender, 1-6 inches long, decumbent at base or ascending: well developed,

several-flowered: the lowest flowers distinctly axillary: leaves not fasciated, 3-6 lines long, pungent flowers 5-merous on long pedicels that are erect in fruit: sepals a line long: petals nearly as long: stamens 10: capsule exceeding the calyx. Moist places and along the Coast, California to Alaska.

A. saginoides Greene l. c. *Sagina Linnæi Presl*. Biennial or perennial, glabrous, densely matted and decumbent, 1-3 inches long, rooting and often forming lateral rosettes: leaves somewhat fasciated, 3-7 lines long, pungent: flowers on long pedicels, at length nodding: sepals a line long, obtuse, exceeding the petals: stamens 10: capsule at length nearly twice longer than the calyx. In wet places on high mountains, Arctic America to California.

A. crassicaulis Greene l. c. *Sagina crassicaulis Watson*. Smooth perennial stems several to many, branching 1-5 inches long: leaves linear, pungent thickish, 2-7 lines long or more, the basal forming a rosette which may persist or not; the cauline connate by broad scarios membranes: pedicels numerous, straight: flowers 5-parted, petals and sepals subequal $1\frac{1}{4}$ lines long: capsule $\frac{1}{3}$ - $\frac{1}{4}$ longer. Near the sea, mouth of the Columbia river to Monterey, Cal.

9 SPERGULA L. Gen. n. 586.

Dichotomously or fasciculately branched annuals with subulate fasciated or apparently whorled leaves with small scarios stipules and small white flowers on slender pedicels in dichotomous cymes. Sepals 5, entire. Stamens 10, rarely 5. Ovary 1-celled, many-ovuled; styles 5, alternate with the sepals. Capsule 5-valved, the entire valves opposite to the sepals. Seeds laterally compressed, acutely margined or winged: embryo spiral.

S. ARVENSIS L. Sp. 440. Smooth: stems several, a foot or two high: leaves filiform, numerous in apparent whorls, 1-2 inches long; stipules small: pedicels at length reflexed: sepals oblong to ovate 2 or 3 lines long, equalling the petals, a little shorter than the broadly ovoid capsule: seeds rough, acutely margined. Sandy fields, especially near the Coast, Washington to California; naturalized from Europe.

10 TISSA Adanson Fam. des Pl. ii, 507.

Low, more or less succulent herbs, usually depressed, with setaceous or linear fasciated leaves with scarios stipules and small white or pink flowers in subracemose cymes. Sepals 5. Petals 5, rarely few or wanting. Stamens commonly 10. Styles 3, very rarely 5. Ovary 1-celled. Capsule with as many valves as styles, when 5, alternate with the sepals. Seeds often margined.

* Perennials with fusiform fleshy roots.

T. macrothecum Brit. Bull. Torr. Club xvi, 129. *Lepigonum macrothecum F. & M* Perennial, rather stout, 4-12 inches high: decumbent at base, sparingly pubescent, at least above: leaves linear, fleshy, 1-2 inches long; with large ovate stipules: flowers large, subracemose; pedicels 4-12 lines long becoming reflexed: sepals ovate-lanceolate, 3-5 nerved, more or less tomentose, 3 lines long or more, equalling or exceeding the petals: capsule ovoid, about equalling the calyx. In salt marshes, Washington to Southern California.

** Annuals: flowers axillary.

T. salina Britton l. c. 123. *Lepigonum marinum Wuhl. spergula salina Presl*. More or less pubescent or often nearly glabrous; much

lbranched, 3-9 inches high; leaves linear, fleshy, $\frac{1}{3}$ -1 inch long or more; stipules short; pedicels 1-9 lines long, reflexed; calyx 1-2 lines long; capsule a little longer than the calyx. Along the Coast, Puget Sound to California, and the Atlantic Coast.

* * * Procumbent or decumbent winter annuals, scarcely at all fleshy; flowers small or of medium size; stipules conspicuous.

T. rubra Britton l. c. 127. *Spargularia rubra* Presl. Stems spreading; wiry, 1-10 inches long, smoothish below, fine glandular-pubescent above; leaves flat above, narrowly linear, cuspidate 4-9 lines long $\frac{1}{3}$ - $\frac{1}{2}$ line broad; stipules white, attenuate 2-3 lines long; inflorescence racemiform; pedicels filiform, exceeding the bracts and about twice as long as the oblong-lanceolate scarious-margined acutish glandular-pubescent sepals; flowers magenta, $1\frac{1}{4}$ lines in diameter, petals scarcely equalling the calyx; capsule equalling the calyx; seeds minutely crested but not winged. Road-sides and sandy places, Washington to California and the Atlantic States (Europe). Cowal
June

* * * Slender spreading or erect annuals scarcely fleshy; stipules short, deltoid.

T. diandra Britton l. c. 128. *Spergularia diandria* Boiss. Viscid pubescent to nearly glabrous; leaves not fascicled, linear-filiform; pedicels slender, about two lines long, spreading or deflexed; sepals in fruit $1\frac{1}{2}$ lines long but little exceeding the capsule; stamens usually only 2 or 3. Sandy places from the Columbia valley to Texas.

ORDER XII. ILLECEBRACEÆ Lindl. Nat. Syst. ed. 2, 127.

Herbaceous or rarely suffrutescent branching plants with opposite or fascicled entire mostly sessile leaves and scarious stipules, closely related to Amarantaceæ. Sepals 5, persistent; petals reduced to mere filaments alternate with the sepals or wanting. Stamens as many as the sepals and opposite them, fixed by the middle introse. Ovary 1-celled by the obliteration of the dissepiments. Style 2-cleft. Fruit an utricle with a solitary or geminate ovule borne on slender funiculi rising from the base of the cell. Seeds campylotropous. Embryo more or less curved around the outside of mealy albumen.

1 PENTACÆNA Bartling.

Low densely tufted perennial, with the subulate leaves densely crowded on the branches, dry and silvery stipules and axillary clusters of sessile flowers. Sepals 5, nearly distinct, hooded, unequal, terminating in a short divergent spine, the inner more shortly awned. Petals minute, scale-like. Stamens 3-5, inserted at the base of the sepals; style very short, bifid. Utricle included in the rigid connivent calyx.

P. ramosissima Hook. & Arn. Bot. Misc. iii, 338. Prostrate and matted, 2-18 inches long, somewhat woolly; leaves 3-5 lines long, pungently awned, at length recurved; stipules lanceolate, acuminate, shorter than the leaves, 1-nerved; calyx tube a line long, the divergent outer lobes nearly twice longer; stamens usually 5; stigmas sessile; utricle apiculate. On the seashore, Oregon to southern California.

ORDER XIII. PORTULACACEÆ Reichb. Consp. 161.

More or less succulent herbs with simple entire leaves and regular perfect flowers. Sepals only 2 (sometimes more in *Lewisia*). Petals 5 and definite or indefinite, imbricated in aestivation. Stamens opposite the petals when of the same number or fewer; filaments all fertile, distinct; anthers fixed by the middle, versatile or introse. Ovary 1-celled by the obliteration of the dissepiments, with few or many campylotropous or amphitropous ovules on a free central placenta, in fruit becoming a capsule with transverse or loculicidal dehiscence. Embryo curved or coiled on the outside of mealy albumen. Flowers axillary or terminal, mostly ephemeral.

* Capsule dehiscing transversely near the middle: sepals united to near the middle, and in ours adnate to the ovary, the upper portion at length deciduous.

1. **Portulaca.** Petals 4-6 periginous: stamens 9-20.

* * Capsule dehiscing transversely at the very base: sepals persistent.

2. **Lewisia.** Sepals 6-8; marcescent-persistent: petals 10-16: scapes 1-flowered, jointed and bracteolate near the middle.

3. **Oreobroma.** Sepals 2: petals 3-10, usually 7; stems scape-like with a pair of (at least when young) opposite bracts below the inflorescence, 1-many-flowered.

* * * Capsule loculicidally 3-valved: sepals 2, ovary several-ovuled: petals 3-several.

4. **Calandrinia.** Sepals 2, persistent: petals 3-7: stamens 3-10, seldom of the same number as the petals.

5. **Talinum.** Sepals 2, deciduous: petals 5.

* * * * Capsule loculicidally 3-valved: sepals 2, persistent: petals 5.

6. **Claytonia.** Capsule several-seeded: stamens 10, inserted on the claw of the free and equal petals.

7. **Montia.** Petals 5, more or less distinctly united at the base, unequal: stamens mostly 3, inserted on the claws of the 3 smaller petals.

* * * * * Capsule 2-valved: sepals 2, broad, more or less scarious, persistent.

8. **Spraguea.** Sepals emarginate at base and apex: petals 4: stamens 3, exerted, opposite the 3 larger petals.

9. **Calyptridium.** Sepals mostly unequal, petals 2-4; stamens 1, 2 or 3, shorter than the petals and alternate with them.

§ 1 *Capsule circumscissile.*

1 PORTULACA Tourn. Inst. 236.

Low succulent diffuse or ascending herbs with alternate or opposite leaves scarious or setaceous stipules and axillary or terminal ephemeral yellow or rose-color flowers in summer. Sepals 2, coherent at base into a tube and adnate to the base of the ovary, the free upper portion at length deciduous. Petals 4-6. Stamens 4-20, periginous with the petals. Style 1, deeply 3-8-cleft. Capsule circumscissile near the middle, many-seeded.

P. oleracea L. Sp. 445. Glabrous and usually purplish: stems prostrate, 2-20 inches long: leaves flat, fleshy, obovate to spatulate, rounded at the summit: stipules minute: sepals acute, carinate; petals yellow, 1-2 lines long: stigmas 5: capsule 3-5 lines long: seeds dull, black, finely tuberculate: flowers sessile, axillary. Cultivated grounds and waste places throughout North America, Europe, etc.

2 LEWISIA Pursh. Fl. 368.

Low acaulescent succulent perennials with thick fleshy roots, short 1-flowered scapes that are joined and bracteolate near the middle, and large usually pink flowers. Sepals 6-8 distinct, marcescent-persistent. Petals 8-16, large and showy. Stamens numerous. Style 5-8 parted nearly to the base. Capsule circumscissile at the very base then bursting irregularly, many-seeded. Seeds black and shining. Cotyledons accumbent.

L. rediviva Pursh. l. c. Leaves densely clustered at the crown of the thick caudex, linear-oblong, subterete 1-2 inches long, smooth and glaucous: scapes but little longer than the leaves, sepals broadly ovate, unequal, partly scarious 6-9 lines long, petals narrowly oblong 9-16 lines long, pink or rose-color to white: capsule broadly ovate, 3 lines long. On top of the highest hills and mountains east of the Cascade Mountains from California to British Columbia and the Rocky Mountains.

3 OREOBROMA Howell Eryth. i, 31.

Low acaulescent perennials with fleshy roots with or without a multicapital caudex bearing tufted leaves and scapose stems which are jointed at the base and 2-bracteolate below the inflorescence. Sepals 2, rarely apparently 4, persistent. Petals 3-10 or more. Stamens 5-20 or more usually not of the same number as the petals. Style deeply 2-7-cleft. Capsule membranaceous, circumscissile at the base, thence splitting upwards irregularly, many seeded. Cotyledons incumbent.

* Root branching, the caudex at the surface of the ground: nerves of bracts and sepals excurrent and gland-tipped: stems terminating in open paniculate many-flowered bracted racemes.

O. Leana Howell l. c. *Calandrinia Leana* Porter Bot. Gaz. i, 43. Leaves numerous, terete or some of the other ones subspatulate, acute, 1-2 inches long, smooth and glaucous: scapose stems, 3-6 inches high: sepals rounded a line long by $1\frac{1}{2}$ lines broad: petals 6-8, obovate, bare retuse or entire 3 lines long, red to white with darker veins. In beds of talc on high exposed ridges of the Siskiyou Mountains.

O. Columbianna Howell l. c. 32. *Calandrinia Columbianna* Howell Gray Proc. Am. Acad. xxii, 277. Leaves numerous, linear-spatulate flat $1\frac{1}{2}$ -3 inches long, not glaucous: scapose stems 5-12 inches high: sepals rounded or truncate, a line long $1\frac{1}{2}$ -2 lines broad: petals 4-7, oblong, more or less truncate, deeply emarginate to entire, rarely several-toothed at apex, 5-6 lines long, white or pink with dark red veins. On bare exposed basaltic rock along the Columbia river below the Cascades. Cascade Mountains lat. 49, *Lyall*.

O. Cotyledon Howell l. c. 32. *Calandrinia Cotyledon* Watson Proc. Am. Acad. xx, 355. Leaves flat, spatulate or oblanceolate 1-2 inches long by 6-12 lines broad, imbricated in a dense rosulate tuft: stems rather stout, 6-12 inches high, sometimes with 2 pairs of bracts below the short cymose panicle: sepals $1\frac{1}{2}$ -2 lines long ovate or orbicular; petals 5-10, 6-8 lines

long oblanceolate, deep rose-color with orange stripe in the centre: stamens about 7, filaments dilated below, coherent in a tube around the 2-4-parted style capsule obscurely 2-4 valved, 12-20 ovuled. On high exposed peaks of syenitic rock near Preston's peak, Siskiyou Mountains.

O. Howellii Howell l. c. *Calandrinia Howellii* Watson l. c. xxiii, 262. Leaves flat, oblong to ovate, attenuate to a margined petiole, 5-7 lines wide, with narrow hyaline crisped margins: stems 4-6 inches high with one or two pairs of bracts below the short racemose cymes: sepals $1\frac{1}{2}$ -2 lines long, orbicular to broadly ovate: petals 7-10, oblong-oblanceolate, emarginate or entire, 6-8 lines long, deep rose-color, stamens 7. On high exposed ridges, Josephine county, southwestern Oregon.

* * Long thick root branching below: the 2-3-divided caudex not reaching the surface of the ground: nerves of the calyx excurrent, but not gland-tipped: stems terminating in a few-flowered umbel.

O. oppositifolia Howell l. c. *Calandrinia oppositifolia* Watson. Radical leaves linear-oblanceolate, attenuate to the scarioso-margined subterranean base $1\frac{1}{2}$ -3 inches long: the lower cauline 1-3 pairs, opposite and similar with occasionally scattered entire bracts above: stems 5-10 inches high bearing a terminal 1-5 flowered umbel: flowers white or pale pink on elongated pedicels 1-3 inches long: sepals orbicular, 2-3 lines long: petals 10, 6-10 lines long: stamens 8-12 or more: style deeply 3-cleft: capsule oblong, 3 lines long, 5-10-seeded. On wet hillsides about Waldo, Josephine county, Oregon, flowering in April and May.

O. Tweedyi Howell l. c. *Calandrinia Tweedyi* Gray Proc. Am. Acad. xxii, 277. Caudex and root very thick: leaves obovate fleshy 2-4 inches long, an inch or two wide, scapes a little longer than the leaves 1-3 flowered: sepals and bracts entire, the former orbicular: petals an inch long: stamens 10-11: capsule 20-30-seeded: seeds with a large and loose orbicular arillus. Wenatchee Mountains, Washington, alpine.

* * * Root fusiform or conical; wholly underground: scapes 1-3 flowered, not surpassing the radical leaves.

O. pygmæa Howell l. c. 33. *Talinum pygmæum* Gray Sillim. Journ. xxxiii, 407. Leaves narrowly lanceolate or linear 1-2 inches long, with broad scarioso-margined underground petioles: bracts scarioso-glandular-ciliate: sepals orbicular, glandular-dentate 2 lines long: petals red, about twice the length of the sepals: capsule obtuse, nearly equalling the calyx, 16-20-seeded. On Mount Adams, Washington to the Rocky Mountains, Nevada and California.

O. Nevadensis Howell l. c. *Calandrinia Nevadensis* Gray Leaves linear 2-4 inches long by a line or two wide, the underground portion dilated, scapes 1-3 inches high with a pair of foliaceous linear bracts near the middle 1-3 flowered: sepals ovoid, more or less apiculate entire, 3-4 lines long: petals 3-10, white, twice as long as the sepals: capsule elliptical, a little longer than the calyx: ovules 3-50. Wet alpine meadows and rivulets, Washington to California and Nevada.

* * * * Root glandular, comparatively deep-seated: radical leaves few or none: scape-like stems with a pair (or sometimes 3 or 4 in a whorl) of opposite fleshy linear leaves near the middle: several-flowered.

O. triphylla Howell l. c. *Claytonia triphylla* Watson l. c. x, 345. Stems 1-3 inches high: radical leaves, when present, narrowly lanceolate to linear 6-12 lines long: cauline 1-4 in a whorl narrowly lanceolate attenuate below: 1-2 inches long. inflorescence a several-flowered bracteate umbel: bracts minute: petals oblong, 2 lines long exceeding the rounded sepals. In wet places on high mountains, California to Brit. Columbia.

§ 2. Capsule 3-valved, 3-several-seeded. Sepals 2, green herbaceous, becoming more or less colored.

4 CALANDRINIA HBK. Nov. Gen. vi, 77 in part.

Succulent herbs with alternate leaves and ephemeral flowers in bracted racemes. Sepals 2, subequal, persistent. Petals 3-7. Stamens 3-10, seldom of the same number as the petals, apparently always hypogynous. Capsule 3-valved from the summit, persistent, several-seeded. Seeds black, minutely tuberculate. Our species annuals.

C. caulescens HBK. l. c. Glabrous or slightly pubescent; stems diffusely branching from the base, decumbent, 3-8 inches long: leaves linear to lanceolate, 1-3 inches long, the lower slender petioled: racemes simple: peduncles erect or ascending: buds 4-angled: sepals ovate acute, strongly carinate, the keel ciliate: petals broadly obovate, 2-6 lines long: capsule ovate, acute or acuminate, the valves becoming somewhat indurated, about equalling the sepals. Roadsides and moist places, Brit. Columbia to South America.

C. micrantha Schl. Linnæa xiii, Lit. Ber. 97. Diffusely branched from the base; stems slender, decumbent or ascending, 2-6 inches long: leaves linear, ciliate on the margins and midrib: racemes simple: pedicels ascending: sepals broadly lanceolate, acuminate, $1\frac{1}{2}$ -2 lines long; petals 3-7, about a line long: capsule ovate, acute, equalling the sepals. Moist sandy places along the Columbia river.

5 TALINUM Adanson Fam. des Pl. ii, 145.

Low glabrous herbs, rarely suffrutescent at base with mostly linear leaves without stipules and usually white or red flowers in paniculate racemes. Sepals 2, deciduous. Petals 5, sessile, hypogynous, stamens 10-30, adherent to the base of the petals. Style trifid. Capsule globose, 3-valved from the top, many-seeded. Seeds smooth.

T. spinescens Torr. Bot. Wilkes xvii, 250. Caudex short, succulent, beset with small subulate spines which are the indurated and persistent, midribs of former leaves: leaves terete, 6 lines long: scapiform, peduncles slender, surpassing the leaves: flowers in terminal paniculate naked cymes: petals rose-red: stamens 20-30. Wenatchee Mountains, Washington.

6 CLAYTONIA L. in Gronov. Fl. Virg. 25.

Low glabrous acaulescent succulent perennial herbs with scapose stems from a fleshy tuber or roots bearing a pair of, at least when young, opposite leaf-like bracts subtending the loose terminal naked racemes or umbels of delicate white or rose-color flowers that open for more than one day. Sepals 2, persistent. Petals 5, equal. Stamens 5, inserted on the claws of the petals. Ovary free, several-ovuled. Capsule loculicidally 3-valved. Seeds compressed, shining.

* Stems and leaves from a deep-seated corm.

C. lanceolata Pursh. Fl. 175. Scapose stems 3-6 inches high: leaves narrowly lanceolate, 1-2 inches long, usually wanting on flowering specimens; involucre leaves sessile, from narrowly lanceolate to oblong, 1 or 2 inches long: racemes few-flowered and cymose with a single scarious bract at

the base of the lowest pedicel: sepals ovate, acutish or obtuse, 1-1½ lines long: petals 3-4 lines long, pale rose color with darker veins: roots globose. Eastern Washington and Oregon to the Rocky Mountains, Nevada and California, in mountainous districts.

C. umbellata Watson Bot. King 43, t. 6. Scapose stems an inch or two high: radical leaves orbicular to oblong or ovate on long slender petioles (often wanting on flowering specimens): involucreal leaves orbicular to ovate or rhomboidal, on slender petioles: flowers 3-5 in a subsessile umbel, subtended by a broad scarious bract: petals 3-4 lines long, a little longer than the rounded, obtuse, somewhat scarious sepals: root of various shape, usually oblong or fusiform, ½-2 inches long. In gravelly ground, Stein's Mountain, southeastern Oregon to Nevada.

* * Stems and leaves from the crown of a fleshy root.

C. Megarrhiza Parry Watson Bib. Ind. 118. Leaves numerous, cuneate with rounded apex, attenuate below to a margined petiole with scarious dilated base 1-6 inches long, 2-18 lines wide; scapose stems not exceeding the leaves: involucreal leaves lanceolate or linear sessile: raceme secund, subsessile, with comparatively large acutish scarious bract at base; sepals oblong 2-3 lines long, petals obovate subemarginate, a third longer than the sepals. High alpine, growing in crevices of rocks, its large purple tap-root penetrating to a great depth. Blue Mountains of eastern Oregon to the Rocky Mountains.

7 MONTIA Micheli Nova Plantarum Gen. 17 t. 13.

Low glabrous and succulent herbs with delicate pale or white flowers in loose axillary or terminal simple or compound racemes. Sepals 2, rarely 3, persistent. Petals usually 5, rarely 3 or wanting; more or less united at base, usually unequal, 3 of them a little smaller than the other 2. Stamens 3-5, inserted on the base of the corolla, opposite its lobes. Ovary 3-ovuled: capsule 3-valved, 3-seeded.

* Leafy-stemmed annuals: petals unequal.

+ At least the lower leaves opposite.

M. minor Gmelin Fl. Bad. i, 301, (?). Stems weak and filiform, forming dense mats 2-10 inches in diameter rooting at the lower nodes: leaves spatulate or obovate to narrowly oblanceolate, 3-9 lines long: flowers a line long or less: petals conspicuous a little longer than the calyx: seeds dull black, tuberculate. In wet places and ditches, Washington to northern California.

+ Leaves all alternate.

++ Stamens 2 or 3: opposite the 3 smaller petals.

M. Howellii Watson Proc. Am. Acad. xviii, 191. Stems slender, diffusely branched ½-3 inches long, procumbent and rooting at the nodes: leaves narrowly spatulate 2-4 lines long with a dilated scarious clasping base, rarely opposite, usually opposite to a triangular scarious clasping bract which subtends a few-flowered raceme: pedicels shorter than the leaves, reflexed in fruit: flowers very small: sepals less than a line long: petals 2, rarely 3-5 or wanting; the 2 larger a little exerted: seeds black, smooth and shining. Willamette valley: flowers in very early spring.

M. dichotoma Howell l. c. 36. *Claytonia dichotoma* Nutt. T. & G. Fl. 202. Erect, 1-3 inches high, branching from the base and compact leaves all linear 6-12 lines long: flowers in dense terminal racemes: sepals broadly elliptical, about a line long, usually colored: petals but little longer: distinctly united at base: seeds thick-lenticular minutely tuber-

culate, small, dull black. In wet places, Columbia river valley from The Dalles westward.

M. linearis Greene Fl. Francis. 181. *Claytonia linearis* Dougl. Stems erect or spreading 2-6 inches long, branching from the base: leaves linear, sessile by a clasping base, 1-3 inches long, flowers in lax terminal often secund racemes: stamens 3, (rarely 2 or 5): sepals broadly elliptical, 2 lines long, often partly scarious and colored; petals a little longer: seeds black and lustrous, a line broad, the largest in the genus, flat and sharply margined. In moist or wet places, Vancouver Island to northern California.

++ Stamens 5, seeds closely striate and transversely lineolate.

M. diffusa Greene l. c. Annual, stems procumbent diffusely branched: 2 inches to a span long: leaves broadly ovate or deltoid, abruptly attenuate into a petiole, $\frac{1}{2}$ -1 inch broad: racemes very numerous, terminal and lateral, subcorymbose; pedicels slender, at length recurved, the lowest one and often several of the upper ones bracteate: petals emarginate, 2 lines long, a little longer than the calyx. In forests and shady or rocky places near the mouth of the Willamette river to northern California.

* * Leafy-stemmed perennials, stoloniferous or bulbiferous; racemes terminal and axillary, not involucre-bracted: petals 5, scarcely unequal: stamens 5.

+ Stems filiform: leaves alternate; racemes terminal.

M. parvifolia Greene l. c. Stems filiform 2-10 inches long: leaves fleshy, lower clustered, oblanceolate or spatulate, 5-18 lines long; cauline much smaller, usually with leafy bulblets in their axiles: racemes terminal few-flowered: some or all of the pedicels subtended by scarious bracts: sepals broadly ovate obtuse, a line long: petals oblanceolate, emarginate. About springs and wet places, California to Alaska.

+ + Leaves opposite: racemes axillary.

M. Chamissonis Greene l. c. 180. Stems weak and slender, erect or decumbent, a foot or less high, stoloniferous and rooting at the joints: leaves oblanceolate or spatulate $\frac{1}{2}$ -1 $\frac{1}{2}$ inches long; often with bulblets in their axiles: racemes few-flowered with a scarious bract at base; flowers on slender pedicels: sepals orbicular $1\frac{1}{2}$ lines wide: petals white, 3 or 4 lines long. In wet places, Alaska to California, east to the Rocky Mountains.

M. Hallii Greene l. c. A span high, destitute of stolons or bulblets: leaves only 2 or 3 pairs: pedicels in fruit ascending: calyx barely a line long: seeds muriculate. Wet ground, Willamette valley.

* * * Leaves all radical: stems scapiform: racemes involucre, petals and stamens 5 each.

+ Involucral bracts more or less united into a disk, other and smaller bracts above them: annuals, apparently confluent in a series.

M. perfoliata Howell l. c. 38. *Claytonia perfoliata* Donn Willd. Sp. ii, 1186. Scapose stems 6-12 inches high: leaves long petioled, ovate to deltoid usually acute $\frac{1}{2}$ -3 inches broad: light green: involucral bracts completely joined together forming a perfoliate shallow-funneliform disk: flowers in short or long peduncled interrupted elongated racemes: sepals ovate 1-1 $\frac{1}{2}$ lines long; petals a half longer: seeds rather small, black and lustrous, lenticular. Common in shady moist places, Vancouver Island to California and the Rocky Mountains, also Mexico and Chile.

M. parviflora Howell l. c. *Claytonia parviflora* Dougl. Leaves light green, spatulate to filiform, including the petiole 2-6 inches long: scapose stems 2-8 inches long, involucral bracts joined together on one or both sides into a perfoliate or clasping or shallow disk: flowers in sessile or short-peduncled racemes; sepals ovate, a line long: petals but little longer:

seeds small lenticular, black and shining. Common in moist shady places, Washington to California.

M. rubra Howell l. c. Whole plant usually livid red, spreading: leaves deltoid or rhomboid, abruptly narrowed to a margined petiole 1-3 inches long: scapes 1-3 inches long, more or less depressed; involueral bracts completely united (or slightly open on one side) into an orbicular perfoliate disk: flowers in short sessile racemes; sepals orbicular, less than a line long, about half the length of the petals. In dry open woods Washington to northern California.

M. spathulata Howell l. c. *Claytonia spathulata* Dougl. Succulent and glaucous or pale, scapose stems 1-8 inches long, spreading or erect: leaves slender, terete or some of the outer ones becoming spatulate and flattish: involueral bracts either wholly united and the disk shorter on one side, or joined together on one side only and that throughout or only in part: racemes short, nearly or quite sessile; the slender and mostly alternate pedicels 3-4 lines long; sepals ovate, a line or more long, about half the length of the white or rose-color petals: seeds minutely tuberculate. In wet saline soil, southern Oregon and California.

M. humifusa. Depressed and spreading in a circular manner, forming a rosette 1-4 inches in diameter, pale green or yellowish: leaves rather 1-6, thin, orbicular or rhombic to oblong or broadly spatulate the blade 2-6 lines long, abruptly or gradually contracted below to a slender petiole, $\frac{1}{2}$ -2 inches long: scapose stems numerous, $\frac{1}{2}$ -2 inches long: involueral bracts large, completely united on one edge and little or not at all on the other, forming a broad somewhat angular reniform sessile leaf: flowers glomerate in the axils of the involucre and not surpassing it; pedicels about a line long: calyx orbicular to broadly obovate, a line long, petals not seen: seeds small, very black and lustrous, turgid, with a distinct white appendage at the hilum. In moist places, valley of the Walla Walla river near Milton, May 18, 1896, *Howell*. This may be *Claytonia parviflora* var. *depressa* Gray Proc. Am. Acad. xxii, 181.

M. tenuifolia Howell l. c. *Claytonia tenuifolia* T. & G. Fl. i, 201. Stems numerous, filiform: leaves narrowly linear or filiform $\frac{1}{2}$ -2 inches long, insensibly decumbent into long petioles: involueral bracts linear, somewhat dilated at base and then slightly connate on one side, much longer than the sessile 1-bracteate subumbellate raceme: petals oblong, longer than the calyx, rose-color. In damp places about cliffs, etc., southern Oregon and California.

M. arenicola. *Claytonia arenicola* Henderson Bull. Torr. Club xxii, 49. "Annual with delicate fibrous roots, 2-6 inches high: radical leaves linear-spatulate, the broadest not over $2\frac{1}{2}$ lines wide (generally about a line wide) 1-2 inches long, tapering from near the obtuse apex into a delicate petiole: cauline leaves a single pair, similar to the radical but shorter, opposite and distinct: racemes numerous and prolifically flowered, the flowers on pedicels $\frac{1}{2}$ - $\frac{3}{4}$ inch long; petals pink-white, 3 lines long, emarginate; seeds $\frac{1}{2}$ line long shining and resembling those of *C. fibrica*, but only half as large. Dry sandy banks along streams as well as dry pine woods, Idaho and eastern Washington."

+ + Involueral bracts distinct; petals subequal.

+ + Perennial with creeping rootstocks: racemes without bractlets.

M. asarifolia Howell l. c. *Claytonia asarifolia* Bong. Veg. Sitch. 137 (?) *C. cordifolia* Watson Proc. Am. Acad. xvii, 365. Scapose stems 4-12 inches high from a creeping caudex: radical leaves subcordate or somewhat reniform to rhombic-ovate, on long slender pedicels: involueral leaves ovate acute, $\frac{1}{2}$ - $1\frac{1}{2}$ inches long; flowers few upon slender pedicels in a long pedunculate naked (or with a single scarious bract) raceme: petals 3-4 lines long, thrice longer than the rounded sepals. Alpine and alpestrin from Alaska to California, east to the northern Rocky Mountains.

-- -- Perennials with a thickened crown and fibrous roots.

M. Sibirica Howell l. c. 38. *Claytonia Sibirica* L. *Sp.* 204 (?). Scapose stems 6-15 inches high from a thickened crown with fibrous roots: radical leaves rhombic-ovate or nearly orbicular to lanceolate, 1-3 inches long, $\frac{1}{2}$ -2 inches wide: involucreal leaves ovate or spatulate-ovate to lanceolate, $\frac{1}{2}$ -2 inches long: flowers on slender pedicels in elongated bracted geminate racemes; sepals ovate, acute, 1-1 $\frac{1}{2}$ lines long; petals oblong, narrowed to a short claw below, somewhat truncate and notched at the upper end, 3-6 lines long. Common in moist ground, Alaska to California, west of the Cascade Mountains.

M. bulbifera Howell l. c. *Claytonia bulbifera* Gray l. c. *ii*, 54. Stems rather slender, 4-12 inches high, erect or ascending from a cluster of bulblets that are the fleshy persistent bases of former leaves: leaves orbicular or rhombic to lanceolate, 6-18 lines long, narrowed below to a slender petiole 2-4 inches long: involucreal leaves orbicular to obovate or elliptical, sessile but not connate: raceme solitary and terminal, rarely with a second one in the axil of a bract below the terminal one; bracts foliaceous; pedicels filiform, 1-2 inches long: sepals cordate, 1-2 lines long, about as broad, acutish; petals oblong, emarginate to 2-lobed, 4-6 lines long, white with red or purple veins; stamens about half as long as the petals: capsule globose: seeds moderately compressed, ovate, with a conspicuous white appendage at the hilum. Along streams and damp places in forests, southwestern Oregon and adjacent California.

§ IV. *Sepals 2, broad, more or less scarious, persistent: capsule 2-valved.*

9. SPRAGUEA Torr. Pl. Frem. 4 t. 1.

Herbs with rosulate tufts of fleshy leaves from the crown of a fleshy root, or on densely-leafy stems, and ephemeral flowers in dense scorpioid spikes umbellate-clustered on a scape-like peduncle. Sepals 2, orbicular, emarginate at both ends, scarious-hyaline, persistent. Petals 4, somewhat unequal. Stamens 3, opposite the 3 larger petals, exserted. Ovary 8-10-ovuled; style long, bifid at the apex. Capsule 2-valved, membranaceous. Seeds black and shining.

S. umbellata Torr. l. c. Stems several from a thickened biennial root, simple, erect or ascending 2-12 inches high: radical leaves spatulate or oblanceolate, on thick petioles 1-4 inches long; the cauline similar but smaller, frequently scarious-stipulate, often reduced to a few bracts; involucre of broader scarious bracts subtending the dense capitate umbel of nearly sessile spikes: sepals very conspicuous, 2-4 lines in diameter, about equalling the oblong-ovate petals: stamens and style conspicuously exserted. In damp sandy places from the Siskiyou to the Sierra Nevada Mountains.

S. multiceps Howell Eryth. i, 39. Depressed freely branching perennial: stems 1-6 inches long with densely leafy branches: leaves 3-6 lines long or on young plants 2 or 3 inches long: peduncle solitary, terminating the short lateral bractlets, usually with 1 or 2 scarious bracts below the involucre: flowers in dense capitate clusters: sepals scarious, 2-4 lines in diameter, about equalling the oblong-ovate petals: stamens and style conspicuously exserted. In volcanic sand, etc., on the snowy peaks of the Cascade Mountains.

9 CALYPTRIDIMUM Nutt. T. & G. Fl. i, 198.

Smooth depressed annuals with alternate fleshy leaves and small ephemeral flowers in dense axillary and terminal clusters

or compound scorpioid spikes. Sepals 2, mostly unequal, ovate or orbicular, more or less scarious. Petals 2-4. Stamens 1-3, shorter than the petals and alternate with them. Capsule membranaceous 2-valved, 6-12-seeded. Seeds black and shining, circinate, compressed, on filiform funiculi of unequal length, rising from the base of the cell.

C. roseum Watson Bot. King 44 t. 6. figs. 6-8. Diffusely branched: stems decumbent, 1-3 inches long: leaves oblong-spatulate, attenuate at the base: sepals very unequal, nearly orbicular, 1-3 lines broad: petals minute, rounded-oblong: capsule oblong-ovate, shorter than the calyx: style very short. Southeastern Oregon to Nevada and California.

ORDER XIII. ELATINACEÆ Lindl. Nat. Syst. ed. 2, 88.

Low annuals with opposite dotless membranous stipulate leaves, regular and symmetrical flowers with hypogynous petals and stamens and distinct styles bearing capitate stigmas. Sepals 2-5 distinct, persistent. Petals as many as the sepals and alternate with them. Stamens as many or twice as many as the petals. Ovary 2-5-celled. Capsule 2-5-valved, crowned with the persistent styles or stigmas: placentæ in the axis. Seeds anatropous cylindrical with crustaceous coat and little or no albumen.

1. **Elatine.** Parts of the flowers each 2-4, sepals obtuse.
2. **Bergia.** Parts of the flowers each 5, sepals acute.

1 ELATINE L. Gen. n. 502.

Small prostrate glabrous annuals, growing in water or wet places with entire leaves and solitary flowers. Sepals 2-4, membranaceous, obtuse, nerveless. Petals as many as sepals: Stamens as many or twice as many as petals. Styles 2, 3 or 4. Ovary globose, with the placentæ in the axis, many-ovuled. Capsule membranaceous 2-4-celled, the partitions remaining attached to the axis or evanescent.

E. Americana Arnott Edinb. Journ. Sci. i, 430. Low and depressed, 1-6 inches in diameter, rooting at the nodes: leaves obovate, very obtuse: flowers sessile, purplish: seeds cylindrical, slightly curved, about one-third of a line long, very minutely pitted in 9 or 10 longitudinal lines. Lower Columbia river bottoms; also in the Eastern States.

E. Californica Gray Proc. Am. Acad. xiii. 361. Floating: leaves obovate, attenuate at base, the lower with a petiole not longer than the blade: flowers shortly pedicellate, with 3 or 4 sepals and petals and twice as many stamens: seeds circinate-incurved nearly one-third of a line long, minutely pitted in 10 or 12 lines. In Sierra valley, California; Spokane Falls, Washington.

2 BERGIA L. Mant. n. 1309.

Branching and often pubescent nearly erect annuals with entire or serrate leaves and fascicled or solitary flowers. Sepals 5, with a strong midnerve or herbaceous in the middle, acute. Ovary ovoid. Capsule subcrustaceous, 5-valved, more or less of the partitions in dehiscence remaining with the axis.

B. Texana Seubert in Walp. Rep. i, 285. Glandular pubescent, branching from the base, 2-10 inches high: leaves oblanceolate, acute, serrate, $\frac{1}{2}$ -1 $\frac{1}{2}$ inches long, attenuate to a short petiole: flowers fascicled, shortly pedicelled: sepals carinate, 1 $\frac{1}{2}$ lines long exceeding the petals and stamens: capsule globose: seeds smooth and shining. Moist or very wet places along rivers and ditches, Columbia river to Nevada, California and Texas.

ORDER XIV. HYPERICACEÆ Lindl. Nat. Syst. ed. 2, 77.

Herbs or shrubs with opposite entire leaves, punctate with immersed pellucid resinous glands and often sprinkled with black glandular dots or lines, without stipules. Calyx of 4 or 5 persistent sepals imbricated in the bud. Petals as many, convolute in the bud, deciduous or withering, usually glandular-punctate. Filaments mostly in 3 sets or bundles. Styles 2-5, usually distinct or becoming so. Stigmas terminal. Ovary and capsule with 2-5 parietal placentæ, or 2-5-celled by their union in the axis. Seeds anatropous, with a somewhat crustaceous coat, filled by the straight cylindraceous embryo. Only one genus in our range.

1 HYPERICUM L. Gen. n. 902.

Herbs or shrubs with simple entire opposite leaves without stipules and yellow flowers in cymes. Sepals 5, rarely 4, similar. Petals as many, oblique. Stamens numerous, sometimes few, in 3-5 clusters: filaments united at base into 3-8 phalanges or distinct. Ovary 1-celled with parietal placentæ or 3-5-celled with placentæ in the axis. Styles 3-5 distinct or united: stigma often capitate: capsule conical to globose.

* Stamens numerous, distinct or united into sets: styles 3, long and distinct: capsule ovate, 3-celled, more or less glandular: tall perennials with opposite leaves.

H. perforatum L. Much branched, 1-4 feet high: leaves linear to oblong, obtuse, mostly tapering at base, 6-12 lines long, 1-5 wide: flowers numerous in loose cymes, about an inch in diameter: sepals narrowly lanceolate, very acute or acuminate: petals bright yellow, black dotted along the margin: capsule conical-ovate 2-3 lines long. Very common in fields and along roadsides. Introduced from Europe.

H. Scouleri Hook. Fl. i, 111. Simple or sparingly branched above often with numerous small branchlets from running rootstocks, 1-2 feet high: leaves thin, shorter than the internodes, about an inch long mostly obtuse, more or less clasping, usually black dotted along the margin on the under side: flowers 6-12 lines in diameter, in more or less paniced cymes: sepals oval or oblong, obtuse, 2 lines long, or less: petals 6 lines long, obovate: stamens numerous in 3 fascicles, 3-celled. In wet meadows and by streams throughout the Pacific States and Territories, flowering in summer. Cov
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** Stamens 15-20, mostly in 3 clusters; styles 3 or 2, short and distinct, stigmas capitate: small slender annuals with small flowers: petals shorter than the sepals.

H. anagalloides Cham. & Schlect. Linnæa iii, 127. Procumbent, diffusely branching, often forming dense mats: stems 1-12 inches long: leaves oblong to broadly ovate, obtuse, 5-7 nerved at base, 2-6 lines long, almost as broad: flowers 3 or 4 lines in diameter, in few-flowered naked or

leafy cymes: sepals foliaceous, unequal, lanceolate to broadly ovate, 1-3 lines long; longer than the ovate 1-celled capsule: stamens 15-20. In wet places, Brit. Columbia to California.

H. Canadense var. major Gray Man. 86. Stems rather stout and strict, almost simple, 12-18 inches high: leaves lanceolate, 1-2 inches long, 4-6 lines broad, more or less clasping, often very acute, glandular dotted beneath: flowers in somewhat crowded cymes: sepals linear-lanceolate long-pointed; stamens 5-10: capsule very acutely conical, 3-4 lines long: seeds yellow, more or less striate and pitted. Green Lake, King county, Washington and the Eastern States.

ORDER XVI. MALVACEÆ Neck. Act. Ac. Theod. Palat. 2, 488.

Herbs or shrubs with alternate stipulate mostly palmately veined leaves and usually showy flowers. Flowers regular, hermaphrodite or rarely dioecious or polygamous. Sepals 5, rarely 3 or 4, valvate in the bud, more or less united at base, often having an external calyx or involucre, Petals hypogynous, equal in number to the sepals, twisted in the bud. Stamens hypogynous, commonly indefinite in number, rarely as few as the petals, united below into a monadelphous tube or ring: anthers 1-celled, reniform, bursting transversely. Ovary formed of several carpels around a common axis, either distinct or cohering. Styles as many as carpels, united or distinct. Fruit capsular or rarely baccate: carpels 1 to many-seeded sometimes closely united, sometimes separate or separable. Seeds campylotropous or heterotropous with little or no albumen. Embryo curved: cotyledons foliaceous, twisted and doubled up.

* Styles stigmatic on the inner face: carpels indehiscent: ovules solitary, ascending.

1. **Malva.** Bractlets 1-3, distinct: axis broad, shorter than the numerous carpels, filaments in 1 series.
2. **Sidalcea.** Bractlets none. Filaments in 2 series; those of the outer series united into 5 clusters: carpels 5-10, covering the axis.
* * Stigmas capitate: carpels mostly dehiscent, at least at the apex.
3. **Sphæralcea.** Bractlets 1-3, ovules 2, the lower ascending, the upper pendulous.
4. **Sida.** Bractlets usually none: ovule solitary.
5. **Abutilon.** Bractlets none: ovuled 3-4 in each cell.

1 MALVA L. Gen. n. 841.

Hirsute or glabrate herbs with angularly lobed or dissected leaves and mostly showy flowers solitary in the axils of the leaves or rarely in terminal racemes. Calyx 5-cleft, with an involucre of usually 3 oblong or setaceous bractlets or rarely none. Petals 5, obovate. Staminal column divided above into numerous filaments. Styles filiform; stigmatic on the inner side. Carpels numerous with a single ascending ovule in each. Fruit depressed, the numerous free carpels separating from the broad and not projecting axis, indehiscent, beakless.

M. BOREALIS Wall. in Liljebl. Sv. Fl. ed. 2, 218. Annual, erect or some-

what decumbent, hairy or nearly glabrous: leaves round-cordate, crenate, more or less strongly 5-7 lobed; peduncles axillary, solitary or clustered, 1-3 lines long: calyx-lobes acute, becoming very broad and enlarged in fruit: petals 2-3 lines long: capsule transversely reticulate-rugose. A weed from Europe, on the Coast from Puget Sound to Lower California.

M. ROTUNDFOLIA L. Stems prostrate from a perennial root, 6-20 inches long, leaves cordate-orbicular, obtusely 5-lobed and crenate on elongated pubescent petioles: pedicels axillary, 1-flowered involucre bracts oblong-linear: calyx lobes acutely triangular: petals 4-6 lines long, pale purple: carpels numerous, wrinkled. Roadsides and waste grounds; introduced from Europe.

2 SIDALCEA Gray Pl. Fendl. 18.

Herbs with more or less deeply lobed leaves and purple or white flowers in a terminal raceme or spike: involucre none: calyx 5-parted. Staminal column double, the filaments of the outer series united usually into 5 sets opposite the 5 petals, of the inner distinct. Styles filiform, stigmatic on the inner face. Carpels 5-9, with a single ascending seed in each, separating at maturity from the short axis, sometimes beaked, indehiscent. Ours all perennials.

* Pubescence not hirsute.

S. glaucescens Greene Bull. Cal. Acad. 3, 77. Minutely stellate-pubescent, and somewhat glaucous throughout: stems numerous and decumbent, 2 feet high, rather slender: leaves, even the lowest, palmately 5-7-parted, the crenate divisions 3-5 lobed or toothed, those of the uppermost entire: raceme simple, loosely flowered: divisions of the calyx attenuate-acuminate: petals deep purple, obtuse or at most only truncate: carpels with distinct longitudinal reticulations. Oregon, *Hall*; station not noted to Mount Shasta and the Sierra Nevada Mountains, California.

S. malviflora Gray Pl. Wright i, 16. Stems 2-4 feet high, erect or a little decumbent, mostly solitary from a fusiform root: hirsute below and on the calyx and pedicels; short, stellate pubescence wanting: leaf margins ciliate: radical leaves orbicular with open sinus and 5-9 shallow, crenate-incised lobes: the uppermost cauline 5-7-parted into linear, entire segments: raceme usually solitary, virgate: pedicels erect, twice the length of the calyx, the lobes of which are broadly ovate, acuminate: carpels smooth, depressed. Idaho to Colorado, New Mexico and Arizona.

S. virgata. Stellate pubescent throughout: stems numerous from the thick somewhat woody root, spreading or ascending, sparingly branched, 6-24 inches high: leaves orbicular in outline, 1-4 inches in diameter all petioled, the lower more or less deeply 5-7 lobed, the obtuse, oblong lobes coarsely toothed at the apex, densely stellate-pubescent beneath, more sparsely so with more simple appressed hairs above: upper more deeply lobed or parted with linear-acute or acutish entire or sparingly toothed segments: flowers bright purple in virgate racemes: bracts setaceous, calyx lobes lanceolate, acuminate, 2-3 lines long, rounded, or retuse and minutely erose-dentate at the apex. Common on dry hillsides, Willamette valley to the northern boundry of California.

** Pubescence of two kinds, hirsute and stellate.

S. spicata Greene l. c. 76. Equably hispid-hirsute throughout, the hairs simple and not deflexed, stellate pubescence sparse, mostly confined to the under surface of the leaves and the calyx where it is minute: stems 2 feet high, strict and simple, or with a few short branches above: lowest leaves orbicular, lobes and teeth shallow, rounded; cauline parted into 7,

variously incised, or the uppermost linear and entire segments: raceme short, spicate-crowded: petals deeply notched, half inch long: pedicels very short: calyx thin, very hairy, its lobes ovate acute or acuminate: carpels small, smooth. Southwestern Oregon to California.

S. campestris Greene l. c. Bristly hairs of the stem abundant, forked from the very base and deflexed: leaves soft beneath with stellate pubescence which becomes dense on the pedicels and calyx: stems erect, 2-6 feet high simple or slightly branched above: lower leaves orbicular, about 9-lobed, the middle and upper 7-9-parted, their segments with 3-5 linear spreading lobes: racemes short: petals emarginate, an inch long: calyx lobes lanceolate acuminate, 3-nerved; carpels papillose-hirsute. In moist places, Willamette valley.

S. Oregona Gray Pl. Fendl. 20. Slender, 1-3 feet high, merely puberulent or glabrous up to the simple or paniculate racemes: foliage as in the preceding, but the segments narrower; lobes of the calyx canescent, broadly deltoid: petals 6-9 lines long: carpels obscurely rugulose-reticulated, at least on the dorsal angles and sides, the back smoothish. Common in wet meadows and swales, British Columbia to California, east to Idaho.

S. Hendersoni Watson Proc. Am. Acad. xxiii, 262. "Tall and apparently perennial (3 or 4 feet high), glabrous throughout, the stem simple or nearly so: leaves palmately 7-cleft to below the middle, the mostly broad segments coarsely lobed and toothed, the upper leaves 3-5-parted and the segments narrower: flowers large (9-12 lines long), in a loose raceme, the pedicels (1-3 lines long), shorter than the linear bracts: calyx large ($\frac{1}{2}$ inch long in fruit), the leaves ovate-lanceolate, shortly acuminate: carpels few (8), smooth and glabrous, 2 lines long including the conspicuous linear beak. Near the shore of Clatsop Beach, *Henderson*," to Seattle, Washington, *Piper*.

3 SPHÆRALCEA St. Hil. Pl. Us. t. 51.

Herbs or shrubs with angular or lobed leaves and mostly showy flowers, solitary or fascicled in the axils of the leaves or bracts, or in terminal racemes. Involucre 2-3-leaved, setaceous, often deciduous. Calyx 5-parted, staminal column simple; free filaments terminal and distinct, numerous. Styles 5 or more, with capitate stigmas. Ovules 1-3, one ascending and maturing, the others pendulous and abortive. Fruit conical. Carpels 2-valved above, the upper portion where the seed is wanting thin-walled and smooth, the lower half rugose-reticulated on the sides. Seeds reniform.

* Carpels 1-2, ovulate, the upper ovule when present abortive, at length directly deciduous from the axis, *Malvastrum Gray, in part*.

S. Munroana Spach. Hist. Veg. iii, 353. *Malvastrum Munroanum Gray*. Grayish or hoary with dense stellate pubescence, branching from the base, 1-2 feet long, usually spreading or ascending: leaves broadly ovate, usually cordate at base, more or less deeply 3-5-lobed, crenately or acutely toothed, 1-2 inches long, equalling or exceeding the slender petiole; calyx lobes acute or acuminate, 2-4 lines long: petals scarlet, broadly obovate, 6-10 lines long: carpels oblong 2 lines long, pubescent on the back. On gravelly banks along rivers, eastern Oregon and Washington to Nevada and Utah.

** Carpels 2-3 ovulate, 1-3 seeded: when separating from the axis cohering by their sides and at base held by a kind of thread which at length either tears away from the back of the carpel or else is carried away with it. Tall perennial herbs.

S. acerifolia Nutt. T. & G. Fl. i, 228. Scabrous with stellate pubescence: stems stout, much branched, 3-6 feet high: leaves cordate, deeply 5-7 lobed, lobes acute, coarsely serrate: racemes leafy below, naked above, the flowers clustered on short peduncles: lobes of the calyx broadly triangular acute or acuminate: petals 9-15 lines long, carpels hirsute on the back. On the Columbia river and its tributaries from the Rocky Mountains to the ocean.

S. leptosepala Torr. Bot. Wilkes 255, of the upper Columbia has slender peduncles and caudate-attenuate calyx lobes. I have been unable to see either a specimen or a description of it.

4 SIDA L. Gen. n. 837.

Pubescent or tomentose herbs with white or yellow axillary solitary fasciated flowers. Calyx usually without bractlets. Staminal tube simple antheriferous at the summit. Petal soblique. Styles 5 or more with capitate stigmas. Carpels as many, 1-ovuled, indehiscent or 2-valved, at length separating from the axis.

S. hederacea Torr. in Gray Pl. Fendl. 23. Stems decumbent from a perennial root, leafy, a foot long or less: leaves reniform, about an inch broad, very oblique, serrate or crenate, shortly petioled: flowers in short axillary panicles or solitary, the pedicels at length deflexed: calyx with 1 or 2 setaceous bractlets at base, the lobes acuminate: petals yellowish, pubescent externally, 4-6 lines long, carpels 6-10, triangular, $1\frac{1}{2}$ lines long, smooth. From Washington (near Walla Walla) to Arizona and New Mexico.

S. SPINOSA, L. Sp. 683. Annual: minutely and softly pubescent, much branched, 10-20 inches high: leaves ovate-lanceolate or oblong, serrate, rather long petioled: peduncles axillary, 1-flowered, shorter than the petiole, flowers yellow, small: carpels 5, each splitting at the top into 2 beaks. On the ballast ground at Portland, Oregon.

5 ABUTILON Tourn.

Herbs, shrubs, or trees, with cordate, rarely somewhat lobed, leaves and solitary axillary flowers. Calyx 5-cleft, without an involucre. Ovary 5-many-celled with 3, rarely more, ovules in each cell. Capsule composed of 5 or more 2-valved, 3-seeded, rarely 4-6-seeded, carpels. Peduncles axillary, solitary or rarely in pairs, 1-many-flowered, sometimes by the abortion of the upper leaves apparently in terminal racemes. None indigenous but the following one introduced and liable to become common.

A. AVICENNÆ Gaertn. Fr. ii, 251, t. 135. Annual: stem 2-5 feet high with spreading branches: leaves orbicular-cordate, abruptly acuminate, 4-6 inches in diameter, velvety tomentose, crenately toothed: flowers usually solitary on axillary peduncles, sometimes 3 or more on short flowering branches which bear 1 or 2 small leaves, orange-yellow: carpels about 15, 3-seeded, inflated, truncate, birostrate, the long beaks spreading in a radiate manner. Waste places and roadsides. Introduced from India.

ORDER XVI. LINACEÆ Dumort. Comm. Bot. 61.

Annual or perennial caulescent herbs or low shrubs. Leaves alternate sometimes opposite or subverticillate below: simple, generally entire, sessile or nearly so, mostly estipulate. Inflorescence usually cymose. Flowers hermaphrodite, 4-5-mer-

ous, hypogynous. Sepals valvate and petals convolute in the bud, distinct or nearly so. Stamens as many as petals and alternate with them, united at base, sometimes with intermediate processes persistent: anthers oblong, introrse more or less versatile, 2-celled, dehiscing longitudinally. Styles 2-5. Ovary slightly 4-10-lobed its cells equal in number to the styles or twice as many from the intrusion of a false partition from the back of each cell, the cells 2-ovuled. Seeds oily with a little albumen.

1 LINUM L. Gen. n. 389.

Leaves estipulate. Flowers 5-merous, symmetrical, except that the carpels are fewer than the other parts in one section. Sepals persistent or at length deciduous. Petals fugacious. Capsule splitting through the false partitions and also septicidal in most species.

* Pedicels elongated: flowers large blue.

L. Lewisii Pursh. Fl. 210. Perennial, glabrous and glaucous 2-3 feet high: stems mostly cespitously clustered, striate: leaves often somewhat crowded, oval-linear, acute or obtusish, 3-5-nerved: flowers somewhat corymbose: sepals broadly oval mostly pointless, the inner scarious margined: petals 5-8 lines long, thrice the length of the calyx: stamens equal to or twice the length of the sepals, appendages slender: capsule two or three times as long as the calyx ovoid, obtuse, incompletely 10-celled and 10-valved, the valves dehiscing widely above and separating nearly to the centre below, the septa ciliate. Alaska to Saskatchewan and the Great Plains, south to Arkansas and Texas, west to the Cascade and Siskiyou Mountains.

* * Pedicels often elongated, flowers of medium-size or mostly small, yellow, white or rose-purple: sepals usually glandular-ciliate, persistent: petals commonly with lateral teeth and 1-3 ventral appendages at base: filaments without intervening appendages but sometimes 2-toothed at base: carpels 2-3 without cartilaginous insertions: styles distinct; stigmas small, oblique or subcapitate: capsule with firm septa, long, ciliate at base, the false partitions mostly incomplete seeds mostly plump: annuals.

L. digynum Gray Proc. Am. Acad. vii, 334. About a span high, glabrous, stems slender, several times forked, rather prominently angled above: leaves mostly opposite elliptical-spatulate, the lower obtuse and entire, the upper acute or mucronate and remotely serrulate, flowers at length corymbose or subracemose, small, yellow: pedicels short about equal to the flowers: sepals ovate-oblong rather obtuse, minutely serrulate, glandular and lacerate below, two of them mostly conspicuously longer and very blunt; petals spatulate-oblong, truncate or emarginate not appendaged about a line long, one half longer than the sepals: stamens and pistils a little shorter than the calyx: carpels 2: capsule a little shorter than the calyx, completely 4-celled. Washington to northern California.

L. micranthum Gray l. c. 333. A span to a foot high, glaucous, somewhat soft-pubescent, loosely dichotomous with slender terete branches: leaves spatulate-oblong, obtuse or acutish, entire, 1-nerved: pedicels slender, longer than the minute white flowers: sepals ovate-lanceolate to oblong the inner slightly glandular ciliate: petals obovate, about twice the length of the calyx, not toothed and without lateral appendages, the median appendage ligulate and loosely hairy: filaments round-toothed and slightly hairy at base: capsule ovoid, acute about equal to the calyx, the false

septa incomplete extending half way to the axis below the middle, narrowed above. California and Oregon.

ORDER XVII. GERANIACEÆ J. St. Hil. Expos. Fam.ii, 51.

Herbs or shrubs with toothed, lobed or compound leaves, perfect regular or irregular but commonly symmetrical flowers on axillary peduncles. Sepals 5, imbricated in the bud. Petals 5, generally imbricated in the bud. Stamens mostly in two sets, those alternate with the petals sometimes sterile: filaments either dilated or monadelphous at base. Ovary formed of 5 1-celled carpels around a central axis with 2 anatropous ovules in each cell of which only 1 matures, separating elastically at maturity from the long-beaked and indurated central axis from below upward, the styles forming long tails which become revolute upward, or spirally twisted. Embryo filling the seed. Cotyledons convolute pleated and incumbent on the radicle.

1. **Geranium.** Fertile stamens 10; tails of the carpels not bearded.
2. **Erodium.** Fertile stamens 5, tails of the carpels bearded.

1 GERANIUM L. Gen. n. 832.

Usually caulescent herbs with simple radiately-divided, petioled stipulate leaves and 1-3 flowered peduncles with a 4-bracted involucre at the base of the pedicels. Sepals 5, imbricated in the bud, persistent. Petals 5, deciduous. Stamens 10, all antheriferous (except in *G. pusillum*), mostly united a little at base; filaments slender in 2 sets, with a gland behind the base of each of the shorter ones. Ovary 5-lobed, 5-celled: style 5-lobed at the summit, the lobes stigmatic on the inner face. Carpels at maturity separating from the long-beaked axis and borne on the recurving persistent beardless styles, (except in *G. pusillum*).

* Annuals with small flowers, the petals not exceeding the sepals: perhaps introduced, but now thoroughly naturalized.

+ Sepals awned: carpels hairy, at maturity detached from the axis and borne on the recurved style.

G. Carolinianum L. Sp. ii, 682. Erect, diffusely much branched from the base or nearly simple 4-20 inches high, pubescent: leaves 1-2½ inches in diameter, palmately 5-7-lobed or parted, the divisions cleft into oblong-linear lobes: pedicels short, crowded at the end of branchlets: petals orbiculate, pale flesh-color, equalling the awned sepals: carpels pubescent: seeds obscurely reticulated. Common from Brit. Columbia to California and across the continent.

G. DISSECTUM L. Amœn. iv, 282. Decumbent or ascending, 6-20 inches long, dichotomously branched, pubescent: leaves 5-7 parted; the divisions deeply and unequally cleft into linear lobes: peduncles elongated usually solitary in the forks of the branches: petals rose-color, a little longer than the ovate acuminate sepals: carpels hairy: seeds strongly reticulated. Cultivated grounds about the mouth of the Willamette river.

+ + Sepals not awned, mature carpels detached from the axis and some on the recurved style.

G. MOLLE L. Sp. Pl. ii, 682. Low, slender, diffuse, the branches a few

inches to a foot long, the herbage softly and somewhat clammy villous: leaves an inch broad or more, cleft into oblong obtusish lobes: sepals ovate-oblong, not awn-pointed: petals very small, rose-color: carpels glabrous, transversely rugose: seeds minutely striate. Plentiful northward, from northwestern California to Brit. Columbia.

+ + + Sepals not awned: carpels rugose, not hairy, at maturity remaining on the axis, not borne on the recurved style.

G. PUSILLUM L. Sp. ed. 2, 957. Soft-pubescent or the pedicels and calyx villous and usually glandular: stems slender or ascending, 3-6 inches long: lower leaves orbicular an inch or less in diameter equally cleft into 7-9 linear or oblong lobes, each more or less regularly 3-toothed at the apex; cauline round-renaliform, 5-7-parted, the divisions cleft into linear lobes: peduncles often in the axils of bracts opposite the leaves, short: sepals ovate, acute or acuminate not awned: petals pale purple, about equalling the calyx, usually only 5 of the filaments antheriferous: carpels fine canescent, keeled, not wrinkled: seeds smooth. Common in open places throughout the Willamette valley; introduced from Europe.

** Perennials: flowers large: stems naked below, dichotomously branched with opposite leaves above: sepals shortly aristate, scarious on one side, the scarious portion often extending lobe-like beyond the apex: filaments and petals pilose at base.

G. Fremonti Torr, in Gray Pl. Fendl. 26. Rather stout, more or less pubescent throughout with a close glandular pubescence, sparsely intermixed with longer pilose hairs: radical leaves 7-cleft, the segments 3-lobed or incised; cauline 3-5 cleft, the divisions 3-lobed: petals obovate twice the length of the sepals: villous at base. Dry open hillsides, Idaho to the Rocky Mountains.

G. Richardsoni F. & M. Ind. Sem. Petr. iv, 37. Erect with slender branches $1\frac{1}{2}$ -3 feet high: pubescence usually fine and appressed: leaves deeply 5-7-cleft, lobes sharply incised: pedicels and sepals glandular pilose: petals entire, hirsute at base. In the mountains from Brit. Am. to New Mexico and westward, perhaps on our eastern border.

G. incisum Nutt. T. & G. Fl. i, 206. Densely pilose with short white spreading or deflexed hairs to nearly glabrate: stems stout, numerous from the crown of a large somewhat woody perennial root, 1-3 feet high, dichotomously branched above with a long 2-flowered peduncle or branch in the forks or at length a pair of opposite sessile leaves, with a peduncle in the axil of each, appearing compact and many-flowered: lower leaves very long petioled, ample, round-renaliform in outline, primarily deeply 3-lobed or parted, the broad cuneiform lateral segments deeply 2-lobed, the oblong lobes coarsely incised and serrate; the upper ones similar but very short petioled or sessile: flowers purple, on slender pedicels $\frac{1}{2}$ -2 inches long, somewhat abruptly contracted above to the rather stout awn, outer ones somewhat pubescent and more or less glandular-ciliate; inner ones minutely pubescent, with rather broad scarious margins; petals broadly obovate 6-8 lines long, more or less retuse, conspicuously veined, densely bearded at base; filaments about equalling the style, dilated and ciliate at base; styles minutely hispid, the free tips 1-2 lines long and spreading or recurved. Along small streams, eastern Oregon and Washington to Brit. Columbia and Dakota.

G. Oregonum. Pilose with short white deflexed hairs or that of the pedicels spreading and gland-tipped, stems several from the crown of a thick perennial root, erect, 1-2 feet high comparatively slender with long internodes, dichotomously branched: leaves all rather long petioled, deeply 5-7-cleft, the cuneate segments irregularly incised and toothed: flowers bright purple on long slender ascending peduncles thus appearing loosely flowered, pedicels 1-2 inches long slender: sepals oblong-ovate, outer ones

4-5 lines long, glandular ciliate and minutely pilose, gradually contracted to the slender awn, inner ones with rather broad purple margins and abruptly awned; petals obovate entire, 6-8 lines long densely bearded on the edges at base inside, obscurely veined; filaments longer than the styles dilated and ciliate at base; styles pilose, the free tips $\frac{1}{2}$ -1 line long, connivent. Carpels minutely pubescent; beak 2 inches long. Edge of woods and open places throughout the Willamette valley.

2 ERODIUM L'Her. Geran. t. 1-6.

Herbs, rarely shrubby with pinnately parted or palmately veined stipulate leaves and 1-3-flowered peduncles usually in the axils of the upper leaves. Sepals 5, equal, regular. Petals 5, mostly equal. Stamens 10, the 5 opposite the petals short and sterile, or reduced to scales, the 5 alternate with the petals longer and perfect, with nectariferous glands at the base of the filaments. Styles persistent, bearded on the inner side, at length spirally twisted below. Leaves often pinnate and bipinnately parted or lobed, when opposite more or less unequal in size: peduncles terminal or lateral (opposite the leaves or in the axil of the smaller one), umbellately 2-several-flowered with a 4-bracted involucre at the base of the pedicels. Carpels very sharp-pointed below, covered with obliquely ascending appressed hairs, tardily if at all dehiscent. Seeds obconical or oblong, not sculptured.

* Leaves mostly opposite, pinnate or pinnatifid, the divisions lobed or toothed: pedicels at length deflexed, the fruit remaining erect.

E. CICTARIUM L'Her. Ait. Hort. Kew. ii, 414. Hairy, much branched from the base, an inch to 2 feet long: leaves opposite, pinnate, the leaflets laciniately pinnatifid with narrow acute lobes: peduncles exceeding the leaves bearing a 4-8-flowered umbel: sepals 1-3 lines long, acute: petals bright rose-color, a little longer: tail of the carpels 1-2 inches long. Common throughout the Pacific States and Territories. Flowers in very early spring.

E. MOSCHATUM Willd. Sp. iii, 631. More or less glandular pubescent: stems a few inches to a foot long: leaves pinnate, the oblong-ovate leaflets unequally and doubly serrate: flowers pale on short pedicels: sepals 3-4 lines long: whole plant exhaling a musky odor. Roadsides, southwestern Oregon and California.

* * Leaves mostly radical, round-ovate: pedicels erect in fruit.

E. macrophyllum H. & A. Bot. Beechy 327 (?). Somewhat canescent with short spreading hairs that are often gland-tipped: subcaulescent, with a straight perpendicular annual root: leaves round reniform to triangular ovate with a broad shallow sinus, crenately dentate, 6-18 lines broad, on petioles 1-3 inches long: peduncles stout, 1-6 inches long 1-several-flowered: involucre bracts lanceolate, acuminate, 1-2 lines long: sepals broadly lanceolate shortly acuminate scarious margined, prominently 5-nerved: petals white, obovate, entire, 2-3 lines long exceeding the calyx: stamens 5, subtended by a broad appendage that is attached to them half way up or more: style shorter than the stamens, 5-lobed: carpels densely hispid 5-7 lines long, prominently keeled, acuminate below: seed oblong, smooth, 3 lines long. On clayey soil near Ashland, Oregon.

ORDER XVIII. LIMNANTHACEÆ Lindl. Nat. Syst. ed. 2, 142.

Glabrous annual herbs with pungent juice, pinnately dissected alternate leaves without stipules and pale flowers. Sepals 3-5, valvate in the bud, united at base, persistent. Petals 3-5, withering-persistent. Stamens twice as many as petals and inserted with them upon a somewhat perigynous disk, all antheriferous, filaments distinct, those opposite the sepals having a small gland at the base on the outside: those opposite the petals usually shorter: anthers roundish introrse. Ovary consisting of 2-5 distinct 1-ovuled carpels opposite the sepals, the styles rising from the centre of each carpel and united into one nearly to the top: stigmas simple. Carpels becoming semi-drupaceous tuberculate nutlets. Seeds erect, anatropous, without albumen. Embryo with very large cotyledons and very short radicle.

1. **Limnanthes.** Sepals, petals and carpels normally 5: stamens 10.
2. **Flerkea.** Sepals, petals and carpels normally 3: stamens 6.

1 LIMNANTHES R. Br. Lond. & Edinb. Phil. Mag. 1833 ii, 70.

Low annuals with estipulate pinnatifid leaves and showy white, yellowish or rose-color flowers, solitary on lateral and terminal peduncles: growing in water or wet places. Calyx deeply 5-parted. Petals 5, persistent. Glands 5, alternating with the petals. Stamens 10. Style 5-cleft at the apex. Ovary with solitary ascending ovules. Carpels distinct, subglobose, at first fleshy, at length hard and indehiscent, separating from the axis.

L. Douglasii R. Br. l. c. Glabrous throughout, diffusely branched from the base: the succulent stems 6-8 inches long: leaves pinnate, the leaflets incisely lobed or parted into linear acute lobes: peduncles at length 2-4 inches long: sepals lanceolate acute, 3 or 4 lines long: petals obovate, emarginate, 6-8 lines long, white, with yellow base: style very slender 3-4 lines long: seeds densely covered with coarse obtusish tubercles. Umpqua valley, Oregon.

L. gracilis. Glabrous throughout, branching from the base, the slender stems 6-18 inches long: leaves pinnate, the ovate to ovate-lanceolate or linear acute, leaflets entire or 3-parted: sepals lanceolate, acuminate, 3 lines long: petals oblanceolate, truncate or emarginate 6-7 lines long, white with yellowish base: fruit smooth or sparsely tuberculate. On wet rocks, Rogue River Valley and southward.

L. rosea Hart. in Benth. Pl. Hartw. 301. Glabrous, petals obovate and emarginate or obovate, light rose-color or purplish below, villous within near the base: fruit strongly tuberculate. California, to be looked for on our southwest border.

L. pumila. Glabrous, simple or sparingly branched near the base, 2-4 inches high: leaves commonly bipinnate with trifoliolate pinnae: pinules lanceolate to oblanceolate acute: sepals lanceolate acuminate 3-4 lines long: petals white, oblong entire, little if at all longer than the sepals: stamens about half the length of the petals: carpels ovoid, rugose below, crowned with short-conic processes. On top of Table Rock, Jackson County, Oregon.

L. floccosa. Floccose-villous, stems simple or sparingly branched

near the base, 1-3 inches high, recurving; leaves pinnate with linear or lanceolate pinnae: flowers white on short slender peduncles fasciated at the end of the stem or branches: sepals broadly lanceolate, acuminate densely villous within: petals oblong, 3-4 lines long not exceeding the sepals: stamens not more than $\frac{1}{2}$ the length of the petals: carpels obovoid the upper half beset with white acuminate processes. On gravelly plains, Jackson county, Oregon to northern California.

2 FLORICA Willd. Neue Schr. Ges. Nat. Fr. Berl. iii, 448.

Low smooth annual herbs with alternate dissected leaves without stipules and small flowers on axillary peduncles. Calyx deeply 3-parted, persistent. Petals 3, alternate with as many glands, open in the bud, withering-persistent. Stamens 6, styles 3, united to near the apex. Ovaries 3, opposite the sepals, 1-ovuled, distinct, fleshy, becoming indehiscent 1-seeded nutlets, separating from the axis.

F. proserpinacoides Willd. Act. Berol. iii, 448. Glabrous: stems weak, 4-10 inches high sparingly branched from the base: leaves pinnate, the lowest trifoliolate with lanceolate leaflets: the upper with more numerous linear filiform leaflets; sepals ovate-acute, about a line long, a little longer than the white petals: carpels globose, densely tuberculate. Under Ash trees in moist places about the mouth of the Willamette river, Oregon to California, Illinois, Canada and the New England States.

ORDER XIX. OXALIDACEÆ Lindl. Nat. Syst. ed. 2, 140.

Herbs, rarely shrubby, with acid juice, trifoliolate or pinnate leaves and variously disposed regular flowers. Sepals 5, equal distinct or nearly so, persistent, imbricate in the bud. Petals 5, hypogynous, equal, unguiculate deciduous, spirally twisted in the bud. Stamens 10, hypogynous, more or less monadelphous: filaments subulate, those opposite the petals longer than the others: anthers short, attached by the middle, introrse, often reflexed and appearing extrorse. Ovary of 5 united carpels with distinct styles and capitate or penicillate or sometimes 2-lobed stigmas. Capsule usually membranaceous, 5-lobed and 5-celled, the capsule at length mostly separable to the axis, opening by the dorsal suture, 1-12-seeded. Seeds anatropous, with a loose fleshy testa which bursts elastically when the seeds are ripe. Embryo straight, as long as the firm fleshy albumen with a rather long radicle. Cotyledons broad and foliaceous.

1 OXALIS L. Gen. n. 582.

Herbs, rarely shrubby, with trifoliolate or pinnate leaves without stipules and perfect, regular flowers. Sepals 5, distinct or united at the very base, imbricate in the bud. Petals 5, convolute and twisted in the bud. Stamens 10, the filaments somewhat dilated and united below in 2 sets of unequal length, all antheriferous. Capsule columnar or ovoid, beaked with the 5 styles, 5-celled, dehiscing loculicidally, the valves remaining attached by the partitions to the axis. Seeds 2-several in each cell, pendulous the outer fleshy aril-like coat at length split-

ting and elastically recurved upon the raphe. Low acaulescent herbs with a sour watery juice: leaves alternate, mostly digitate-trifoliate, rarely stipulate: peduncles umbellately or cymosely 1-many-flowered. Ours all perennials with trifoliate leaves.

* Acaulescent: leaves and scapes from the end of a slender perennial scaly rootstock: flowers white or pinkish, somewhat yellow at base and mostly red-veined: leaves palmately trifoliate.

O. Oregona. Nutt. T. & G. Fl. i, 211. Villous with spreading rusty hairs: leaves and scapes clustered at the end of the short lateral scaly branchlets of long creeping rootstocks: petioles 2-6 inches high: leaflets broadly obovate 1-2 inches wide, smooth above: scapes not longer than the petioles, 2-bracted above the middle, 1-flowered: sepals oblong, rounded at the apex: petals oblong-obovate entire or emarginate, 8-12 lines long, white with purple veins: capsule globose, 2 or 3 lines in diameter, its cells 1-2-seeded. In moist places and along streams in dense forests, Puget Sound to California.

O. trilliifolia Hook. Fl. i, 118. Glabrous or the underside of the leaflets and inflorescence minutely pubescent: scapes and few leaves from the end of a short, branching, fleshy-scaly rhizome: petioles 4-12 inches high: leaflets broadly obovate, $\frac{1}{2}$ -2 inches broad: scapes longer than the petioles, terminating in a few-flowered umbel of white flowers on short pedicels: sepals oblong-lanceolate, acute, 2 lines long: petals broadly oblanceolate, deeply emarginate, 6 lines long: capsule linear, 6-8 lines long with an acuminate beak half its length: carpels about 6-seeded. Along mountain streams in dense forests: Puget Sound to California.

** Caulescent perennials, with trifoliate leaves and yellow flowers.

O. Suksdorfii Trelease Mem. Bost. Nat. Hist. Soc. iv, 89. More or less villous throughout: stems erect, slender, 4-12 inches high: leaflets deeply obovate with unequal lobes: peduncles scarcely longer than the petioles: 1-3-flowered: sepals-oblong-lanceolate, acute, densely villous at the apex: petals yellow, 6-8 lines long, thrice as long as the sepals, attached to each other near the base: wavy-margined, not emarginate: styles shorter than the inner stamens: capsule nearly smooth, about twice the length of the sepals. On dry wooded hillsides, Oregon and Washington.

ORDER XX. BALSAMINACEÆ Dumort. Anal. Fam. 46.

Succulent herbaceous plants with bland colorless juice, simple opposite or alternate leaves without stipules and irregular axillary flowers. Sepals 5, imbricate in the bud, deciduous, the two upper usually connate, the lowest spurred or gibbous. Petals hypogynous, usually 4, and united by pairs, rarely 5 and distinct. Stamens 5, hypogynous; with subulate filaments and 2-celled anthers. Ovary 5-celled with the placenta in the axis, ovules few to many in each cell, suspended. Stigmas 5, sessile, distinct or more or less united. Capsule 5 celled, the dissepiments usually disappearing, 5 valved, with several anatropous seeds in each cell. Seeds without albumen. Embryo straight: cotyledons plano-convex.

1 IMPATIENS L. Gen. n. 1008.

Ours glabrous annuals with alternate leaves and transparent stems. Sepals apparently only 4 from the union of the two up-

per ones. Petals 4, apparently only 2 from the union of each of the lower to each of the lateral ones. Filaments 5, more or less united at the apex. Cells of the ovary formed by membranous projections of the placenta which occupy the axis of the ovary and are connected with its apex by 5 slender threads. Capsule often 1-celled by the disappearance of the dissepiments.

I. pallida Nutt. Gen. i, 146. Stems 2-5 feet high, much branched: leaves oval or ovate, coarsely and obtusely serrate with mucronate teeth: peduncles 2-4-flowered: lower sepal obtusely conic, dilated, shorter than the petals, broader than long with a very short recurved spur: flowers pale yellow sparingly punctate. Near the Coast from the Columbia river northward and east to the Atlantic States.

I. fulva Nutt. l. c. Smaller, with smaller flowers: leaves rhombic-ovate coarsely and obtusely serrate, teeth mucronate: peduncle 2-4 flowered: lower sepals acutely conic, longer than the petals, (longer than broad) with a rather long resupinate spur: flowers deep orange with numerous reddish-brown spots. Same range as the preceding.

ORDER XXI. CELASTRACEÆ Lindl. Nat. Syst. ed. 2, 119.

Shrubs or trees with simple or undivided leaves with small or no stipules and small, usually perfect regular flowers. Sepals 4-5, united at base imbricate in the bud, usually persistent. Petals as many as the sepals and alternate with them, inserted by a broad base under the margin of the disk, imbricate in the bud. Stamens as many as the petals and alternate with them inserted on the margin or upper surface of the flat, fleshy disk. Ovary more or less immersed in and adhering to the disk, 2-5 celled with 1-several erect or ascending ovules in each cell. Styles and stigmas 2-5, distinct or combined into one. Seeds anatropous, often arilled.

1. **Euonymus**. Flowers rather conspicuous. Ovary 3-5-celled: fruit colored: seeds in a bright red arill: deciduous shrubs.
2. **Pachystima**. Flowers very small: ovary 2-celled: fruit small, not colored. Evergreen undershrubs.

1. EUONYMUS Tourn. Inst. t. 388 L. Gen. n. 271.

Shrubs with 4-angled branches, opposite leaves with small, deciduous stipules and small flowers in axillary 1-many-flowered cymes. Sepals and petals 4 or 5, widely spreading. Stamens as many, very short, on a broad angular disk. Style short or none. Capsule 2-6-lobed and 3-5-valved. loculicidal, coriaceous, colored, often warty. Seeds 1-4 in each cell, covered with a fleshy red arill.

E. occidentalis Nutt. T. & G. Fl. i, 258. A smooth straggling shrub 7-15 feet high, with slender greenish branches: leaves smooth, ovate to oblong-lanceolate, acuminate, serrulate, 2-4 inches long, on short petioles: peduncles slender 1-4-flowered: flowers dark brown, 4-6 lines in diameter, the parts in fives: fruit smooth, deeply lobed. Along mountain streams, Puget Sound to California.

2 PACHYSTIMA Raf. Am. Month. Mag. 1818.

Low evergreen shrubs with opposite leaves, and small flowers in 1-few-flowered axillary cymes. Calyx with a short obconical tube and four rounded lobes. Petals 4. Stamens 4, inserted at the edge of the broad disk which lines the calyx-tube. Ovary free, 2-celled: style very short: capsule 2-valved, 1-2-seeded. Seeds enclosed in a white, many-cleft membranous aril.

P. Myrsinites Raf. l. c. Densely branched to nearly simple, 1-3 feet high: leaves smooth, ovate to oblong or lanceolate, cuneate at base, the upper half serrate or serrulate, $\frac{1}{2}$ -1 inch long on very short peduncles: flowers a line or two long: fruit 2 lines long, smooth. In the mountains, from Brit. Columbia to California and the Rocky Mountains.

ORDER XXII. RHAMNACEÆ Dumort. Fl. Belg. 102.

Trees or shrubs, the branches often thorny. Leaves simple with minute stipules. Flowers small, sometimes by abortion dioecious, monoecious or polygamous. Calyx 4-5-cleft, valvate in the bud. Petals distinct, cucullate, (each wrapped around a stamen) narrowed at base, inserted upon the throat of the calyx, sometimes wanting. Stamens as many as the lobes of the calyx and alternate with them. Ovary 2-4, united carpels, 2-4-celled, free from or usually cohering with the tube of the calyx or more or less immersed in the fleshy perigynous disk: ovules solitary, erect. Styles more or less connate: stigmas simple usually distinct. Fruit free or commonly more or less cohering with the calyx, fleshy and indehiscent or with the carpels dry and at length separable. Seeds erect, anatopous, with a large, straight embryo in sparing fleshy albumen.

1. **Rhamnus.** Calyx and disk free from the ovary: calyx-lobes erect or spreading: fruit berry-like.
2. **Ceanothus.** Calyx and disk adnate to the base of the ovary: calyx-lobes connivent. Fruit dry or nearly so.

1 RHAMNUS L. Gen. n. 265 in part.

Shrubs or small trees with alternate petioled pinnately veined leaves, small deciduous stipules and axillary cymose or racemose flowers. Flowers perfect or polygamo-dioecious. Calyx 4-5-cleft, with erect or spreading lobes, the campanulate tube lined with the disk and persistent. Petals 4 or 6 or more, inserted on the margin of the disk: claws short. Stamens 4 or 5: filaments very short. Ovary free, 2-4-celled: style short, 3-4-cleft. Fruit baccate, containing 2-4 cartilaginous 1-seeded nutlets, mostly indehiscent.

§ 1 RHAMNUS Brongn. Ann. Sc. Nat. x, 360. Seeds and nutlets deeply sulcate or concave on the back, the raphe in the hollow: flowers mostly dioecious, solitary or fasciated in the axils.

R. alnifolia L'Her. Sert. Angl. 5. Shrub 2-4 feet high: leaves deciduous, ovate-oblong, acute at each end or acuminate, 2 or 3 inches long, crenately serrate, the slender petioles slightly puberulent: lobes of the

calyx and stamens 5; petals wanting: fruit black, 3-lobed, 3 lines long, equalling the pedicels. Eastern Washington to California, east to Canada and New England.

§ 2 *FRANGULA* Brongn. l. c. Seeds and nutlets convex on the back, the raphe lateral; flowers mostly perfect, in pedunculate cymes.

R. Californicus Esch. Mem. Acad. Petr. x, 281. A spreading shrub 4-18 feet high; young branches somewhat tomentose: leaves ovate-oblong to elliptical, 1-4 inches long, 6-18 lines broad, acute or obtuse, mostly rounded at base, denticulate or nearly entire, persistent: peduncles with numerous mostly abortive flowers in subumbellate fascicles: calyx usually 5-cleft; petals very small, broadly ovate, emarginate: fruit very dark purple, 3-4 lines in diameter, 2-3-lobed and 2-3-seeded; pulp thin. From Klamath lake, Oregon, to southern California.

R. occidentalis Howell P. C. Pl. Coll. 1887. Erect shrub 2-10 feet high: smooth throughout or the young branches and petioles minutely scabrous: leaves coriaceous, yellowish-green, elliptical, acute to obtuse or retuse, obscurely repand-dentate, 1-2 inches long by 6-15 lines broad, persistent: peduncles with numerous flowers in subumbellate fascicles: calyx usually 5-cleft, the deltoid lobes with a raised callous down the centre: petals small, orbicular, 2-lobed at the summit: fruit black when mature, obscurely 3-lobed; pulp moderately thick. On gravelly hillsides and plains, along the eastern base of the Coast Mountains near Waldo, Josephine Co., Oregon.

R. Purshiana DC. Prodr. ii. 25. *CASCARA*. A tree 20—50 feet high: young branches tomentose: leaves elliptical, 2-7 inches long by 1-3 inches broad, mostly acute, obtuse or cordate at base, denticulate pubescent beneath, thin, deciduous: flowers perfect, comparatively large, in a somewhat umbellate cyme; sepals 5; petals 5, small, 2-lobed, embracing the very short stamens: styles united to the summit: stigmas 3: fruit black, turbinate, 3-seeded. Common from Brit. Columbia to California west of the Cascade Mountains.

CEANOTHUS L. Gen. n. 267.

Shrubs or small trees with petioled simple leaves and perfect flowers in lateral and terminal dense thyrsoid panicles or corymbs. Calyx 5-cleft, with acute connivent lobes, the upper part at length separating by a transverse line the tube remaining; disk thick, adnate to the turbinate or hemispherical tube and to the ovary. Petals 5, longer than the calyx, saccate and arched, on long claws. Stamens 5, exserted; filaments filiform; anthers, ovate, 2-celled. Styles 3, more or less united below, diverging above. Fruit subglobose, 3-lobed, surrounded at base by the adnate calyx-tube, soon dry, the 3 crustaceous nutlets at length separating and dehiscent by the inner suture. Seeds convex on the back.

§ 1 *CEANOTHUS* proper. Leaves all alternate, 3-ribbed from the base or pinnately veined, glandular-toothed or entire. Fruit not crested.

* Leaves 3-ribbed from the base.

+ Erect shrubs, the branches not rigidly divaricate nor spiny: leaves usually large, more or less serrate: inflorescence thyrsoid.

++ In florescence on leafless lateral shoots from wood of the previous

season's growth.

C. sanguineus Pursh Fl. 167. A stout shrub 4-12 feet high with terete reddish branches: leaves thin, 1-4 inches long, ovate to elliptical, finely serrate, pubescent beneath, on slender petioles 6-15 lines long, deciduous: whole inflorescence white, 1-4 inches long, pubescent, the numerous flowers fascicled on the sides and at the ends of the short lateral branches: style shorter than the stamens, 3-lobed. Common on rocky hillsides, Brit. Columbia to northern California and Montana.

** Inflorescence on lateral shoots of the previous year's growth or terminal on leafy shoots of the present season's growth.

C. velutinus Dougl. Hook. Fl. i, 125, t. 45, (MOUNTAIN BALM). A smooth shrub 2-6 feet high, with terete green branches, cespitose, often decumbent at base, the branches somewhat pendulous; leaves orbicular-elliptical or elliptical-ovate, obtuse, subcordate, glandularly crenate above, serrulate, coriaceous, glabrous and shining above, (as if var. *ashed* and exuding a fragrant balsamic substance), velvety-canescens and strongly 3-ribbed beneath, 2-3 inches long, on petioles, 6-8 lines long, persistent; panicles axillary, thrice compound, elongated, on rather long peduncles; flowers white; styles as long or longer than the stamens. Common in mountainous districts, Brit. Columbia to eastern Oregon and the Rocky Mountains.

C. laevigatus. *C. velutinus* var. *laevigatus* T. & G. Fl. i, 686. (SMOOTH MOUNTAIN BALM). A large shrub 8-15 feet high with smooth terete green erect branches: leaves orbicular to elliptical, 2-4 inches long, subcordate, finely glandular-serrate, dark green and shining above the whole upper surface glandular and exuding a balsamic fragrant substance, paler but smooth and prominently 3-ribbed beneath, thick-coriaceous, persistent: panicles axillary, compound, rather small, the peduncles but little if any longer than the leaves: flowers white. In forests, Vancouver Island to Northern California, near the coast.

C. Californicus Kell. Proc. Cal. Acad. i, 55. *C. integerrimus* of recent authors not of H. & A. Bot. Beech. 329: *C. thyrsiflorus* var. *macrothyrsus* Torr. Bot. Wilkes 263. A slender branching shrub, 2-10 feet high, young branches more or less angled and pubescent: leaves thin, oblong to broadly lanceolate, 1-3 inches long, more or less serrulate toward the apex, pubescent with minute appressed hairs, on slender petioles 2-6 lines long, deciduous: flowers blue to white, fascicled on terminal and axillary peduncles from wood of the present season's growth; bracts ovate, shortly acuminate, 1-2 lines long: pedicels slender, 4-6 lines long: styles shorter than the stamens, united to near the summit. On dry open hillsides, from the Columbia river to California.

C. thyrsiflorus Esch. Mem. St. Petersburg. Acad. x, 285. An erect shrub or small tree 6-15 feet high with strongly angled branches: leaves lanceolate, finely dentate, 1-2 inches long, on short petioles, deciduous: flowers blue, in dense subcompound racemes, terminating the usually elongated and somewhat leafy peduncle. Puget Sound to California, near the coast.

+ + Erect shrubs, the branches usually rigid and spinose: leaves rather small: flowers in simple racemes or clusters.

C. divaricatus Nutt. T. & G. Fl. i, 266. A straggling shrub with terete, often pruinose branches: leaves oblong-ovate to ovate, 4-15 lines long, rounded at base, lucid, somewhat obtuse, minutely and glandularly serrulate, pubescent beneath, somewhat coriaceous, on petioles about 2 lines long, persistent: flowers blue to white, in subsimple often elongated racemes 1-4 inches long. Southern Idaho to

southern California.

C. cordulatus Kell. Proc. Cal. Acad. ii, 124, fig. 39. A densely cespitose erect shrub with intricate branches and spinose branchlets, 4–6 feet high, hirsutely pubescent with short erect or spreading hairs and cinereous: leaves oval to elliptical or oblong, 6–12 lines long, rounded or subcordate at base, finely glandular-serrulate, densely tomentose beneath, somewhat coriaceous on slender petioles 3–6 lines long, deciduous: flowers white, in racemes or fascicles: styles united to near the summit, shorter than the stamens. In the mountains of southern Oregon and California.

§ 2 **CERASTES** Watson l. c. Leaves mostly opposite, 1-ribbed, with numerous straight parallel veins, very thick and coriaceous, spinosely toothed or entire. Flowers in sessile or short-peduncled axillary clusters. Fruit large, with 3 horn-like or warty processes below the summit.

C. cuneatus Nutt. l. c. An erect shrub 2–12 feet high with rigid intricate branches: the young branches white with a villous tomentum, at length smooth and whitish: leaves cuneate-obovate or oblong, rounded or retuse above, entire or rarely few-toothed, minutely tomentose beneath, on short rather slender petioles: flowers white or rarely light blue, in rather loose axillary fascicles. On dry hillsides, from the lower Willamette (the original locality.) to Lower California.

C. pumilis Greene Eryth. i, 149. A rigid depressed much branched under shrub: branches 6–18 inches long, rooting at the nodes and forming mats 1–3 feet in diameter: leaves cuneate-oblong to obovate, 2–6 lines long, entire to spinose-dentate, but mostly 3-toothed at the apex, very minutely white-tomentose between the veins beneath, very short petioled: flowers bright blue to white, fascicled at the ends of short lateral branches; pedicels filiform, 6–8 lines long; sepals ovate, spreading, nearly a line long; styles united to the top, shorter than the stamens. On dry hillsides, about Waldo, Josephine Co., Oregon.

C. prostratus Benth. Pl. Hartw. 302. (MAHALA MATS). Glabrous, prostrate, the branches rooting and repeatedly subdivided, the whole forming a close mat 2–8 feet in diameter: leaves 3–12 lines long, obovate or oblong-cuneiform, obtuse or truncate, with 2 or 3 pairs of coarse spinose teeth above the middle, on short slender petioles: flowers dark blue to white, clustered at the ends of short stout peduncles: fruit large, with erect horns. In open pine forests, Washington to California.

ORDER XXIII VITACEÆ Lindl. Nat. Syst. ed. 2, 30.

Mostly climbing shrubs with simple or compound leaves, the upper ones opposite the racemes or thyrsoid panicles of small flowers, or tendrils. Calyx minute, nearly entire or 5-toothed. Petals 4 or 5, inserted upon the outside of an annular disk, inflexed, valvate in the bud, caducous. Stamens as many as petals and opposite them, inserted on the surface of the disk. Ovary 2 celled, with two collateral ovules in each cell. Style short or none: stigma simple. Fruit a globose, mostly pulpy berry, often by abortion 1-celled. Seeds anatropous, erect, with a hard testa. Embryo much shorter than the horny or fleshy albumen: radicle slender. Cotyledons lanceolate or subulate.

1 VITIS Tourn. Inst 613. L. Gen. n. 284. (GRAPE.)

Woody vines, climbing by tendrils that are opposite to leaves, with acid juice, mostly simple opposite leaves and small greenish flowers in compound racemes or panicles that are opposite the upper leaves. Calyx very small, entire or 4-5-toothed or -lobed, the tube filled with a fleshy annular disk which bears the 4 or 5 thick caducous petals and the distinct stamens. Fruit a more or less pulpy berry.

V. California Benth. Bot. Sulp. 10. Stems often 1-2 inches in diameter below, climbing trees to the height of 20-30 feet: leaves round-cordate with a deep and narrow sinus, 2-3 inches long, nearly as broad, obtuse, rather coarsely serrate and often somewhat 3-lobed, tomentose or canescent, especially beneath: fruit 4 lines in diameter, in rather large clusters, purple, covered with bloom: seeds broad. Along streams, from the Umpqua Valley, Oregon, to southern California.

ORDER XXIV ACERACEÆ J. St. Hil. Expos. Fam. ii, 15.

Trees or shrubs with opposite palmately lobed or pinnately 3-5-foliolate (rarely alternate and entire) leaves without stipules and small flowers in lateral or terminal racemes or fascicles that are often by a bortion polygamous or diœcious. Sepals 6, rarely 4-9, more or less united, imbricate in the bud. Petals as many as sepals and alternate with them, inserted around a commonly lobed hypogynous disk, sometimes wanting. Stamens usually 8, sometimes 3-12, distinct inserted on the disk: anthers introrse or versatile. Ovary 2-lobed, composed of 2 united carpels each containing 2 collateral ovules, or a single 2o vuled carpel. Styles more or less combined, stigmatose on the inside or the stigma almost sessile. Fruit composed of 2, rarely 3 or 4, indehiscent samarioid carpels, finally separable from the filiform axis the wing thickened at the lower margin, or a cartilaginous follicle. Seeds 1 or 2 in each cell, erect, with little or no albumen. Embryo curved or nearly straight, with foliaceous cotyledons variously folded upon each other.

- 1 **Acer.** Leaves opposite, palmately lobed or rarely divided: flowers in racemes or fascicles, polygamous.
- 2 **Forsellesia.** Leaves alternate, simple and entire: flowers solitary terminating short axillary branches or spur-like fascicles, perfect.

1 ACER Tourn. Inst. 615, L. Gen. 1155. (MAPLE.)

Trees or shrubs with opposite mostly palmately lobed leaves and small flowers in terminal racemes, umbel-like corymbs or fascicles. Calyx colored, usually 5-lobed. Petals 5, sometimes wanting. Stamens 3-12, usually 8, inserted with the petals upon a lobed hypogynous disk. Styles 2, elongated. Ovary 2-lobed, rarely 3- or 4-lobed, and as many celled, with a pair of ovules in each cell, becoming in fruit a double, rarely triple or quadruple, samara that is separable at maturity into 1-seeded indehiscent winged nutlets.

FORSELLESIA.

* Flowers in racemes; body of the fruit hispid.

A. macrophyllum Pursh Fl. 267. (LARGE LEAVED MAPLE). A tree 50—90 feet high, 1—3 feet in diameter: leaves 6—12 inches long, nearly as broad, cordate with a deep sinus, deeply 3—5-cleft, the segments cleft into 3—5 sinuate, acute lobes, pubescent beneath when young: flowers yellow, fragrant, in crowded pendent racemes 3—6 inches long, appearing after the leaves: calyx petaloid, campanulate, the broad obovate segments 2—3 lines long: petals obovate, about equalling the sepals: stamens 8—12 exerted, filaments hirsute at base style longer than the stamens, deeply 2-lobed: fruit densely hispid, the glabrous wing $1\frac{1}{2}$ —2 inches long. In mountain ravines and river bottoms, Brit. Columbia to California and Idaho.

* * Flowers in loose umbel-like corymbs or fascicles: fruit smooth.

A. glabrum Torr. Ann. Lyc. N. Y. ii. 172. (SMOOTH MAPLE). A shrub or small tree 6—30 feet high, 2—8 inches in diameter, glabrous throughout except the bud scales which are densely villous inside: leaves round-cordate with shallow sinus, 2—4 inches broad, nearly as long, more or less deeply 3-lobed or parted, the ovate acuminate lobes doubly serrate with acuminate teeth, conspicuously veined and reticulated: flowers few, greenish-yellow, somewhat corymbose, on short 2-leaved branchlets, appearing after the leaves: calyx campanulate, deeply 5-cleft, the spatulate segments about 2 lines long: stamens 8, shorter than the spatulate petals: fruit very smooth, with slightly spreading wings, about an inch long. Along streams and on the highest mountains, Vancouver Island to California and the Rocky Mountains.

A. circinatum Pursh Fl. 266. (VINE MAPLE). A large shrub 10—30 feet high, usually declined and somewhat viny: leaves round-cordate with a narrow shallow sinus, 3—5 inches long nearly as broad, 7—9 lobed nearly to the middle, the acute lobes doubly and sharply serrate, villous beneath and on the veins above when young, becoming glabrate: flowers in loose 10—20-flowered terminal corymbs: calyx dark red, deeply 5-lobed or parted, the ovate acute sepals 2—3 lines long, spreading: petals greenish white, about half as long as the sepals, ovate, acute, erect: stamens 8, exerted: style short; ovary villous: fruit 10—16 lines long, the wings spreading at right angles to the pedicels. In forests and along streams, Alaska to California, west of the Cascade Mountains.

2 FORSELLESIA Greene Eryth. 1, 206.

GLOSSOPETALON Gray Pl. Wright. ii, 29, t. 12. not Schreber.

Low and rigid shrubs with slender spinescent branches, and small alternate simple entire leaves, which separate in age by an indistinct articulation from a dilated scale-like minutely 2-stipulate base; the setaceous-subulate stipules adnate to the scales, and small solitary flowers, terminating short axillary branchlets, or spur-like fascicles. Calyx deeply 4—5-cleft, persistent, its flat base within filled by an 8—10-lobed perigynous disk; petals 4 or 5, inserted on the margin or under the edge of the disk, somewhat withering-persistent. Stamens 8 or 10 inserted at the sinuses of the disk, shorter than the calyx; filaments subulate, persistent: anthers didymous. Ovary 1-celled, of a single ovoid carpel, with style extremely short or none, and a depressed entire or obscurely 2-lobed stigma. Ovules 2, collateral or nearly so inserted on the ventral suture barely above the base of the

cell, ascending, anatropous. Fruit a firm-coriaceous follicle opening down the ventral suture, 1-2-seeded.

F. spinescens Greene l. c. *Glossopetalon spinescens* Gray l. c. A smooth rigidly branched shrub 2-3 feet high: leaves oblong to spatulate, narrowed below on slender pedicels 2-4 lines long, acute or obtuse: flowers on slender pedicels 2-4 lines long: lobes of the calyx oblong, a line or more long: petals white, 4-5 lines long, spatulate, attenuate below to a short slender claw: stigma nearly sessile, 2-lobed; ovary acute; fruit not seen. Bluffs of Snake river (Cusick).

ORDER XXV. ANACARDIACEÆ. Lindl. Nat. Syst. ed. 1.

Shrubs or trees with resinous or milky juice, simple or compound leaves without stipules, and small flowers in axillary or terminal panicles. Flowers usually regular, perfect, dioecious or polygamous. Sepals usually 5, distinct or more or less united, mostly persistent. Petals of the same number as the sepals, or wanting, inserted into the disk which lines the bottom of the calyx. Stamens as many as sepals, or twice as many, or more, sometimes part of them sterile; filaments distinct, sometimes alternately shorter, inserted with the petals. Ovary solitary, free, or rarely adhering to the calyx, 1-celled, or with 1 or 2 abortive cells; ovule solitary, on a funiculus which rises from the base of the cell. Styles 3, rarely 4, distinct or combined. Fruit a 1-seeded indehiscent drupelet. Seed erect or suspended, anatropous, without albumen. A large order, represented here only by the genus

RHUS L. Gen. n. 361.

Shrubs or small trees with alternate leaves and small polygamous or polygamo-dioecious flowers in axillary and terminal bracteate racemes or panicles. Calyx small, 4-6-parted, persistent, imbricated in the bud. Petals 4-6, imbricated in the bud. Stamens as many or twice as many as petals, with subulate filaments, inserted under the edge of the disk. Fruit a dry drupelet. Seed pendulous upon a slender seed-stalk arising from the base of the cell.

* Flowers polygamous or dioecious; paniced, developed with or after the leaves.

R. glabra L. Sp. i. 265. (SUMACH). An erect shrub 4-12 feet high, smooth and glaucous when young: leaves oddpinnate; leaflets 13-31, petiolulate, oblong to lanceolate, acuminate, acutely serrate 1-3 inches long: inflorescence terminal, thyrsoid, hirsute: sepals broadly subulate, about a line long: petals oblong, a little longer than the sepals: drupelets clothed with crimson acid hairs: seeds smooth, about a line long. In ravines and along streams, eastern Oregon to Brit. Columbia and the south Atlantic States.

R. toxicodendron L. Sp. 266. Stems erect, 1-3 feet high; leaves trifoliolate, pubescent; leaflets rhomboid, acuminate, entire or toothed, the lateral ones more or less oblique: panicles axillary: racemes subsessile; flowers mostly dioecious: fruit white, subglobose, smooth, persistent. Along small streams, eastern Oregon to the Atlantic States.

R. diversiloba T. & G. Fl. i, 218. (POISON OAK). Stems erect and shrubby or climbing by rootlets attached to the bark of trees; 2–20 feet high, usually somewhat pubescent: leaves usually 3-foliolate rarely 5-foliolate; leaflets ovate, obovate or elliptical, 1–3 inches long, obtuse or acutish, 3-lobed or coarsely toothed, (rarely entire), the lobes and teeth rounded: panicles peduncled: flowers dioecious: fruit white, 2–3 lines in diameter, falling soon after maturing. In forests and rocky hillsides, Brit. Columbia to California.

* * Flowers polygamo-dioecious, in short scaly-bracted spikes preceding the leaves.

R. trilobata Nutt. T. & G. Fl. i, 219. A shrub 2–5 feet high, diffusely branched, more or less pubescent, at length nearly glabrous: leaves trifoliolate: leaflets sessile, cuneate-obovate or rhomboidal, 1–2 inches long, coarsely toothed above and often 3-lobed, the segments obtuse: spikes of small yellowish flowers 4–6 lines long, approximate at the ends of the branchlets: fruit somewhat viscid, 2–3 lines in diameter, globose, bright red; nut smooth. On gravelly plains and hillsides, along streams, southern Oregon to California and the Rocky Mountains.

ORDER XXVI. LEGUMINOSÆ Berh. Hor. Acad. ii, 22.

Herbs shrubs or trees with alternate usually compound stipulate leaves, and usually showy flowers in axillary or terminal racemes or spikes, rarely solitary or capitate. Sepals united into a 5-cleft or 5-toothed calyx, the lobes often unequal or variously combined, the odd one inferior. Petals 5, sometimes by abortion fewer or wanting, perigynous or hypogynous, irregular and unequal, or sometimes regular, distinct or variously cohering, the odd one superior. Stamens mostly 10, diadelphous (9 and 1) or monadelphous, sometimes distinct or numerous, inserted with the petals. Ovary simple, solitary, very rarely two or more, free from the calyx, the style protruding from the upper or ventral suture: stigma simple. Fruit a 1-celled 2-valved pod (legume), or sometimes a drupe. Seeds solitary or several, heterotropous or anatropous, sometimes with an aril or large caruncle: albumen none. Embryo straight or with the radicle bent back along the edge of the cotyledons. Cotyledons thin and somewhat foliaceous, or thick and fleshy.

Ours are all of

SUBORDER PAPILIONACEÆ L. Sepals imbricate or rarely somewhat valvate in the bud. Corolla papilionaceous or otherwise more or less irregular, rarely wanting. Stamens 10, rarely fewer, inserted with the petals into the bottom of the calyx, or perigynous. Radicle bent back upon the edge of the cotyledons, or straight. Leaves simple or simply compound. Flowers usually perfect.

TRIBE I. PODALYRIÆ. Herbaceous or suffrutescent plants with palmate, or pinnate or simple leaves and papilionaceous flowers. Stamens 10, distinct; anthers uniform. Embryo incurved or inflexed, or often straight.

1. **Thermopsis**. Herbs with conspicuous stipules, digitately trifoliolate

leaves and yellow flowers in racemes.

TRIBE II. GENISTEÆ. Herbs or shrubs with palmately compound or simple leaves and various colored flowers in racemes or solitary. Stamens 10, monadelphous: anthers of two forms. Radical, incurved or inflexed.

2. **Lupinus.** Herbs, rarely shrubby, with various colored flowers in racemes: leaves digitate, mostly of more than 3 leaflets; calyx deeply bilabiate: upper petal with recurved sides; keel falcate: pods large, straight.
3. **Ulex.** Spinescent shrubs with inconspicuous simple leaves and yellow axillary flowers.
4. **Cytisus.** Shrubs with green, often angular branches, palmately or pinnately trifoliolate leaves and solitary or racemose yellow flowers.

TRIBE III. TRIFOLIEÆ. Mostly low herbs with palmately or pinnately trifoliolate, rarely 5-7-foliolate leaves and axillary or terminal, racemose, spicate, capitate or umbellate inflorescence. Corolla papilionaceous. Calyx 5-lobed. Stamens diadelphous (9 and 1).

5. **Medicago.** Herbaceous or rarely shrubby plants with palmately trifoliolate leaves and axillary peduncles: petals free from the stamens, deciduous: pods 1-several-seeded, falcate-incurved, or coiled into a spiral.
6. **Melilotus.** Erect herbs with pinnately trifoliolate leaves and small fragrant flowers in slender axillary racemes: petals free from the stamens, deciduous: pods ovoid, small, scarcely dehiscent, 1-2 seeded.
7. **Trifolium.** Herbs with palmately or pinnately trifoliolate, rarely 5-7-foliolate leaves and mostly very many flowers on axillary or terminal peduncles: corolla persistent: the banner and wings commonly coherent with the staminal tube: pods concealed within or but little exerted from the calyx, 1-6-seeded.

TRIBE IV. LOTEÆ. Herbs or shrubs with pinnately 1-many-foliolate leaves and various colored flowers capitate or umbellate on axillary peduncles, rarely solitary.

8. **Lotus.** Herbaceous or suffrutescent plants with pinnate, usually 3-many-foliolate leaves and solitary or numerous flowers on axillary peduncles with or without a 1-3-foliolate bract at summit: corolla deciduous, the banner often remote from the other petals: pods oblong to linear, terete, turgid or plain, few or many-seeded.

TRIBE V. GALEGEÆ. Erect herbs, or shrubs with unequally pinnate, seldom stipellate leaves and axillary or terminal, racemose or spicate inflorescence. Corolla papilionaceous or otherwise irregular. Stamens diadelphous (9 and 1), or sometimes monadelphous. Pods continuous, 1-celled, several-seeded, dehiscent; or 1-2-seeded and indehiscent. Radicle incurved or inflexed.

9. **Psoralea.** Herbs with trifoliolate leaves and axillary spikes of rather small flowers; herbage glandular-dotted: stamens monadelphous or diadelphous: pods indehiscent, 1-seeded.
10. **Petalostemon.** Herbs with gland-dotted herbage unequally pinnate

leaves and small flowers in pedunculate dense terminal spikes or heads; petals 5, on filiform claws that are united to the stamen-tube the upper one free, all deciduous: stamens 5, monadelphous: ovary with two collateral ovules: pods 1-seeded.

TRIBE VI. ASTRAGALÆ. Erect or decumbent herbaceous, rarely suffrutescent, plants with unequally pinnate leaves and axillary or radical, racemose or spicate inflorescence. Stamens diadelphous (9 and 1). Pods 1-celled or often spuriously 2-celled by the introflexion of one or both sutures, dehiscent, several-seeded or rarely 1-2-seeded. Radicle incurved.

11. **Astragalus**. Unarmed herbs with unequally pinnate leaves without tendrils and axillary spikes or racemes of comparatively small flowers: herbage neither glandular nor dotted: pods various, often coriaceous and turgid, or thin and bladderly-inflated, or thin and flat, more or less 2-celled by the intrusion of the dorsal suture: keel obtuse.
12. **Oxytropis**. Unarmed herbs or sometimes suffruticose plants, with unequally pinnate leaves: the flowers spicate on axillary or radical peduncles: pods partly 2-celled by the introflexion of the palmar suture: keel with a subulate point.
13. **Glycyrrhiza**. Glandular-viscid perennials with unequally pinnate leaves and flowers in peduncled axillary spikes: pods short, compressed, prickly, indehiscent, few-seeded.

TRIBE VII. HEDYSARÆ. Herbs or shrubs with pinnate or simple leaves, the flowers in axillary or terminal spikes, racemes or umbels. Stamens 10, monadelphous or diadelphous. Pods usually transversely divided into 1-seeded indehiscent joints.

14. **Hedysarum**. Herbs with unequally pinnate leaves, the flowers in axillary or terminal racemes: keel obliquely truncate, longer than the wings: stamens diadelphous: pods of several 1-seeded joints connected by their middle.

TRIBE VIII. VICIÆ. Herbs with abruptly pinnate leaves, the common petiole not articulated with the stem, produced at the apex into a bristle or tendril, the flowers in axillary racemes. Stamens 10, diadelphous. Pods not jointed, dehiscent. Cotyledons remaining under ground and unchanged in germination. Radicle inflexed.

15. **Vicia**. Weak herbs with stems climbing by tendrils which terminate the pinnate leaves, and 1-several-flowered axillary peduncles. Style bent upward at the apex and villous under the stigma on the under or outer side.
16. **Lathyrus**. Herbs clinging by tendrils which terminate the pinnate leaves and few-several-flowered axillary peduncles: style bent at right angles to the ovary and villous in a line on the inside.

Tribe 1 Podalyriæ Benth. B. & H. Gen. i, 437. Mostly herbs with simple or digitately trifoliolate, rarely many-foliolate, leaves, and papilionaceous flowers. Stamens 10, free, or slightly united at base. Pod dehiscent. Radicle incurved or inflexed.

1 THERMOPSIS R. Br. in Ait. Hort. Kew. e. 2, iii, 3.

Stout perennial herbs with erect stems, digitately trifoliolate

leaves, foliaceous free stipules, petiolulate entire leaflets, and moderately large yellow flowers in terminal bracteate racemes. Bracts herbaceous, persistent. Calyx campanulate, 4-5-cleft to the middle, the lobes equal or the two upper ones united. Upper petal roundish, shorter than the oblong lateral ones, the sides reflexed, keel nearly straight, obtuse, equalling the wings. Stamens 10, distinct. Style slightly curved; stigma minute. Pods narrow, compressed, few to many-seeded.

T. montana Nutt. T. & G. Fl. 1, 388. Glabrous below, somewhat silky-villous above: stipules ovate to lanceolate, 1-2 inches long: leaflets oblong-ovate to oblong, 1-3 inches long, obtuse or acute, sparingly villous beneath, smooth above: bracts mostly lanceolate: lobes of the calyx triangular one and a half lines long: pods silky-villous, 2 inches long or more, nearly straight, erect, short stipitate, linear, 10-15-seeded. Along streams, Brit. Columbia to California and the Rocky Mountains.

T. gracilis Howell Eryth. 1, 109. Sparingly strigose-pubescent throughout: stems slender, erect, 1-3 feet high, sparsely branched above the branches spreading: stipules broadly ovate to lanceolate, usually acute: leaflets oblanceolate, acute at base, petiolulate, 1-3 inches long by 8-12 lines broad: racemes short, loosely flowered: bracts ovate, acute, mostly shorter than the pedicels: lower teeth of the calyx triangular, acute, the upper truncate or barely 2-toothed: ovary about 12-ovuled: pods appressed-silky, 2 inches long or more by 2 lines broad, on a very short stipe, usually spreading and often falcate. In the mountains of southern Oregon from the sources of the Willamette river to northern California.

T. robusta Howell l. c. Densely tomentose throughout: stems stout, 4-6 feet high: stipules large, broadly ovate to orbicular-ovate, acute at both ends, 2-3 inches long: racemes long, densely many-flowered: bracts ovate-lanceolate, acuminate, longer than the pedicels: teeth of the calyx acuminate, the upper 2-toothed: fruit not seen. In open forests on top of the Coast Mountains on the old Crescent City Wagon road, collected in June, 1884, not since reported.

T. argentata Greene Eryth. iii, 18. Rather slender, a foot or two in height: all the growing parts, and when young the whole plant silvery-canescens throughout with a very dense and minute silky pubescence, the mature part also not indistinctly silky and pale: stipules 6-18 lines long, from broadly to narrowly lanceolate and often slightly falcate: leaflets of the lowest leaves obtusish and of narrowly cuneate-obovate outline, of the upper from oblanceolate to rhombic-obovate and very acute: raceme short and rather few-flowered: calyx-teeth triangular-subulate and about as long as the campanulate tube: petals of the wings and keel notably longer than the banner: pods long, spreading, silky-tomentulose. Modoc County, California, perhaps in southeastern Oregon.

Tribe 2. Genistæ DC. Prodr. ii, 115. Herbs or shrubs with simple or compound estipellate leaves, and papilionaceous flowers. Stamens 10, monadelphous; anthers of two forms. Pod continuous, 1-celled, sometimes intercepted internally, but not jointed. Radicle incurved or inflexed.

2 LUPINUS Tourn. L. Gen. n. 865.

Herbaceous or rarely shrubby plants with palmately 5-15-folio-

late, rarely 1-foliolate, leaves, small stipules and mostly showy flowers in terminal racemes or spikes. Calyx deeply bilabiate, often 2-bracteolate; the upper lip 2-cleft or -toothed, or rarely entire, the lower entire or 3-toothed. Upper petal with the sides reflexed, the lateral ones foveolate-plicate toward the base, united at the summit, keel falcate, acuminate. Stamens monadelphous, the sheath entire; alternate filaments longer; the 5 anthers opposite the sepals oblong, maturing early, those opposite the petals roundish or reniform, maturing later. Stigma bearded: Pod coriaceous, somewhat oblong, more or less compressed, often torulose or intercepted with cellular partitions. Cotyledons fleshy.

§ 1 LUPINUS PROPER. Flowers in terminal racemes. Sides of the upper petal strongly reflexed. Ovary 5-12-ovuled. Cotyledons petioled after germination.

* Perennial, shrubby, at least at base, tall, branched and leafy: pubescence silky, mostly appressed: leaflets 5-7: petioles rarely much exceeding the leaves; bracts deciduous; flowers large; lips of the calyx nearly equal: ovules 8-12.

L. holosericeus Nutt. T. & G. Fl. i, 380. Frutescent, silvery-canescens: stems 12-20 inches high, leafy, branching, ascending: leaflets 5-9, lanceolate, obtuse or acute, mucronulate, narrowed at base, often arcuate, densely silky-canescens and silvery on both sides, mostly shorter than the petiole or the upper ones as long or longer than the petiole: stipules subulate: flowers verticillate or somewhat scattered, approximate, on short pedicels: bracts lanceolate, shorter than the flowers: calyx bracteolate the upper lip slightly 2-cleft, the lower nearly as long and entire: petals bright blue, 6 lines long or more, the lateral ones broadly oblong. Islands and gravelly banks of the Willamette river, to California.

L. propinquus Greene Eryth. i, 126. Shrubby, much branched and bushy, usually 2-4 feet high, all the herbage except the glabrous upper surface of the leaves puberulent: racemes short and short-peduncled, the flowers indistinctly whorled: bracts squarrose spreading, very caducous: lobes of the calyx subequal, the upper notched, often deeply so: petals 5 lines long, subequal, violet, the upper one reddening in age; keel strongly ciliate. In damp woods along the coast from Santa Barbara to Crescent City, California; no doubt on the coast of southern Oregon.

** Perennials: stems wholly herbaceous, more or less elongated.

+ Leaflets glabrous above or nearly so, oblong or oblanceolate an inch or more long; stems mostly succulent and fistulous: flowers subverticillate: bracts deciduous: lips of the calyx usually but slightly toothed: ovules 8 or more.

L. Nootkatensis Donn Cat. Cant. Sims Bot. Mag. t. 1311. Stems often stout, 1-2 feet long, more or less decumbent, leafy: pubescence densely villous, spreading or subappressed: stipules elongated, setaceous-acuminate: leaflets 6-8, cuneate-oblong, obtuse or acutish, mucronate, 1-2 inches long, about equalling the petiole: racemes elongated, nearly sessile: bracts linear-lanceolate, equalling the calyx: flowers blue or purplish, verticillate or scattered; pedicels 2-6 inches long: calyx large, with long setaceous bractlets, the upper lip rather deeply bifid and the lobes often erosely truncate, the lower one usually strongly 3-toothed: petals 8-9 lines long, the keel a little shorter and usually naked: ovules 9-12: pods 18 lines long. Near the sea,

northern Washington to the Aleutian Islands.

L. polyphyllus Lindl. Bot. Reg. xiii, t, 1096. Stems stout erect, 2-6 feet high, sparingly villous: the bracts calyx and youngest leaves silky-pubescent: stipules triangular to subulate: leaves distant, long-petioled; leaflets 10-16, in the upper leaves often but 8-10, glabrous above, 2-6 inches long by 6-12 lines broad: racemes often 1-2 feet long; bracts oblong-lanceolate, equalling or shorter than the calyx: flowers mostly scattered, blue, purple or white: pedicels 3-6 lines long: lips of the calyx subequal, entire; bractlets very caducous; petals equal, 6-7 lines long, keel naked: ovules 8-10: pods an inch long or more. Common from Brit. Columbia to California, west of the Cascade Mountains.

L. Wyethii Watson Proc. Am. Acad. 525. Stems ascending, stout, 6-- inches high, sparingly leafy: pubescence villous, spreading: stipules setaceous: leaflets 8-12, oblong to oblanceolate, 1-3 inches long, acute, glabrous above; the lower petioles much elongated: racemes 4-10 inches long, often long-peduncled: bracts subulate-setaceous, exceeding the calyx: flowers blue or pink, scattered or subverticillate: pedicels slender, 3-4 lines long: calyx villous, with short setaceous bractlets, upper lip 2-toothed, the lower one longer, subentire: petals equal, 6-7 lines long, keel naked: ovules 7-8. Flathead river (Wye...) Clearwater, Idaho (Spalding).

L. longipes Greene Fl. Francis. 41. Stems more or less clustered, erect, stoutish, not at all succulent, sparingly branched above, 2-4 feet high, striate, glabrous or loosely hairy: leaves mostly basal, on petioles 12-18 inches long: stipules setaceous-subulate: leaflets 7-11, broadly lanceolate, acute, setaceously mucronulate, 2-4 inches long, glabrous, the margin often more or less ciliate: raceme peduncled, elongated, not dense: flowers subverticillate, long-pedicelled, blue to white, keel ciliate in the middle: pod an inch long or more, densely hirsute, about 7-seeded: seeds compressed, oval, brown with a dark diagonal line. Along streams and in wet meadows, from the Columbia river to California.

L. latifolius Agh. Syn. Lup. 18. Stems erect, 2-4 feet high, smooth, with numerous slender branches, flowering throughout the season: stipules small, linear-lanceolate: leaflets 7-9, light or yellowish green, oblanceolate or spatulate, narrowed below, mostly shorter than the petioles, 1-4 inches long by 3-12 lines broad, obtuse, with a slender mucro a line long at the apex, smooth above, rather sparsely pubescent with minute appressed hairs beneath: racemes 4-12 inches long, short peduncled; flowers subverticillate or scattered, pale blue or pinkish; bracts setaceous, about equalling the calyx, caducous; pedicels slender, 4-6 lines long: calyx appressed-pubescent, upper lip ovate-lanceolate, 2-toothed, shorter than the linear entire lower one: petals 6 lines long, light blue and white, the keel naked: ovary densely pubescent with brownish hairs, 7-8-ovuled: seeds light-colored, very smooth. In open places and among shrubs, Washington to California, west of the Cascade Mountains.

L. Burkei Watson Proc. Am. Acad. viii, 525. Stems 2-3 feet high, nearly glabrous: stipules lanceolate: lower leaves long-petioled: leaflets 7-10, 1-5 inches long, oblanceolate, acute or the lower ones obtuse, glabrous above: racemes short and dense, with the pedicels mostly but 1-2 lines long: flowers blue: bracts villous, somewhat persistent: pubescence of the calyx somewhat villous, spreading: pods 8-seeded. From Mount Adams, Washington, to the falls of the Yellowstone, Idaho and Nevada.

L. ligulatus Greene Pitt. i, 215. Stems clustered, simple, erect, stout and somewhat fistulous, 2-4 feet high, glabrous, a little glaucous: other parts of the plant except the upper surface of the leaves more or

+ + Leaflets pubescent both sides.

less hirsute: stipules an inch long, adnate for something less than half their length, the elongated-linear acuminate free part strongly villous-hirsute: petioles 3-5 inches long; leaflets about 9, oblanceolate, acute, 1-2 inches long: racemes short-peduncled, 6-10 inches long: bracts villous-ciliate: flowers rather distinctly verticillate, nearly 6 lines long; keel densely ciliate in the middle: ovary very villous. On Crooked Creek, southern Oregon.

L. littoralis Dougl. Bot. Reg. xiv, t. 1198. Stems slender, decumbent or ascending, 1-2 feet long often not succulent, leafy: pubescence silky, rather thin: stipules linear; leaflets 5-8, oblanceolate or cuneate-oblong, 6-12 lines long, the petioles sometimes twice longer; racemes short; bracts setaceous, exceeding the calyx: flowers blue or violet, verticillate or scattered on pedicels 2-3 lines long: calyx large with small bractlets, upper lip 2-toothed; petals equal, 6 lines long; keel ciliate: ovules and seeds 10-12: pods narrow, 15 lines long. On sand dunes along the coast, Washington to California.

+ + + Rather sparingly leafy, the lower petioles at least twice as long as the leaflets: racemes loose; bracts mostly deciduous; flowers large, not yellow: ovules 6-7, rarely fewer: leaflets glabrous above.

L. arcticus Watson l. c. 526. "Villous or subglabrous: stems rather stout, one foot high or less, erect or ascending, simple: stipules conspicuous, acuminate: leaflets 6-8, cuneate-oblong or oblanceolate, 1-2 inches long, acute or obtuse, the petioles much elongated: racemes 2-4 inches long; bracts linear about equalling the calyx, deciduous or subpersistent: flowers subverticillate or scattered, on slender pedicels 2-3 lines long: bractlets wanting or caducous: calyx-lips short, the upper entire or slightly toothed, the lower a little longer; petals 7-8 lines long, the upper one shorter: keel naked: ovary slightly hairy, 5-7-ovuled. Near the coast, Washington to the Polar Sea."

L. mucronulatus Howell Eryth. i, 109. Pubescence short and appressed: stems slender, decumbent, 2-6 inches long, 2-3 leaved: stipules subulate: leaflets 6-10, obovate to oblanceolate, obtuse or acutish, mucronulate, 1-2 inches long, sparingly pubescent on both sides or glabrous above: peduncles equalling the leaves: racemes 2-3 inches long, rather dense; bracts setaceous; flowers subverticillate, purple or ochroleucous; upper lip of the calyx acute, entire, the lower longer, narrow, subentire: petals 4-5 lines long, equal, keel ciliate above the middle. On dry hillsides, eastern base of the Coast Mountains in Josephine County, Oregon.

+ + + Leafy and branching: the petioles not longer than the leaflets: flowers large: subverticillate: bracts deciduous: ovules 6-8.

L. Sabinii Dougl. Hook. Fl. i, 166. Stems erect, 2 feet high: pubescence short, appressed, silky: stipules long, setaceous; leaflets 8-11 oblanceolate, 12-18 lines long, acute, silky both sides, racemes 6-10 inches long, rather dense and long-peduncled: bracts linear-setaceous; pedicels 3-4 lines long: calyx minutely bracteolate, upper lip shortly toothed, the lower longer and entire; petals yellow, equal, 7-8 lines long, the upper one emarginate, naked, keel ciliate: ovules 7. In the Blue Mountains of Oregon.

L. albicaulis Dougl. l. c. 165. Pubescence short, more or less villous and spreading or appressed: caespitose; stems slender, erect, 1-3 feet high, branched, whitish: stipules linear-setaceous: racemes 4-12 inches long, short-peduncled; bracts subulate; pedicels 2-3 lines long: calyx large, lips nearly equal, upper one narrow, shortly 2-toothed,

lower one subentire: petals equal, 5-7 lines long, blue, violet or whitish, the upper one acute, naked, keel strongly falcate, naked: ovules 5-7: pods 1-2 inches long, 4-5 lines wide, 3-6 seeded. From the Columbia to the Sacramento Valley.

L. ornatus Dougl. Bot. Reg. xiv, t, 1216. Stems decumbent or ascending: pubescence short, more or less silky, mostly appressed: stipules setaceous: leaflets 5-7, oblanceolate or cuneate-oblong, 8-24 lines long, acute or acutish: racemes 3-8 inches long, usually short-peduncled: bracts short, subulate or ovate; pedicles 2-3 lines long: calyx-lips nearly equal, the upper rather shortly toothed or bifid, the lower subentire; petals blue, equal, 5-7 lines long, the upper one acutish, subsilky on the back; keel ciliate: ovules 5-8. pods 15 lines long, 3-4 lines broad. From the Columbia river to California.

+ + + + + Leaves distant lower petioles elongated; leaflets not smooth above: racemes mostly dense.

L. sulphureus Dougl. Hook. Fl. i, 166. Stems erect slender, sulcate, silky: leaflets 13-15, narrowly lanceolate, densely sericeous on both sides, shorter than the petiole, whitish: stipules subulate, short: flowers somewhat verticillate, in a dense thick raceme: calyx ebracteolate, very silky: flowers small, pale sulphur-color, keel glabrous. On the Blue Mountains of Oregon.

L. sericeus Pursh Fl. 468. Rather stout, suberect, 1-2 feet high: pubescence more or less coarsely villous or subsilky, spreading: stipules usually long-setaceous: leaflets 5-8, rarely 10, narrowly oblanceolate, 1-3 inches long, acute; racemes short-peduncled; bracts deciduous, subulate-setaceous often much exceeding the calyx; flowers subverticillate or scattered, on short pedicels blue, pink or white; calyx strongly gibbous, minutely bracteolate, densely silky-villous, the lips nearly equal, 6 lines long, keel ciliate: ovules 4-6: pods densely hairy, an inch long. Common from Washington to northern California and Nevada.

L. saxosus Howell Eryth. i, 110. Stems simple, decumbent or ascending, 4-10 inches long, soft-pubescent with spreading hairs: stipules subulate: leaflets 8-12, densely appressed-silky beneath, sparsely so above, 6-12 lines long, acute or obtusish: racemes dense, 2-3 inches long, short-peduncled: bracts lanceolate, acuminate, caducous: flowers subverticillate, on short slender pedicels: upper lip of the calyx bifid, the lower a little longer, trifid: petals equal, 6 lines long, bright blue, the upper one obtuse, smooth, keel ciliate: ovules 4-5: pods villous. On high stony ridges in the John Day Valley, eastern Oregon, and the Klickitat hills, Washington.

L. leucophyllus Dougl. Bot. Reg. xiii, t, 1124. Stout, 2-3 feet high, branching, leafy, densely white-silky throughout: stipules long-setaceous or subulate: leaflets 7-10, oblanceolate or cuneate-oblong, 1-3 inches long, acute, the petioles about equalling the leaflets or the lower ones twice longer: racemes sessile or nearly so, very dense, 6-12 inches long: bracts subulate or linear, subsistent or deciduous, longer than the buds: flowers scattered or subverticillate, nearly sessile: calyx minutely bracteolate, upper lip rather broad, more or less villous, keel ciliate. On damp hillsides, Brit. Columbia to California and New Mexico. Flowering from May until heavy frosts in autumn.

L. canescens Howell, l. c. Rather stout, strict, 2-3 feet high, at length branching, silky-canescens or the inflorescence hirsute: leaflets 8-12, lanceolate, acuminate, 1-3 inches long, densely appressed-villous on both sides: racemes short-peduncled, dense, 8-10 inches long:

bracts somewhat persistent, subulate, about equalling the calyx: flowers subverticillate, on stout pedicels a line long or more: upper lip of the calyx bifid, the lower subentire: petals 4 lines long, equal, the upper one rather broad, pubescent outside, keel ciliate. By small streams, western base of Buck Mountain, eastern Oregon.

L. lepidus Dougl. Bot. Reg. xiv, t, 1149. Stems slender, 6—24 inches high, leafy at base, densely appressed silky: stipules setaceous: leaflets 7—9, narrowly oblanceolate, 9—18 lines long, acute, petioles much elongated: racemes 2—8 inches long, many-flowered: bracts not exceeding the calyx, caducous: flowers in near verticils or scattered: pedicels 1—2 lines long: upper lip of the calyx 2-toothed or deeply cleft, the lower 3-toothed or subentire: petals violet, equal, 5 lines long, the keel ciliate: ovules 4—6: pods an inch long. In prairies and plains, Puget Sound to the Klamath Lakes.

+ + + + + Stems leafy: petioles short: racemes short-peduncled: bracts deciduous, mostly short: flowers usually small, not yellow: ovules 3—5.

L. flexuosus Lind. in Agh. Syn. Lup. 34. Stems ascending or decumbent, 18 inches high, branching pubescence short, silky, appressed, or subvillous on the leaves: stipules linear-setaceous: leaflets 6—8, oblanceolate, 12—18 lines long, acute, silky on both sides: racemes 3—6 inches long or more: bracts lanceolate-setaceous, equalling or much exceeding the calyx: flowers subverticillate, on pedicels 2—3 lines long: lips of the calyx nearly equal, the upper slightly toothed, the lower subentire: bractlets short, setaceous: petals blue or flesh-color, equal, 5 lines long, the upper one very hairy, keel strongly ciliate: ovules 4—5: pods an inch long. Columbia valley to the Rocky Mountains.

L. parviflorus Nutt. H. & A. Bot. Beech. 338. Stems strict, usually solitary, slender, erect 2—3 feet high, at length branching: pubescence scanty, short, appressed, the calyx and pedicels silky: stipules setaceous: leaves rather distant; leaflets 5—11, oblanceolate to obovate, 1—2 inches long, acute or obtuse, mucronulate, glabrous above, the lower ones shorter than the petioles: racemes 6—12 inches long, slender; bracts linear-subulate, equalling the calyx: flowers subverticillate or scattered, the slender pedicels 1—2 lines long: lips of the calyx nearly equal, the upper bifid: petals light blue, equal, 3—4 lines long, keel ciliate or naked: pods 9—10 lines long, 2—4 seeded, pubescent. In the mountains, from the Columbia river to northern Utah and the Yosemite Valley, California.

L. laxiflorus Dougl. Bot. Reg. xiv, t. 1140. Stems cespitose, erect or ascending, 1—2 feet high, slender, at length much branched: pubescence minute, silky, appressed: stipules setaceous, mostly very small: leaflets 6—8, narrowly oblanceolate, canaliculate, arcuate, 1—2 inches long, acute, appressed-silky both sides or nearly smooth above, at least half as long as the petioles: racemes rather loose, 3—6 inches long: bracts subulate, deciduous: flowers subverticillate or scattered, on slender pedicels 2—4 lines long: calyx narrowed and more or less spurred at base, minutely bracteolate, the upper lip broad, shortly 2-toothed, lower one a little longer, almost oblong or broadly lanceolate, subentire: petals blue to white or yellowish, 3—5 lines long, equal, the upper one subpubescent, keel villous ciliate in the middle; ovules 4—5: pods silky-pubescent. Common from Vancouver Island to northern California, Utah and Montana.

Var. montanus Howei Eryth. iii, 33. Leaflets silky both sides, rather shorter than the type: calyx dense-silky, prominently spurred, the upper lip more distinctly toothed. On Mount Hood, near the line of perpetual snow.

L. argenteus Pursh Fl. 468. Silvery canescent: stems erect or ascending, cespitose, 1–2 feet high, slender and branching: pubescence minute, silky, appressed: stipules small: leaflets 5–8, linear-lanceolate, 1–2 inches long, acute, smooth above or nearly so, about equalling the petioles: racemes 2–6 inches long, nearly sessile: flowers subverticillate or scattered; pedicels 1–2 lines long; calyx campanulate, gibbous but not spurred at base, upper lip broad, 2-toothed, the lower subentire, slightly longer; petals blue or cream-color, equal, 3–4 lines long, the upper one very broad, naked or subpubescent, keel naked or subciliate; ovules 3–5. Plains of the Columbia and Snake rivers.

*** Dwarf, short stemmed, mostly cespitose: racemes mostly short and dense: bracts subsistent; flowers subverticillate, short-peduncled: calyx with the upper lip deeply cleft, the lower 3-toothed, keel ciliate: ovules 3–6: pods hairy, 1–4-seeded.

L. cespitosus Nutt. T. & G. Fl. i, 376. Stems very short and cespitose: pubescence dense, villous, appressed: leaflets 5–7, oblanceolate, 6–12 lines long, acute, the petioles thrice longer: racemes sessile, shorter than the leaves: bracts setaceous, exceeding the calyx; petals pale blue, equal, 3–4 lines long, the upper one narrow, 2 lines broad: pods 6 lines long. Eastern Oregon to Colorado.

L. aridus Dougl. Bot. Reg. xv, t. 124. Stems cespitose, 2–3 inches long, with rather long internodes: pubescence silky-hirsute, fulvous, appressed: leaflets 5–7, oblanceolate, acute, 9–12 lines long, the petioles 3–4 times longer: racemes dense, 2–3 inches long, the peduncles shorter than the leaves: bracts nearly equalling the calyx: upper lip of the calyx shortly toothed, the lower subentire: petals purple, 5 lines long, nearly twice longer than the calyx, the elliptical upper one usually shorter: pods 5 lines long, very hairy. In sandy or gravelly places, Washington to California.

L. Lobbii Gray in Herb. Watson l. c. 533. *L. aridus* var. *Lobbii* Watson. Stems cespitose, 1–3 inches long, leafy: pubescence silky, appressed: leaflets 5–7, oblanceolate to obovate, 6–8 lines long, the petioles 2–3 times longer: racemes dense, 1–2 inches long, peduncles shorter than the leaves: bracts nearly equalling the calyx: upper lip of the calyx deeply bifid, the lower slightly trifid; petals purple, the upper one orbicular. In alluvial prairies and hillsides, Washington to California.

L. minimus Dougl. Hook. Fl. i, 163. Appressed silky-villous, 3–6 inches high: leaflets 5–9, obovate or lanceolate, 3–8 lines long, mostly acutish, the petioles 3–4 times longer: pedicels equalling or exceeding the leaves: bracts short, deciduous: calyx half the length of the petals, upper lip deeply bifid; petals purple, 4–5 lines long, equal, the upper one orbicular. Eastern Oregon and Washington.

L. Cusickii Watson Proc. Am. Acad. xxii, 469. Canescent throughout with soft appressed hairs: stems 2–4 inches high, much branched from the biennial or perennial root: leaflets 5–8 oblanceolate, slightly less villous above, 3–9 lines long, the petioles usually elongated: peduncles mostly very short, the loosely few-flowered racemes shorter than the leaves: flowers purple, 3–4 lines long: calyx narrowly lobed 1–3 lines long; upper petal glabrous, keel ciliate: pods villous with short appressed hairs, 2–3 seeded, 4–5 lines long. On sterile hillsides, Union County, Oregon.

L. Brewerii Gray Proc. Am. Acad. vi, 334. Stems 2–6 inches long, from a spreading branched woody caudex, very leafy: pubescence dense, villous, appressed: leaflets 7–10 obovate, obtuse, 4–6 lines long, the petioles 1–2 times longer: racemes very short: peduncles equalling the leaves: bracts short; lips of the calyx nearly equal, the upper

one deeply bifid, the lower one shortly and equally toothed; petals blue, equal, 3-4 lines long, the upper one orbicular. Alpine, on the Sierran and Sierra Nevada Mountains.

L. Lyallii Gray l. c. Canescent with dense appressed villous pubescence: stems leafy, 2-6 inches long, from a spreading woody caudex: leaflets 5-7, obovate, 3-4 lines long, acutish, the slender petioles 3-4 times longer: racemes very short, the pedicels exceeding the leaves: bracts short: lips of the calyx nearly equal; petals purple or blue, 5 lines long, nearly equal, the upper one elliptical: pods silky, 4-6 lines long. Common on the highest points of the Cascade and Sierra Nevada Mountains from Washington to California.

* * * * Erect annuals: leaflets mostly 5-7: upper lip of the calyx 2-parted or bifid: keel mostly ciliate.

L. carnosulus Greene Bull. Cal. Acad. ii, 144. Erect annual, 1-2 feet high, simple or branched, stout and succulent: pubescence appressed, minute; leaflets pubescent both sides, oblanceolate, 6-12 lines long, obtuse but with a small recurved mucronation: the petioles 1-3 times longer; racemes loose, distinctly verticillate; bracts mostly exceeding the calyx; upper lip of the calyx deeply cleft, the lower entire; petals barely exceeding the calyx, 2 lines long, the upper one entire; petals 3-6 lines long, deep blue, keel villous in the middle: pods fleshy, an inch long. In open places, Willamette Valley to Marin County, California.

L. micranthus Dougl. Bot. Reg. xv, t. 1251. Stems slender, branching from the base, 6-8 inches long, pilose-pubescent, not at all succulent: leaflets 5-7, narrowly linear to linear-spatulate, 6-18 lines long, on petioles twice longer; racemes peduncled; flowers more or less distinctly verticillate; bracts shorter than the calyx; pedicels 1-3 lines long; upper lip of the calyx with divergent lobes, lower lip longer, entire: petals barely exceeding the calyx, 2 lines long, the upper one short, orbicular, mucronulate, blue with white dots in the centre, lateral ones narrow, appressed, dark blue, keel woolly-ciliate toward the apex: pods an inch long, 3-4 lines broad, appressed-pubescent, 5-7-seeded: seeds grayish with a dark diagonal line near the hilum. In open places along streams, Washington to California.

L. bicolor Lindl. Bot. Reg. xiii, t. 1199. Stems stoutish, 6-10 inches high, erect, diffusely branched, sometimes simple, silky-pilose: stipules linear-lanceolate: leaflets 5-8, unequal, narrowly oblanceolate, obtuse or acutish, 6-10 lines long, appressed-silky both sides, the petioles 3-4 times longer: racemes long-peduncled; bracts setaceous, shorter than the calyx, deciduous; flowers in 2-4 verticils, on stout pedicels a line or more long; upper lip of the calyx deeply cleft, the lower a little longer and slightly 3-cleft; petals 3-4 lines long, the upper one orbicular, blue with a white dotted with blue stripe down the center, lateral ones broadly obovate, dark blue, keel ciliate: pods an inch long by 3 lines broad, densely appressed-silky, 4-6 seeded: seeds light brown. In open places, Washington to California.

L. trifidus Torr. in Watson Proc. Am. Acad. viii, 535. Stems slender, 6-10 inches high, branched from the base, pubescent throughout with rather coarse more or less spreading whitish hairs: stipules linear-lanceolate, adnate for half their length: leaflets 5-8, unequal, linear-oblanceolate, obtuse, not half as long as the petioles: bracts deciduous, linear-lanceolate, 2-3 lines long; upper lip of the calyx deeply cleft, the segments divergent, lower lip a little longer, trifid: flowers verticillate, on pedicels a line long; petals nearly 3 lines long, the upper one orbicular, blue and white, the lateral ones dark blue, keel ciliate above the middle. On dry hillsides, southern Oregon to California.

§ 2 PLATYCARPOS. Watson Proc. Am. Acad. viii, 588. Flowers in terminal racemes. Sides of the upper petal strongly reflexed. Ovary 2-ovuled. Cotyledons broad and clasping after germination, usually long-persistent. Annuals with cuneate-oblong or obovate leaflets and persistent bracts; pods ovate.

L. luteolus Kell. Proc. Cal. Acad. v, 38. Stout, 1—2 feet high, usually much branched: pubescence short, appressed, rather silky: stipules setaceous, villous; leaflets usually 7, cuneate-oblong, an inch long or more, the petioles but little longer: racemes short, dense; peduncles exceeding the leaves; bracts linear-setaceous, villous; flowers yellow, 6 lines long; upper lip of the calyx narrow, about a line long, lower lip 4 lines long, upper petal oblong, shorter than the others: pods villous; seeds 2 lines long, black, rough. Southern Oregon to California.

L. microcarpus Sims Bot. Mag. t, 2413. Erect and branching, 3—18 inches high, villous with long spreading hairs: stipules long-setaceous; leaves mostly approximate upon the stem, on elongated petioles; leaflets 7—11, usually 9, cuneate-oblong, 1—2 inches long, obtuse and mucronulate or emarginate, smooth above: flowers in close verticils, on pedicels 1—2 lines long; bracts subulate-setaceous, equalling the calyx or shorter; calyx dense villous, lower lip large 3-toothed, the middle tooth small; upper lip very short, sub-scarious, 2-toothed; petals purple to white or cream-color, 6—7 lines long, the keel slightly ciliate: pods villous, 8 lines long. On moist slopes, from the Columbia river to southern California.

L. pusillus Pursh Fl. 468. Rather stout, 3—10 inches high, diffusely branched from the base, hirsute with long spreading hairs; leaflets usually 5, cuneate-oblong or oblanceolate, 9—15 lines long, acute or obtuse, nearly glabrous above, about half as long as the petioles: racemes short-peduncled or sessile, not exceeding the leaves, 2—3 inches long; pedicels 2—3 lines long; upper lip of the calyx 2-cleft, the lower subentire; petals purple or rose-color, 4 lines long, equal: seeds nearly 2 lines broad. On sandy plains, eastern Washington to the Missouri river and New Mexico.

L. brevicaulis Watson Bot. King 53, t, 7. Stems short or nearly wanting: leaves 1—4 inches high, pubescent with spreading hairs; leaflets mostly 7, cuneate-obovate, 5—7 lines long, rounded at the apex: racemes dense, 1—2 inches long, the peduncles nearly equalling the leaves: upper lip of the calyx very short or truncate, scarious, the lower one subentire: petals blue, 3—5 lines long, equal. Southeastern Oregon to Nevada, Arizona and New Mexico.

3 ULEX L. Gen. n. 881. (FURZE.)

Compact thorny shrubs with simple prickly-pointed leaf-like organs without stipules, and scattered yellow flowers. Calyx of two nearly or quite distinct yellowish sepals. Petals short, unguiculate, subequal the upper one not reflexed. Stamens 10, monadelphous; anthers in two sets, the outer ones short and versatile, the inner long and basifixed. Ovary sessile, many-ovuled; style smooth, incurved; stigma capitate.

U. Europaicus L. Sp. 741. A dense shrub 3—6 feet high, the numerous short branches villous, ending in a short spine: lower leaves sometimes lanceolate, more commonly reduced to spines, 6 lines long; flowers 6 lines long, yellow, solitary in the axil of a spinaceous leaf, often crowded on the short branchlets: calyx villous; upper petal ovate, obtuse, hardly erect: pods few-seeded, but little longer than the calyx.

On sandy plains about the mouth of the Columbia river. Introduced from Europe.

4 CYTISUS L. Gen. n. 877.

Shrubs with green, more or less leafy angular branches, palmately or pinnately trifoliolate leaves, minute or inconspicuous stipules and solitary or racemous, yellow or white flowers. Calyx with campanulate tube and bilabiate limb. Petals broad, unguiculate, free, the keel obtuse. Stamens 10, monadelphous; anthers in two sets, the outer ones short and versatile, the alternate ones long and basifixed. Ovary mostly sessile, many-ovuled; style glabrous, incurved; stigma terminal, capitate or oblique. Pod compressed, several-seeded.

C. SCOPARIUS Link. Enum. ii, 241. (SCOTCH BROOM). A much branched shrub 3-8 feet high with prominently angular green branches; sparingly leafy, leaflets glabrous, often 1 only: flowers large, bright yellow, solitary or in pairs along the branchlets, in the leaf-axils and apparently racemose: pods pilose along the margins. Becoming common in many places. Introduced from Europe.

Tribe 3. Trifoliæ Bronn. DC. Prodr. ii, 171. *Erect or procumbent, mostly low herbs, rarely a little shrubby, with palmately or pinnately trifoliolate, rarely 5-7-foliolate leaves, the leaflets often toothed or serrulate, and axillary or terminal, racemose, spicate, capitate or umbellate inflorescence. Corolla papilionaceous. Stamens diadelphous. Pod continuous, 1-celled, several-seeded and dehiscent, or one to few-seeded and nearly indehiscent. Radicle inflexed.*

5 MEDICAGO Tourn. L. Gen. n. 899.

Herbaceous, or rarely shrubby, plants with palmately trifoliolate leaves, often incised stipules, and axillary, 1-2- or many-flowered peduncles. Calyx somewhat cylindrical, 5-cleft. Keel of the corolla remote from the upper petal. Pod usually many-seeded, of various forms, falcate or spirally coiled.

M. SATIVA Moris. Hist. ii, 150. (ALFALFA). Perennial; glabrous: stems erect, 2-4 feet high: leaflets cuneate-oblong or oblanceolate, toothed above, mucronate; stipules lanceolate, somewhat toothed: flowers numerous, racemose, violet: pods spirally coiled, unarmed. Fields and roadsides, sparingly introduced.

M. LUPULINA L. Sp. 779. Annual, slender, procumbent, 1-2 feet long, soft-hairy: leaflets obovate, small: flowers minute, in small, oblong heads; yellow: pod small, reniform or curved almost into a ring, black when ripe, 1-seeded. Klickitat Co., Washington. Introduced from Asia.

M. DENTICULATA Willd. Sp. iii, 1414. (BUR-CLOVER). Annual, much branched, decumbent, glabrous: leaflets obovate or orbiculate, denticulate: flowers 2-3, yellow: pods coiled into 2 circles, their margins armed with hooked prickles. Introduced from Asia.

6 MELILOTUS Tourn. Inst. t. 226 L. Gen. n. 899 (SWEET CLOVER).

Erect herbs with pinnately trifoliolate leaves and small fra-

grant flowers in slender axillary racemes. Calyx tubular or campanulate, 5-toothed, persistent. Corolla deciduous, the upper petal free, longer than the lateral ones, keel petals completely united cohering with the lateral ones, all free from the stamens. Stamens diadelphous. Style filiform. Pods coriaceous, globose or ovoid, longer than the calyx, scarcely dehiscent, one to few-seeded.

M. INDICA All. Fl. Ped. i, 303. *M. parviflora* Desv. Stems erect or ascending, with spreading branches, 1-3 feet high, from an annual root: leaflets of the lower leaves obovate and often nearly entire, of the upper ones cuneate-oblong or linear, truncate or emarginate, serrate; stipules linear-setaceous; racemes at first dense, at length rather loose; flowers yellow, small; teeth of the calyx broad, nearly equal, half the length of the corolla; petals nearly equal: pods globose-ovate, wrinkled, 2-seeded. In low grounds and along rivers. Introduced.

M. ALBA. Lam. Encycl. iv, 63. Stems erect, branching, 3-6 feet high, from a biennial root: leaflets ovate-oblong, truncate at the apex, mucronate, remotely serrate; stipules setaceous: racemes elongated, paniced, loose; teeth of the calyx unequal, as long as the tube; corolla white, 2-3 lines long, more than twice the length of the calyx, the upper petal longer than the others: pods ovate, wrinkled, two-seeded. Along streams and river bottoms. Introduced.

7 TRIFOLIUM Tourn. Inst. t. 228. L. Gen. n. 896. (CLOVER).

Herbs with palmately or pinnately trifoliolate, rarely 5-7-foliolate, leaves with adnate stipules, and usually numerous flowers in capitate racemes, spikes or umbels, on axillary or apparently terminal peduncles. Calyx 5-cleft or -parted, with nearly equal teeth, persistent. Petals persistent, unguiculate, the claws all more or less adnate to the staminal tube, or the upper one free: keel short, obtuse. Stamens diadelphous. Pods concealed within or little exerted from the calyx, 1-6-seeded, dehiscent or indehiscent.

§ 1. LUPINASTER Monch. DC. Prodr. ii, 203. Heads not involucrate, dense: leaflets 5-7, rarely only 3; flowers sessile: teeth of the calyx nearly equal, filiform, plumose: perennials.

T. megacephalum Nutt. Gen. ii, 105 (?). Stems stout, 4-8 inches long, from a stout perennial root, decumbent or ascending, villous, 1-2-leaved below, and a pair of opposite ones at the summit; stipules foliaceous, the lower ones lanceolate to oblong, irregularly incised with acuminate lobes, to almost entire, the pair subtending the peduncle obliquely ovate, 6-8 lines long by 4-6 lines broad, laciniately lobed and toothed; leaflets 5-7, obovate to oblanceolate, 4-10 lines long, spinulose-dentate, apiculate, obtuse or emarginate, strongly veined; peduncle stout, apparently terminal, longer than the leaves: flowers many, in dense capitate spikes, very shortly pediceled, an inch or more long, ochroleucous and purple: tube of the calyx 1-2 lines long, the setaceous plumose teeth 5-6 times longer; upper petal broad, free, longer than, and enfolding the others, wings and keel unguiculate, the claws adnate to the staminal tube: pods sessile, ciliate near the apex, otherwise smooth, 4-6-ovuled, usually 2-seeded. In wet gravelly places, Eastern Oregon and Washington.

T. Plummeræ Watson Bot. Cal. ii, 440 (?). Stems caespitose, 1-3 inches high, clustered at the crown of a thick perpendicular root, canescent with

appressed hoary pubescence throughout: leaflets 3-5, obovate to oblanceolate, coarsely serrate, 3-6 lines long: stipules mostly scarious and inflated: peduncles shorter than the leaves; flowers few, 3-4 lines long, on short pedicels: teeth of the calyx linear, but little longer than the tube, a third shorter than the petals: ovary densely villous, 2-ovuled. In open forests, Blue Mountains of Oregon.

§ 2. *EUTRIFOLIUM*. Heads not involucrate: peduncles terminal or apparently so: flowers sessile or nearly so.

* More or less pubescent: teeth of the calyx longer than the tube, very narrow: stipules linear or lanceolate, acuminate.

+ Teeth of the calyx plumose or hairy.

** Flowers never reflexed.

T. alboburpureum T. & G. Fl. i, 313. *T. Macraei* of authors not H. & A. Somewhat villous, with appressed or spreading hairs: stems slender, branching, 6-12 inches high: from an annual root: stipules ovate to lanceolate, long-acuminate: leaflets obovate to narrowly oblong, obtuse or retuse, serrulate above the middle, 2-6 lines long: flowers in dense, ovate slender-peduncled heads, sessile, dark purple; calyx very villous, the straight filiform plumose teeth as long as the petals, somewhat spreading: petals scarcely connected: ovary pubescent: pods 1-seeded. On dry hillsides, western Washington to California.

T. PRATENSE L. Sp. 1082. (RED CLOVER). Perennial: stems ascending, somewhat hairy, 1-3 feet long: stipules broadly lanceolate, membranaceous, nerved, setaceously acuminate: leaflets obcordate or oblong-ovate, often emarginate, nearly entire, glabrous above, 1-2 inches long: heads of flowers ovate, dense, nearly sessile, bracteate; teeth of the calyx setaceous, hairy, the lower one much longer than the other four, which are equal and about half as long as the corolla; petals purplish-red, all united into a tube at the base. Roadsides and cultivated fields, common.

T. longipes Nutt. T. & G. Fl. i, 314. Glabrous or nearly so: stems erect or ascending from spreading perennial roots, 6-20 inches high, stout: stipules mostly narrow, entire or sparsely toothed, apiculate: leaves long-petioled; leaflets lanceolate to ovate, entire or minutely denticulate, 1-2 inches long, acute or obtuse, apiculate, strongly veined: flowers white, in dense ovate long-peduncled heads, sessile or nearly so; tube of the calyx sparingly villous, a line long, the setaceous teeth minutely plumose; 5-7 lines long, nearly equalling the corolla; upper petal free, the others united with the staminal tube: ovary pubescent at the apex, shortly stipitate, 2-4-ovuled. In wet places and about springs, Brit. Columbia to California and the Rocky Mountains.

Var. latifolium Hook. Lond. Journ. Bot. vi, 209. Often low: leaflets broad: flowers pedicellate, in loose heads. From the Rocky Mountains to the Pacific.

** ** Flowers at length reflexed.

T. eriocephalum Nutt. l. c. 313. Villous with spreading hairs, stems erect, 6-10 inches high or more, from a stout perennial root: stipules linear to lanceolate, entire or repand; 12-18 lines long: leaflets oblong to lanceolate, 1-2 inches long, acutely and minutely serrulate: flowers in dense ovate spikes, yellowish or white, 4-8 lines long; tube of the calyx very short, its filiform plumose teeth abruptly narrowed from a broad base, nearly equalling the petals; claws of the petals united to the staminal tube; ovary hairy, 2-4-ovuled. Common in open places, western Washington and Oregon to northern California.

T. plumosum Dougl. Hook. Fl. i, 130, t. 49. Silky-pubescent: stems

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June 17. 1

slender, 8-16 inches high, from a stout perennial root, erect or ascending: stipules linear-lanceolate, acuminate, adnate to above the middle: leaflets narrowly oblong to linear, 1-2 inches long, acuminate, denticulate: flowers white, in dense oblong or ovate spikes, 6 lines long, reflexed; tube of the calyx very villous, a line or less long, the subulate-setaceous teeth about half as long as the petals, silky-plumose: ovary 4-ovuled. In open places that are wet in spring, Oregon to California.

T. Harneyensis Howell P. C. Pl. Coll. of 1887. Glabrous or nearly so; stems erect; 6-18 inches high, from a creeping perennial root: stipules linear to lanceolate, entire or dentate, an inch or more long; leaflets linear to oblanceolate, irregularly dentate, 1-3 inches long, appressed pubescent beneath; flowers in dense oblong heads, on rather long pedicels, at length reflexed: tube of the calyx appressed-pubescent, less than a line long, the subulate teeth 2-3 lines long, less than half as long as the petals: ovary densely tomentose. In alluvial prairies, Harney valley southeastern Oregon.

T. Oregonum Howell Eryth. i, 110. Perennial; stems decumbent or ascending, 6-8 inches long; herbage glabrous or the petioles and peduncles appressed-silky; stipules linear or the upper ones lanceolate, acute, entire or serrate above the middle; leaflets linear-oblong to lanceolate, entire or denticulate, 6-12 lines long; flowers pinkish or light red in loose subumbellate heads, the short pedicels reflexed in age; tube of the calyx minutely villous, a line long, the subulate-setaceous teeth twice longer: ovary smooth, stipitate, 3-4-ovuled. In moist places, eastern base of the Coast Mountains, near Waldo, Josephine Co., Oregon.

* * Glabrous perennials: teeth of the calyx subulate, rigid, contorted, twice longer than the tube: flowers sessile, not reflexed: stipules lanceolate, acuminate.

T. altissimum Dougl. Hook. Fl. i, 130, t, 48. Erect, stout, a foot or more high: stipules very long, toothed; leaflets narrowly oblanceolate, very acute, 2 inches long, strongly veined, the veins excurrent: flowers in dense oblong or ovate spikes, 6-8 lines long; lower tooth of the calyx straight, the others curved or twisted: petals red: ovary smooth, 2-ovuled. Eastern Oregon and Washington to Idaho.

* * * Glabrous throughout: teeth of the calyx straight, scarcely longer than the tube: stipules lanceolate to ovate: flowers on very short pedicels, at length reflexed: perennials.

T. Beckwithii Brewer Watson Proc. Am. Acad. xi, 128. Stout: leaflets oblong to oblanceolate, obtuse or acute, 1-2 inches long, coarsely veined and toothed: flowers 7-9 lines long, in dense globose heads; teeth of the calyx linear-subulate: ovary 2-6-ovuled. Southern Idaho to northern California.

T. Kingii Watson Bot. King, 59. Slender, 6-8 inches high: stipules lanceolate to ovate, entire or the upper ones dentate; lower leaflets round-ovate to oblong, obtuse, upper ones linear-oblong to lanceolate, acute, all serrate: flowers in oblong spikes, the rachis often produced above the head with a few spinescent bracts; teeth of the calyx thin, subulate, a line long, but little if any longer than the tube, about one-third the length of the purplish corolla. In moist places, eastern base of the Cascade Mountains at Camp Polk, Oregon, to California. Utah and Montana.

T. Howellii Watson Proc. Am. Acad. xxiii, 262. Stems stout, erect, 1-3 feet high: stipules of the lower leaves narrowly lanceolate, of the upper ones ovate, all entire: petioles short; leaflets mostly cuneate-oblanceolate, 1-3 inches long irregularly-toothed peduncles axillary, longer than the leaves; flowers white, in rather dense ovate or oblong heads, 4-6 lines long; teeth of the calyx subulate, about as long as the tube; upper petal oblong, 6-7 lines long, much longer than the others, free; ovary 2-ovuled;

Pods 1-2-seeded, a little longer than the calyx, dehiscent. Along streams and ditches, Siskiyou Mountains, Oregon and northern California.

* * * * Peduncles axillary: flowers on slender pedicels, soon reflexed: ovules 2-4: spreading perennials.

T. Breweri Watson l. c. xi, 131. Somewhat pubescent throughout, stems procumbent, very slender, 4-12 inches long, from a rather thick perennial root: stipules lanceolate, short; leaflets obovate to oblong, mostly retuse, toothed or serrulate, 3-9 lines long: flowers white or pinkish, on slender pedicels, in loose globose heads: calyx very narrow, the slender teeth much shorter than the corolla. In moist places, southwestern Oregon and northern California.

T. REPENS L. Sp. 1080. (WHITE CLOVER). Glabrous perennial; stems slender, creeping, rooting at all the nodes, 4-20 inches long: leaves long-petioled; stipules narrowly lanceolate, scarious; leaflets obcordate, denticulate, 4-10 lines long: flowers white or pinkish, in loose depressed-globose long-peduncled heads, soon reflexed; teeth of the calyx unequal, lanceolate-subulate, shorter than the tube: pods 4-seeded. Common in cultivated fields and roadsides. Introduced from Europe.

* * * * * Peduncles axillary: flowers on short pedicels, in small heads, at length reflexed: teeth of the calyx subulate, mostly glabrous: slender annuals.

T. ciliolatum Benth. Pl. Hartw. 304. *T. ciliatum* Nutt. not Clark. Glabrous; stems erect, often 1-2 feet high, simple or branched: stipules usually narrow, acuminate; leaflets cuneate-oblong to obovate, 6-12 lines long, obtuse or retuse, serrulate: flowers in small dense ovate heads, the rachis prolonged above as 2 stout bristle: calyx campanulate, the teeth very unequal, the two upper ones lanceolate, spinulose-acuminate, longer than the corolla, the others similar but smaller, about two-thirds as long, all with scarious and rigidly ciliate margins; petals purple and white, 3-4 lines long, the upper one free and folded around the others: pods shorter than the calyx, 1-seeded; seeds oblong, turgid, light brown. In moist meadows of the Willamette Valley to California.

T. Hallii. *T. gracilentum* and *bifidum* of authors as to the Oregon plant not T. & G. Subvillous to glabrous, pale green and somewhat glaucous: stems slender, diffusely branched to simple, 6-18 inches high from a slender annual root: stipules ovate-lanceolate, setaceous-acuminate, entire: leaflets linear-cuneate to obcordate, sparsely dentate, more or less deeply notched at the apex, the midnerve excurrent in the centre, 4-8 lines long: peduncles exceeding the leaves, pilose near the summit; flowers pink or rose-color, in small depressed-globose 10-30-flowered heads, on short pedicels, soon reflexed; calyx 5-parted, the teeth subulate-setaceous, sparsely hirsute, somewhat unequal, but little shorter than the corolla; petals rose-color, 3-4 lines long, the upper one free and folded over the others: pods included, 1-seeded. Open places and prairies, western Washington to California.

T. PROCUMBENS L. Sp. 772. Pubescent; stems procumbent to sub-erect, slender, 4-12 inches long: leaves short-petioled, pinnately-trifoliate; stipules rather foliaceous, ovate, ciliate, mostly shorter than the petiole; leaflets cuneate-obcordate or cuneate-oblong and emarginate, denticulate, the lower pair distant from the terminal one: flowers on slender axillary peduncles, in small ovate heads, soon reflexed; teeth of the calyx unequal, the two upper ones very short; petals yellow, the upper one striate when old: pods 1-seeded. Common in fields and roadsides. Introduced from Europe.

§ 3. INVOLUCRARIUM T. & G. Fl. i, 317. Heads of flowers subtended by a monophyllous, usually many-cleft involucre: pedun-

cles axillary: flowers sessile or nearly so, never reflexed: pods often dehiscent at the ventral suture: veins of the leaves often reticulate.

* Involucre not membranaceous, deeply lobed, the lobes laciniately and sharply toothed: corolla not becoming inflated.

T. fimbriatum Lindl. Bot. Reg. t. 1070. Glabrous: stems long and thick, prostrate: stipules ovate, acuminate, laciniate-spinulose: leaflets oblong or slightly cuneate, spinulose-denticulate, an inch or more long: involucre laciniately many-cleft, shorter than the large subglobose heads of purple or reddish flowers: teeth of the calyx broadly subulate, straight, half the length of the corolla, shorter than the tube, unequal, spiny: corolla slender: pod 2-seeded. In salt marshes along the coast, Oregon to California.

T. spinulosum Dougl. Hook. Fl. i, 133. Glabrous: stems prostrate or ascending, slender, 1-2 feet long: stipules ovate, acuminate, spinulose-serrate; leaflets oblong, acute at each end, spinulose-denticulate, terminated by a rigid spiny point; involucre often small, laciniately many-cleft, shorter than the subglobose heads; teeth of the calyx narrowly subulate, pungent, shorter than the corolla, 3-4 times as long as the tube; corolla white, or the keel and wings tipped with fine purple: pods 2-seeded. In mountain valleys near springs, Oregon.

T. heterodon T. & G. Fl. i, 133. Glabrous: stems several from a branching perennial root, decumbent, 10-18 inches long, simple or a little branched, usually producing only terminal heads: stipules membranaceous, ovate, acuminate, laciniately serrate with subulate teeth, the lower ones lanceolate and nearly or quite entire; leaflets oblong or oval, somewhat cuneiform at base, mucronately ciliate-serrulate, obtuse, the lowermost mostly emarginate, 6-18 lines long: heads an inch or more in diameter depressed-globose, long-peduncled; involucre large, foliaceous, laciniately many-cleft with spinulose lobes, little shorter than the heads; teeth of the calyx narrowly subulate, nearly equal, 2-3 times longer than the tube, shorter than the corolla; petals an inch long, purple, the upper one pale at the tip: pods somewhat stipitate, 3-6-seeded. In salt meadows along the coast, near the mouth of the Columbia river.

T. obtusiflorum Hook. Ic. Pl. t. 218. Sparsely short-hairy or glabrous, often more or less resinous-glandular: stems stout, a few inches to 3 feet long, from an annual root, erect or decumbent, diffusely branched: lower stipules scarious, prominently nerved, lanceolate, setaceously acuminate, an inch long, entire or toothed, upper ones more herbaceous, setaceously pectinate: leaflets elliptic-lanceolate 12-18 lines long, spinulose-serrate, acute at each end, terminated by a rigid spiny point: heads an inch or more broad on long stoutish peduncles: involucre setaceously many-cleft: tube of the calyx oblong-campanulate, 3 lines long, with 10 prominent and as many lesser nerves, these branching and forming reticulations above, teeth subulate-spinose, entire, shorter than the tube; petals 8-10 lines long, lilac-purple with dark centre: pods elliptical, 2-seeded, dehiscent. On clayey hillsides, southwestern Oregon to middle California.

T. tridentata Lindl. Bot. Reg. under t. 1070. Glabrous annual: stems slender, erect, simple or branched, 3-20 inches high: stipules scarious, narrowly lanceolate, spinulose acuminate, the lower entire, the upper setaceously laciniate: leaflets linear-lanceolate, 1-2 inches long, spinulose serrate; heads nearly an inch broad: involucre orbicular, setaceously many-lobed and toothed, shorter than the flowers: tube of the calyx campanulate, prominently 10-nerved, reticulated, the short oblong lobes abruptly contracted above to a slender spine, often subtended by a pair of short spines or teeth; flowers purple and white: mature pods fully as broad as

long, 2-seeded, dehiscent. Common on rocky hillsides and river banks, Brit. Columbia to California.

T. oliganthum Steud. Nom. i, 707. *T. pauciflorum* Nutt. not d'Urville. Glabrous annual: stems slender, erect, much branched from the base and sometimes sparingly so above, about a foot high: stipules lacinate, acuminate: lower leaflets on long petioles, cuneate-oblong, obtuse or emarginate, upper ones on short petioles, lanceolate-linear, acuminate, 8-10 lines long by 1-2 lines broad, distinctly and minutely spinulose-serrulate; involucre 12-16-parted, about one-third the length of the flowers: heads 5-7-flowered, on long filiform peduncles; teeth of the calyx simple, broadly subulate, pungent, scarcely longer than the tube, shorter than the petals; lower part of the corolla dull purple, upper part whitish: pods 2-seeded. Wet places on the higher plains of the Columbia and Willamette valleys.

T. variegatum Nutt. T. & G. Fl. i, 317. Glabrous winter annual; stems weak and decumbent, 8-12 inches long, branching from the base and sparingly above: upper stipules roundish, laciniately dentate with subulate-setaceous teeth: leaflets obovate to oblong or somewhat obcordate, minutely spinulose-serrate, 3-6 lines long, peduncles filiform, longer than the leaves; involucre open-campanulate or at length spreading, laciniately many-cleft, shorter than the flowers; heads about 6 lines in diameter; teeth of the glabrous calyx equal, lanceolate-subulate with setaceous points, longer than the tube, shorter than the corolla: petals purple with white tips: pods small, 2-seeded. Common in wet places throughout the Willamette valley.

Corvallis
June 16. 11

* * Involucre membranaceous, at least at base, less deeply lobed, the lobes entire or toothed: corolla not becoming inflated: annuals.

T. microcephalum Pursh Fl. 478. Villous with soft hairs: stems slender, erect or decumbent, 6-20 inches long, diffusely branched from the base: stipules lanceolate to ovate, acuminate, mostly entire: leaflets oblanceolate to obcordate or obovate, denticulate: 4-6 lines long: heads small, densely many-flowered; involucre about 9-lobed, the lobes acuminate, 3-nerved, entire; calyx hairy, its subulate teeth scariously margined, sometimes toothed at base, attenuate to a long spinulose point, equalling the corolla: ovules 2; pods glabrous, 1-seeded. Common in open places, Brit. Columbia to California.

Corvallis
June 16. 11

T. microdon H. & A. Bot. Beech, 330, t. 79. Somewhat villous: stems slender, erect or ascending, diffusely branched below, 6-12 inches high: stipules lanceolate to ovate, spinulose-acuminate, entire; leaflets obcordate, serrate, 4-8 lines long, nearly as broad: heads small, long-peduncled; involucre conspicuously cup-shaped, as long as the flowers, 9-12-lobed, the oblong lobes laciniately toothed: calyx glabrous, campanulate, 10-nerved, the short teeth triangular-subulate, spinose; petals rose-color: pods small, 1-seeded. On dry hillsides, Brit. Columbia to California.

T. cyathiferum Lindl. Bot. Reg. under t. 1070. Glabrous: stems erect or ascending, 4-12 inches high, diffusely branched: stipules ovate to lanceolate, laciniately toothed or entire; leaflets obovate to oblanceolate, obtuse or acute, 6-12 lines long by half as broad; heads 6-10 lines in diameter, long-peduncled; involucre broad and membranaceous, conspicuously nerved and reticulated, 7-10-lobed, the shallow acute lobes spinulose-dentate, nearly as long as the flowers: calyx smooth, the tube somewhat inflated, prominently 5-nerved, the nerves excurrent into branching setaceous tips which equal the small white corolla: pods oblong, 2-seeded. About springs and on wet rocks, Brit. Columbia to California and the Rocky Mountains.

* * * Involucre membranaceous: the upper petal becoming conspicuously inflated and enclosing the lower ones.

T. fucatum Lindl. l. c. t. 1883. Usually stout and fistulous, the decumbent branches 1-2 feet long: herbage light green, glabrous and somewhat succulent: stipules large, membranaceous nearly or quite entire: leaflets 6-18 lines long, broadly obovate, obtuse or retuse, dentate or spinulose-denticulate; peduncles stout, far exceeding the leaves; bracts of the involucre ovate-lanceolate, acuminate, scarious-margined, connate at base; heads hemispherical, 1-2 inches broad: calyx thin, campanulate, the short teeth entire, unequal: corolla 6-12 lines long, ochroleucous, fading with a red tinge: pods stipitate, 3-8-seeded: seeds roundish, nearly a line broad, minutely granulate. Along the coast, Oregon and California.

T. depauperatum Desv. Journ. Bot. iv, 69, t. 32. Smooth, low and slender, decumbent or ascending: stipules small, lanceolate, acuminate, entire; leaflets obovate to linear, obtuse, 6 lines long or less: heads 3-10-flowered; involucre reduced to a very small toothed or truncate, often minute and scarious ring: calyx short, the narrowly subulate teeth but little longer than the tube; upper petal much inflated and enclosing the others, pods 1-2-seeded, seeds little broader than long, rather angular, tuberculate-rugose. In wet places top of Table Rock, Southern Oregon to California and South America.

Tribe 4. Lotæe B. & H. Gen. 442 Herbs rarely shrubby, with one to many-foliolate leaves, entire leaflets, foliaceous, scarious or gland-like stipules, and capitate, umbellate or solitary inflorescence. Petals free from the stamens. Stamens 10, diadelphous. Pod continuous, one-celled but often with spongy partitions between the seeds.

8 LOTUS Tourn.

HOSACKIA Benth. and American authors.

Herbaceous or suffrutescens plants with pinnately one to several-foliolate leaves with gland-like, rarely scarious or foliaceous, stipules and one to several-flowered axillary peduncles, the flower often subtended by a 1-5-foliolate bract. Calyx 5-toothed or -cleft, the teeth nearly equal, usually longer than the tube. Petals free from the stamens, nearly equal, the upper one ovate or roundish, lateral ones obovate or oblong, keel somewhat incurved, obtuse or acutely beaked. Stamens diadelphous: the alternate filaments dilated or thickened under the anthers. Pods linear, compressed or terete, straight or arcuate, sessile, dehiscent or indehiscent, 1-several-seeded, with spongy partitions between the seeds. Seeds variously rounded or elongated, sometimes quadrate, smooth, tuberculate or rugose.

§ 1 *ACMISPON* Raf. New Fl. 53, as genus. Annuals with 1-5-foliolate nearly sessile leaves with small gland-like stipules and small flowers on axillary peduncles. Petals but little exceeding the calyx the claws equally approximate to each other, keel narrowed above into a rather short, acute, incurved beak, equalling or exceeding the wings: pods linear, straight or nearly so, somewhat compressed, readily dehiscent, several-seeded.

L. Americanus Bisch. Hort. Heidelb. *Hosackia Purshiana* Benth. More or less villous or glabrous: stems erect or assurgent, 6-18 inches high, simple to diffusely branched: leaves nearly sessile or short-petioled; leaflets ovate to lanceolate or oblong, 3-9 lines long often only the terminal one present, the others when present scattered on a short slightly dilated

wallis
June 17, 1910

rachis: peduncles usually exceeding the leaves, with a single unifoliolate bract at the summit; flowers solitary, 2-3 lines long; teeth of the calyx linear, much longer than the tube, almost equalling the corolla; petals salmon-color, the upper one orbicular: pods narrow, somewhat compressed, about an inch long, 5-7-seeded, with very spongy partitions between the oblong black or mottled seeds. Common on bars and gravelly banks of streams. Brit. Columbia to California, Missouri and Arkansas.

§ 2. *ANISOLOTUS* Bernh. as genus. Leaves pinnately 2-10-foliolate, the leaflets scattered on a more or less dilated rachis, with gland-like stipules and small flowers on axillary peduncles. Pods promptly deciduous.

* Annuals: flowers solitary, on very short pedicels, not bracted: claws of the petals equally approximate to each other; the keel narrowed above into a somewhat incurved beak: pods short, not attenuate at base, few-seeded, promptly deciduous.

L. Wrangelianus F. & M. Ind. Sem. Hort. Petrop. 16. *Hosackia subpinnata* T. & G. Pilose or subglabrous: stems diffusely branched from the base, 4-6 inches high: leaflets 2-4, all but one on the outside of the rachis, oblong, subglabrous, 4-6 lines long, more or less pilose: flowers sessile or nearly so, about 2 lines long; teeth of the calyx subulate, several times longer than the tube, ciliate with long spreading hairs, not as long as the yellow corolla: pods pubescent, 6 lines long, nearly obtuse, 5-7-seeded. Southern Oregon to California.

L. humistratus Greene Pitt. ii, 139. *Hosackia brachycarpa* Benth. Softly villous: stems 4-6 inches high, diffusely branched from the base: leaflets usually 4, all but one on the outside of the rachis 3-6 lines long, obovate to oblong, acute, flowers sessile, 3-4 lines long, bright yellow; calyx-tube very short, its subulate teeth much longer, nearly equalling the corolla: pods 3-4 lines long, oblong, obtusish, very pubescent, nearly terete, 2-4-seeded. On gravelly bars and banks along streams, Southern Oregon to California.

L. denticulatus Greene l. c. *Hosackia denticulata* Drew. Pale green and glaucous, glabrous or the inflorescence villous: stems erect, sparingly branched, 1-2 feet high: leaflets 2-6, all but one on the outside of the rachis, obovate to oblanceolate, 4-8 lines long, sparingly hairy beneath: flowers 2-3 lines long, solitary, on short axillary pedicels or nearly sessile: calyx deeply 5-cleft, its subulate teeth longer than the tube, denticulate, about equalling the corolla; petals about 2 lines long, pale yellow or salmon-color, changing to rich dark red: pods pubescent, very short, 3-seeded. In wet places, Vancouver Island to California.

** Peduncles elongated, one to several-flowered, mostly bracted: claw of the upper petal commonly remote from the others: keel mostly obtuse.

L. micranthus Benth. Trans. Linn. Soc. xvii, 367. *Hosackia parviflora* Benth. Annual: glabrous or nearly so: stems slender, ascending, 4-12 inches long, usually branching from the base: leaflets 3-5, obovate to narrowly oblong, 2-8 lines long: peduncles longer than the leaves, 1-2-flowered, with a 1-3-foliolate bract at the summit: petals yellow, about 2 lines long, keel with a short incurved apex, nearly equalling the wings; banner obovate: pods 6-12 lines long, 5-7-seeded, often contracted between the seeds. Common on dry or gravelly plains and hillsides, Vancouver Island to California.

§ 3 *SYRMATIUM* Vogel as Genus. Mostly perennials with pinnately 3-7-foliolate leaves, and gland-like stipules. Peduncles umbellately one to several-flowered; claw of the upper petal

remote from the others; keel broad and obtuse above. The mature calyx deciduous with the indehiscent, usually small, arcuate, slender-pointed, few-seeded pod.

L. Douglasii Greene l. c. 149. *Hosackia decumbens* Benth. Villous-pubescent and somewhat tomentose: stems slender, ascending or diffusely procumbent, 6-18 inches long, from a thick very tough perennial root: leaflets 5-7, cuneate-obovate to oblong, mostly acute, 3-6 lines long: umbels of yellow flowers on short peduncles, subtended by a 1-3-foliolate bract: calyx silky, its slender teeth often as long as the campanulate tube: pods pubescent, falcate, the beak longer than the seed-bearing portion, about 2-seeded. Open plains and hillsides, Brit. Columbia to California.

§ 4. *HOSACKIA* Benth. Bot. Reg. xv, under t. 1257, as Genus. Perennial herbs with pinnate leaves, true stipules, the leaflets evenly distributed upon a linear rachis. Peduncles umbellately many-flowered, the flowers usually subtended by a bract. Claw of the upper petal remote from the others, the lateral ones partially cohering with the broad and mostly very obtuse keel and spreading away from the claw of the upper one. Pods acute above, linear, straight or nearly so, 5-20 seeded, glabrous, terete or somewhat compressed, tardily dehiscent.

* Glabrous throughout or becoming so: bracts petioled or wanting: stipules scarious: leaflets 5-15: flowers rather large.

L. crassifolius Greene l. c. 147. *Hosackia crassifolia* Benth. Stout, erect, often 2-4 feet high, widely branching: leaflets 9-15, minutely pubescent or somewhat villous but soon glabrate, thickish obovate or oblong, usually obtuse and mucronulate, 6-12 lines long, peduncles nearly equaling the leaves, usually many-flowered: bract usually some distance below the umbel, 1-3-foliolate: flowers on slender pedicels, 2-4 lines long: tube of the calyx campanulate, 3 lines long, truncate, the very short triangular teeth distant from each other: petals much longer than the calyx, dull dark purple: pods thick, about 2 inches long by 3 lines in diameter: seeds nearly orbicular. In rich alluvial soil, foothills of the Cascade Mountains, Washington to California.

L. pinnatus Hook. Bot. Mag. t. 2913. *Hosackia bicolor* Dougl. Glabrous throughout: stems numerous, from a thick perennial root, erect, branched above, 1-2 feet high: leaflets 5-9 obovate or oblong, obtuse or acutish, 6-12 lines long: stipules rather large, triangular, acuminate: peduncles mostly longer than the leaves, 3-10-flowered, naked, or sometimes with a small scarious or 1-3-foliolate bract at the summit: flowers nearly sessile, 8-10 lines long: calyx campanulate, oblique, its triangular teeth but half as long as the tube; upper petal bright yellow, the lateral ones usually white: pods nearly terete, 2 inches long, but little more than a line in diameter: seeds numerous, oblong. In springs and ditches, Brit. Columbia to California.

L. formosissimus Greene l. c. *Hosackia gracilis* Benth. Low and slender, the weak stems 6-12 inches long: leaflets 5-7, broadly obovate to obovate-oblong, obtuse, the lowest truncate or retuse; stipules thin, ovate: pedicels equalling or shorter than the leaves; bract petioled, 1-3-foliolate: teeth of the calyx unequal, triangular, acute or acuminate, shorter than the campanulate tube; petals 7 lines long, the upper one yellow, the wide spreading lateral ones and much shorter keel rose-color: pods short. In moist ground along the seaboard, Oregon to California.

** Pubescent or puberulent; bracts nearly sessile, at the top of the peduncles.

L. Torreyi Greene l. c. 146. *Hosackia Torreyi* Gray. Minutely pubescent: stems rather slender, numerous, from a stout perennial root, 1-2 feet high, mostly simple: stipules triangular, a line or more long; leaflets 5-9, obovate to narrowly oblanceolate or linear, densely pubescent beneath, mostly obtuse, 6-12 lines long; peduncles exceeding the leaves; bracts usually trifoliolate: umbels 5-7-flowered; teeth of the pubescent calyx subulate, about as long as the short campanulate tube; petals 6 lines long, the upper one bright yellow, the lateral ones and very obtuse keel white or reddish: pods linear, 1-2 inches long, with an acuminate hooked beak. In springs and ditches, southwestern Oregon to California.

Tribe 5. Galegeæ. Bronn. (partly) T. & G. Fl. i. 292. Erect herbs, shrubs, or trees with usually unequally pinnate, seldom stipellate leaves and axillary or terminal, racemose or spirally inflorescence. Corolla papilionaceous, or otherwise irregular. Stamens diadelphous or sometimes monadelphous. Pods continuous, rarely with transverse cellular partitions between the seeds, but never separating into joints, 1-celled, several-seeded, dehiscent, or 1-2-seeded and indehiscent. Radicle incurved or inflexed.

9 PSORALEA Royen L. Gen. ed. 2, 358.

Our species perennial herbs, the herbage punctate with dark glandular dots with digitately or pinnately 3-5-foliolate leaves with entire leaflets and free stipules, and white or purple flowers in axillary pedunculate spikes or racemes, mostly with membranaceous deciduous bracts. Calyx campanulate, persistent, 5-cleft, its teeth nearly equal, or the lower one longest, the two upper ones often connate. Petals free from the stamens; keel broad and obtuse above, united with the wings. Stamens usually diadelphous, the upper one sometimes united with the others at the base; anthers uniform, often only 5 perfect. Pods ovate, about as long as the calyx, 1-seeded, indehiscent, thick, often wrinkled.

* Leaves digitately 3-5-foliolate, rarely 7-foliolate.

P. lanceolata Pursh. Fl. 475. Aromatic-glandular throughout: stems slender, 12-30 inches high, erect or assurgent, branched, glabrous or with a few scattered hairs: stipules linear-lanceolate to setaceous, 3-6 lines long; petioles 1-2 inches long; leaves trifoliolate; leaflets 1-2 inches long, linear-lanceolate to obovate, acute or obtuse, mucronate, glabrous or with a few hairs: peduncles longer than the leaves; inflorescence capitate, small; bracts minute; flowers nearly white; calyx minutely hairy, the lobes nearly equal, obtuse: pods globose, 3 lines long, light with conspicuous large raised brown glands, nearly glabrous, beak small and erect: seeds globose, brown. On sandy plains, Oregon and Washington to Iowa and Arizona.

P. Purshii Vail Bull. Torr. Club, xxi, 94. Glandular throughout; stems assurgent 6-20 inches high or more, from a long slender rootstock, glabrous or somewhat hirsute at base; scales ovate, scarious: leaves 3-foliolate; stipules lanceolate, 3-4 lines long; leaflets 1-2 inches long, obovate cuneate or elliptical, or the uppermost nearly lanceolate and often much narrower, varying greatly in size and shape, retuse or mucronulate, glandular, glabrous or with a few scattered white hairs: peduncles varying in length, rarely longer than the leaves: flowers scattered in slender spikes or crowded in nearly capitate heads; bracts minute; lobes of the

calyx about equal, sparingly hirsute; pods glabrous, 4 lines long, with a short erect beak, light with scattered brown glands and more or less densely villous with white hairs; seeds globose, 3 lines long, light brown. On sand banks along the Columbia river, to Idaho and Nevada.

* * Leaves pinnately 3-foliolate.

P. physodes Dougl. Hook. Fl. i, 136. Glabrous or with a few weak, mostly black hairs: stems slender, assurgent, 1-2 feet high, simple: leaves 3-foliolate; stipules lanceolate, acuminate, reflexed; leaflets broadly rhomboid-ovate, mostly acute, mucronate an inch long, glandular; peduncles equalling or exceeding the leaves; flowers in capitate racemes; bracts small, elliptical; calyx more or less villous with usually dark-colored hairs, 4-5 lines long, becoming much inflated, lobes nearly equal, triangular, the margins ciliate with dark hairs; petals 5-6 lines long, white or purplish, pods membranaceous, rounded, somewhat compressed, 3 lines long; seeds grayish. In open woods and rocky hillsides, Vancouver Island to California.

P. mellilotoides Michx. Fl. ii, 58. *Hedysarum pedunculatum* Mill. Gardn. Diet. No. 17. Stems erect, 1-2 feet high, from a long rootstock, simple or branching from the base: stipules 2-3 lines long, setaceous; petioles shorter than the leaflets; leaves remote, 3-foliolate, rarely 4-5-foliolate; leaflets 2 inches long, lanceolate, acute, rarely ovate and obtuse, glabrous except the veins and margins which are very sparingly hirsute; peduncles much exceeding the leaves; flowers in loose spikes; bracts glandular, broadly ovate, much imbricated, the cuspidate apex longer than the flowers; lobes of the calyx acute, glandular, the lower one the longest; pods orbicular, compressed, transversely wrinkled, beak minute, recurved: seed orbicular, flat, brown. Seattle, Washington (Piper) and the Atlantic States.

10 PETALOSTEMON Michx. Fl. ii, 48, t. 37.

Herbaceous, mostly perennial glandular dotted plants with unequally pinnate leaves with minute setaceous stipules, and small flowers in dense terminal spikes or heads. Calyx often glandular, 5-toothed, the teeth connivent, nearly equal. Petals 5, on filiform claws; 4 of them nearly similar, their claws united to the stamen-tube quite to the summit, alternate with the stamens, deciduous by an articulation, the upper one free, inserted at the bottom of the calyx, the limb cordate or oblong, conduplicate. Stamens 5, monadelphous, the tube cleft. Ovary with 2 collateral ovules. Pod membranaceous, enclosed in the calyx, indehiscent, 1-seeded.

P. ornatus Dougl. Hook. Fl. i, 138. Perennial; stems simple, 1-2 feet high, glandular-dotted: leaflets 5-9, obovate to narrowly oblong, 5-6 lines long, flowers in dense, long-peduncled terminal spikes, sessile, bright purple; bracts lanceolate, acuminate, about equalling the flowers; calyx densely silky-villous; upper tooth as long as the tube, the others shorter; ovary pubescent. Hillsides and old river banks, Eastern Oregon.

Tribe 5. Astragaleæ. Adans. Erect or decumbent, herbaceous, rarely suffrutescent, plants with unequally pinnate leaves and axillary or radical, racemose or spicate inflorescence. Corolla papilionaceous. Stamens monadelphous. Pod continuous, turgid or inflated, rarely flattened, often spuriously 2-celled or partly 2-celled by the introflexion of one or both of the sutures, dehiscent, several-seeded, rarely 1-2-seeded. Radical incurved.

11. ASTRAGALUS TOURN. (RATTLE WEED, LOCO-WEED).

Erect or decumbent herbs with unequally pinnate leaves without tendrils, persistent stipules and axillary spikes or racemes of rather small, narrow flowers. Calyx 5-toothed. Petals with slender claws, the keel obtuse. Stamens diadelphous. Stigma terminal, minute. Pod very various, commonly turgid or inflated, one or both sutures often projecting inward more or less, the dorsal one frequently so much as to divide the cell into two, rarely flat. Seeds few or many, on slender stalks, generally small for the size of the pod.

SERIES I. ASTRAGALUS L. gen. n. 892 as genus. Pod completely or imperfectly 2-celled by the intrusion of the dorsal suture, the ventral suture being not at all or less deeply intruded.

§ 1. DIPHYSI Gray Proc. Am. Acad. vi, 193. Pods ovate or globose, membranaceous or coriaceous, inflated, glabrous or nearly so, sessile, completely 2-celled and more or less didymous by the intrusion of both sutures, several-seeded: pubescence short or wanting; flowers rather small, white to purple or yellowish, spicate or subspicate.

A. araneosus Sheld. Bull. Minn. Nat. Hist. Surv. No. 9, 170. Glabrous throughout or slightly pubescent when young: stems decumbent or assurgent, 6-18 inches long, very finely striate, simple, few to many from a thick perennial root: leaves 4-6 inches long, the rachis slightly winged, not channeled or but slightly so: stipules deltoid-acuminate, semi-sheathing below, reflexed; leaflets 6-8 pairs, 5-6 lines long, somewhat fleshy, orbicular or obovate, obtuse, retuse or emarginate; peduncles equalling the leaves, striate, capitate or subspicately 10-12 flowered; calyx short-cylindrical, with a few scattered, blackish hairs, the linear spreading teeth $\frac{1}{2}$ - $\frac{1}{2}$ the length of the tube; petals whitish tipped with purple: pods ovate-lanceolate, arcuate-incurved, with a long acuminate incurved beak, 6-10 lines long, coriaceous, glabrous, minutely reticulated, sessile, both sutures intruded so as to form a nearly 2 celled cavity which is lined throughout with fine cobwebby hairs, 8-10-seeded. On dry plains and hillsides, Eastern Oregon and Washington to Utah.

A. lentiginosus Dougl. Don Syst. Gard. and Bot. ii, 257. Slightly pubescent: stems tufted, 6-12 inches long, soon diffusely spreading: stipules small, ovate, acute; leaflets 11-19, from obovate or oblanceolate to oblong, 3-3 lines long: pods turgid, ovate, acuminate, more or less incurved, 4-6 lines long, puberulent, often mottled, thick-membranaceous, sessile, 2-celled by the intrusion of both sutures, 6-8-seeded. Dry plains, Brit. Columbia to California and Nevada.

A. salinus Howell Eryth. i, 111. Minutely hirsute: stems numerous from a thick perennial root, decumbent or ascending, rather slender 4-8 inches long, much branched: leaflets 9-17, obovate to oblong, obtuse or retuse, 4-6 lines long: peduncles shorter than the leaves: calyx narrow, its short subulate teeth half as long as the tube; flowers yellowish 6-8 lines long: pods inflated, ovoid, short-beaked, chartaceous, 6-8 lines long, very glabrous, nearly 2-celled by the intrusion of the dorsal suture, several-seeded. In saline soil, Harney valley, southeastern Oregon.

A. diaphanus Dougl. Hook. Fl. i, 151. Prostrate and diffuse, pilose-scabrous; stipules small, ovate, acuminate; leaflets 11-19, obovate; peduncles shorter than the leaves: flowers about 6 lines long, purple, in loose heads; bracts minute, ovate, acuminate, rather shorter than the pedicels:

Pods falcate, somewhat reflexed, linear, compressed, somewhat diaphanous; nearly glabrous, 2-celled, many-seeded. Sandy soil, near the Great Falls of the Oregon (Douglas).

A. accidens Watson l. c. Sparingly pubescent; the numerous stems 6-18 inches long, from a thick perennial root: leaflets 10-15 pairs, oblong, retuse, cuneate at base, glabrous above, appressed pubescent beneath, 6-8 lines long: peduncles about equalling the leaves: flowers reflexed, in a short raceme; calyx campanulate, dark-pubescent, 3 lines long, the teeth nearly equalling the tube: corolla yellowish, the narrow erect banner 6-7 lines long. Pod white-pubescent, on a stipe as long as the calyx, oblong-ovate subsulcate on the back, the ventral suture somewhat prominent, straight, reflexed, 4-5 lines long. On open hillsides, southwestern Oregon.

A. Pacificus Sheld. Bull. Minn. Nat. Hist. Surv. 9, 174. *A. Hendersoni* Watson, not Baker. Thinly pubescent throughout with soft woolly hairs, the numerous stems erect or ascending from a stout perennial root-stock, 1-2 feet high: leaflets 6-10 pairs, narrowly oblong, obtuse or retuse, 6-9 lines long; stipules lanceolate: pedunculate racemes exceeding the leaves, few-flowered: calyx tubular-campanulate, dark-villous, 3-4 lines long, the narrow teeth nearly equalling the tube: pods reflexed, 2-celled, very fleshy-coriaceous, upon a stipe twice longer than the calyx, turgid, oblong to oblong-obovate, with a stout prominent ventral suture, the dorsal less prominent, very abruptly mucronate, glabrous, rugose, 8-11 lines long by 4 thick. Open hillsides, Jackson Co., Oregon and adjacent California.

§ 2 CHÆTODONTES Gray l. c. 194. Pods ovate, small, sessile, coriaceous, turgid or at times subcompressed, more or less sulcate on the back, 2-celled by the intrusion of the dorsal suture, cells 3-4-ovuled. Many-stemmed perennials.

A. Spaldingii Gray l. c. 524. Villous-pubescent: stems a foot in height: leaflets 21-25, lanceolate to oblong-linear, 3-6 lines long: peduncles exceeding the leaves: spikes oblong, dense, or rather loose at base; flowers nearly 5 lines long; bracts setaceous; calyx very villous; pods 2-3 lines long, villous scarcely sulcate, 2-4-seeded. Plains of eastern Washington and Idaho.

A. Lyallii Gray l. c. 195. White-silky: stems a foot high, leaflets 19-25, 3-6 lines long, lanceolate to oblong-linear: peduncles not exceeding the leaves; spikes long and loose; calyx villous, the tube equalling the teeth: pods hoary, sulcate. Valley of the Yakima, Wash., near the Brit. Columbia boundary.

§ 3. ULIGINOSI Gray l. c. 196. Pod coriaceous, turgid, oblong, terete, scarcely sulcate and only on the back, nearly straight, sessile, septum perfect. Tall perennials with appressed gray-pubescence or glabrate.

A. Mortonii Nutt. Journ. Acad. Philad. vii, 19. Minutely appressed-pubescent, greenish: stems erect 18-24 inches high: stipules broad and membranaceous; leaflets 11-17, oblong, obtuse, 6-12 lines long: peduncles as long as the leaves; flowers sessile or nearly so, in dense racemose spikes, reflexed as they open, the fruit erect; calyx villous, its teeth triangular-lanceolate, shorter than the tube: pods 6 lines long, minutely pubescent, elongated-oblong, grooved at the dorsal suture the ventral suture externally prominent: seeds numerous. Dry plains, eastern Oregon and Washington to Montana, Utah and Nevada.

§ 4. ONOBRYCHIDES Gray l. c. 196. Pods coriaceous, oblong

or ovate, straight, usually more or less compressed or obcompressed-triangular, dorsally sulcate 2-celled, pubescent, many-ovuled, erect: stipules more or less sheathing: flowers in dense spikes or small heads: perennials.

A. adsurgens Pall. Astrag. 40. Cinereous with minute appressed pubescence or glabrate: stems rather stout, 4-18 inches high, ascending or decumbent: leaflets 13-19, narrowly to linear-oblong, 10-12 lines long, obtuse, pale green: peduncles longer than the leaves; flowers erect, in oblong to subglobose spikes; tube of the calyx long-campanulate, twice as long as the setaceous teeth, subvillous with partly black hairs; petals bright purple, the upper one about one-third longer than the others: pods coriaceous, erect, sessile, ovate-oblong, 4-5 lines long, straight, usually triangular compressed, dorsally sulcate, pubescent with appressed hairs, many-ovuled. Plains of eastern Oregon to Brit. Columbia and western Kansas.

A. hypoglottis L. Mant. ii, 274. Somewhat hirsute: stems 6-24 inches long, slender, diffusely procumbent or ascending: leaflets 15-21, oblong or obovate to elliptical, obtuse or retuse; stipules lanceolate, more or less cohering: peduncles longer than the leaves; bracts longer than the calyx, lanceolate: calyx blackish-pilose, its subulate teeth as long as the tube petals bright purple: pods ovate, triangular, compressed, silky-villous, very shortly stipitate, 6-8-seeded. Alluvial plains, southeastern Oregon and Washington to Colorado and Hudson Bay.

§ 5. **DIDYMOCARPI** Gray l. c. 188. Pods thin-coriaceous, obcompressed-didymous with a narrow perfect septum, transversely ridged or reticulated, at length separating into two 1-2-seeded divisions, mostly deflexed; ovary short-stipitate: caulescent annuals.

A. Catalinensis Nutt. Pl. Gamb. 152. *A. nigrescens* Nutt. not Pall. Cinereous with a short appressed pubescence: stem annual, 2-6 inches high, branching from the base: stipules scarious, triangular-ovate, acuminate, distinct, nearly free; leaflets 7-11, cuneate-oblong, obtuse or retuse, a line long, pubescent beneath, sometimes smooth above; peduncles longer than the leaves; flowers 4-8, in a subcapitate raceme, on very short spreading pedicels, soon deflexed, a line long; calyx campanulate, pubescent with dark colored hairs, the broadly subulate teeth twice longer than the tube: pods broadly ovate, obcompressed, pubescent, 2-celled by the intrusion of the dorsal suture, the ventral suture obtuse, several-ovuled. On dry hill-sides and banks, both sides of the Siskiyou Mountains near Ashland, Oregon.

§ 6. **MICRANTHI** Gray l. c. Pod coriaceous, oblong, lanceolate, or linear, straight or curved, sessile, dorsally sulcate, the ventral suture rather prominent, 2-celled, many-ovuled.

A. drepanolobus Gray l. c. xix, 75. Perennial: strigose-pubescent throughout; the numerous stems ascending or decumbent, diffusely branched, 6-12 inches long: leaflets 9-11, obovate, usually emarginate, 4-6 lines long: peduncles exceeding the leaves, rather loosely-flowered; calyx short-campanulate, its subulate teeth shorter than the tube: pod linear-oblong, compressed, very falcate, 2-celled by the intrusion of the dorsal suture, many-ovuled. On gravelly bars of the John Day river near its junction with the Columbia.

A. umbraticus Sheld. l. c. *A. sylvaticus* Watson, not Willd. Glabrous: stems numerous from a stout perennial root, ascending or erect, 12-18 inches high, branching: leaflets 17-21, oblong, retuse, 4-9 lines long: peduncles equalling or exceeding the leaves; racemes close, rather few-

flowered; calyx slightly pubescent, campanulate, its acuminate teeth about equalling the tube; petals 8-10 lines long, yellowish or whitish; pod deflexed, chartaceous, linear, more or less curved, compressed, 2-celled by the intrusion of the dorsal suture, the ventral suture acute, 6-10 lines long by $\frac{1}{2}$ line broad, black when mature. In forests at Glendale, southwestern Oregon.

A. malacus Gray Proc. Am. Acad. vii, 336. Villous-hirsute with long spreading hairs: stems rather stout, from a perennial root: leaflets 11-17, obovate, retuse, 4-8 lines long: peduncles exceeding the leaves, bearing a rather loose spike of several to many flowers; calyx cylindrical, pubescent, with dark-colored hairs, the slender teeth much shorter than the tube, but little shorter than the corolla: pods pendulous or spreading, lunate-lanceolate, an inch long, 3-4 lines broad, densely long-hairy, turgid and sulcate on the back, sharp-edged ventrally, many-seeded. On alkaline plains, southeastern Oregon to Nevada and Colorado.

A. arrectus Gray l. c. viii, 280. Somewhat cinereous-pubescent or nearly glabrous: stems 1-2 feet high from a perennial root, erect, sulcate, simple or branched: stipules distinct, scarious; leaflets 19-25, ovate or narrowly oblong, obtuse or retuse, 6-8 lines long: racemes on long peduncles, loosely rather few-flowered; flowers ochroleucous, 7 lines long; calyx tubular-campanulate, pubescent with black hairs, its teeth short and slender: pods erect upon spreading or somewhat deflexed pedicels, coriaceous, subglabrous, oblong, 8-12 lines long, nearly straight, cuspidate, abruptly narrowed at base into a stipe as long as the calyx, with a deep dorsal sulcus and somewhat carinate ventral edge, 2-celled, many-seeded. Eastern Washington to Idaho and Nevada.

A. obscurus Watson Bot. King. 69. Somewhat canescent, with a minute appressed pubescence: stems 6-12 inches high, numerous, slender, ascending; from a perennial root: stipules small, triangular, somewhat adnate to the petiole; leaflets 5-15, linear to oblong, 2-5 lines long, obtuse or acute: peduncles exceeding the leaves: racemes 5-15-flowered, loose or capitate, calyx pubescent with black hairs, the campanulate tube twice longer than the acute teeth, petals 6 lines long, ochroleucous or tinged with violet, the upper one orbicular, longer than the entire lateral ones and arched keel; pods terete, with a narrow dorsal sulcus, sessile, chartaceous, erect, 10-15-ovuled. Eastern Oregon to Nevada.

§ 7. **SUCCUMBENTES** Gray l. c. vi, 200. Pod chartaceous-coriaceous, sessile, strongly compressed, falcate upward, bicarinate and deeply sulcate on the back, the ventral suture prominent and acute.

A. succumbens Dougl. Hook. Fl. i, 151. Hirsute throughout: stems numerous, from the crown of a perennial root, decumbent, branching, 8-15 inches long: stipules small, oblong, acuminate, free and distinct; leaflets 11-15, obovate to oblong, 6 lines long or less; peduncles stout, shorter than the leaves; racemes short, dense, many-flowered; calyx cylindrical, loosely hirsute, its triangular acuminate teeth shorter than the tube: petals 8-10 lines long, nearly equal: pods glabrous, linear-lanceolate, falcate, 2 inches long, erect on spreading pedicels, bicarinate and deeply sulcate on the back, the ventral suture prominent, acute, strongly compressed, many-ovuled. On rocky or sandy hillsides along the Columbia river above The Dalles.

§ 8. **GALEGIFORMES** Gray l. c. Pod exsert-stipitate, pendent coriaceous or cartilaginous-chartaceous, straight, narrow, more or less triangular, very deeply sulcate dorsally, the suture intruded to the middle or beyond.

A. Howellii Gray Proc. Am. Acad. xv, 46. Cinereous-pubescent throughout: stems erect, slender, 1-2 feet high, sparsely leafy; stipules linear-lanceolate, partly adnate, 2 lines long; leaflets 11-31, oblong to linear, obtuse to retuse, 4-8 lines long; peduncles exceeding the leaves; flowers white, on shortspreading pedicels, soon deflexed, in a loose raceme; calyx campanulate, subgibbous at base, its subulate-setaceous teeth about equalling the tube: pods straight, oblong-lanceolate, acuminate, attenuate at base to a stipe, twice longer than the calyx, 2-celled by the intrusion of the dorsal suture, the ventral suture prominently keeled, canescent, several-ovuled. Dry hillsides and plains, Eastern Oregon near The Dalles.

A. misellus Watson Proc. Am. Acad. xxi, 449. Canescent with a short appressed pubescence: stems numerous from a thick perennial root, decumbent or ascending, 4-6 inches long: stipules triangular to broad-subulate, slightly connate; leaflets 17-21, oblong to linear, 2-3 lines long, pubescent beneath, soon glabrate above: peduncles about equalling or much exceeding the leaves, few-flowered; flowers spreading or reflexed, on very short pedicels: calyx campanulate, its teeth nearly equaling the tube: pod linear, somewhat curved; attenuate below to a stipe a little longer than the calyx, compressed, 2-celled by the intrusion of the dorsal suture, the ventral suture rounded or acute, reflexed, finely pubescent. 8-10 lines long. On sterile hillsides in the John Day valley at Mitchell, Oregon.

A. racemosus Pursh Fl. 740. Appressed pubescent or glabrate: stems 1-2 feet high, rather stout, somewhat sulcate, very leafy: leaflets about 21, elliptical, oblong or oval, obtuse, mucronate, smooth above, 6-8 lines long: peduncles about the length of the leaves, loosely many-flowered; flowers nodding and somewhat secund, calyx whitish-pubescent, strongly gibbous at base, the setaceous teeth slightly shorter than the tube, equalling the stipe: pods lance-oblong, an inch long, triangular, not 2-celled, very smooth. Plains of Idaho to Kansas and the Northwest Territory.

§ 9. **ARGOPHYLLI** Gray Proc. Am. Acad. vi, 209. Pods mostly thick-coriaceous and obcompressed, the intruded dorsal suture more or less approaching the ventral, not 2-celled, pubescent.

A. iodanthus Watson Bot. King 70. Canescent with an appressed hairy pubescence, or nearly glabrous with scattered hairs upon the petioles and margins of the leaves; stems decumbent, 6-10 inches long, from a perennial root: stipules ovate-lanceolate, free or somewhat adnate to the petiole; leaflets 13-21, 2-5 lines long, obovate or orbicular, obtuse: peduncles equalling the leaves; spikes short, dense: flowers on short pedicels, deep violet-purple or ochroleucous tinged with purple, the lateral and upper petals 6-8 lines long, exceeding the obtuse keel, the somewhat nigrescent campanulate calyx-tube twice longer than the subulate teeth: pods 18 lines long, 3 lines broad, linear-oblong, acuminate, strongly arcuate or hamate, sessile, nearly glabrous with a very sparse pubescence, mottled, chartaceous, irregularly folded but usually with a deep dorsal sulcus approximating the suture to the prominent ventral one, many-seeded. Eastern Oregon to California, Nevada, Colorado and Montana.

A. Beckwithii T. & G. Pac. R. Rep. ii, 120. Glabrous or nearly so: stems 1-2 feet long, from perennial roots, diffusely spreading: stipules ovate-lanceolate, adnate to the petiole: leaflets 13-25, 6 lines long, broadly oval: flowers 5-8, in a short loose raceme, ochroleucous, 9 lines long; calyx nearly glabrous, its subulate teeth scarcely shorter than or exceeding the campanulate tube: pods 1 inch long, glabrous, transversely rugulose, coriaceous, short stipitate, somewhat obcompressed, flattened dorsally with the sutures slightly intruded, bisulcate ventrally with the prominent suture acutely margined, many-seeded. Brit. Columbia to Southern Idaho, Utah Nevada and California.

A. glareosus Dougl. Hook. Fl. i, 152. Silky-villous with incumbent

hairs: stems short, depressed: stipules oblong, acuminate, appressed, membranaceous: leaflets 13-15, linear-oblong: peduncles as long as the leaves or shorter, 3-4-flowered; bracts linear, as long as the cylindrical elongated blackish-hairy calyx; teeth of the calyx one-third as long as the tube: pods oblong-ovate, attenuate above, incurved, silky-pubescent. Southern Idaho and Wyoming.

SERIES II. PHACA L. Gen. n. 891, as genus. Pod 1-celled, neither suture being inflexed, nor the ventral more intruded than the dorsal.

§ 9. *ERIOCARPI* Gray Proc. Am. Acad. vi, 212. Pod very woolly, short turgid, coriaceous, more or less incurved, acuminate or pointed, sessile. Stems prostrate, from a stout perennial root.

A. inflexus Dougl. in G. Don. Gen. Syst. ii, 256. Soft-woolly throughout: stems 1-2 feet long, prostrate, branching: stipules subulate or acuminate from a rather broad base, 6-8 lines long: leaflets 21-25, oblong or oblanceolate, about 6 lines long, densely silky peduncles not exceeding the leaves; flowers purple, rather numerous, in short capitate spikes: bracts setaceous, 6-8 lines long; calyx about equalling the lateral petals, its subulate teeth about as long as the tube; upper petal longer than the lateral ones, pubescent on the back: pods ovate, acuminate, densely silky-villous, at length strongly incurved, 1-celled but at maturity the dorsal suture becomes inflexed so as to nearly meet the ventral, but not forming a partition. On sandy banks and plains, along the Columbia river above The Dalles.

A. dorycnioides Dougl. in G. Don Gen. Syst. ii, 258 (?). Appressed-silky with white hairs, stems short, depressed, several from the crown of a stout perennial root 1-3 inches long: stipules subulate, setaceous-acuminate, 6-9 lines long: leaves numerous; leaflets usually 13, 6-10 lines long by 2 lines broad, oblong to oblanceolate, acute or acuminate, densely silky both sides; peduncles shorter than the leaves; capitate few-flowered; calyx tubular, 4-5 lines long, its subulate teeth about half as long as the tube; corolla 8-10 lines long, persistent, bright purple: pods ovate, acuminate, at length strongly incurved, densely villous, 10-12 lines long, 1-celled, the dorsal suture at maturity strongly intruded, the ventral rounded. On rocky hillsides, eastern Oregon and Washington.

A. leucocystis Greene Eryth. iii, 76. (*A. lanocarpus* Sheld. l. c. 144). Woolly-pubescent with long white hairs: stems caespitose, very short, from a thick perennial root, branching and forming a close mat 4-8 inches in diameter: leaves numerous, 3-6 inches long, the rachis channelled; leaflets 7-11, usually absent from the lower half of the rachis, narrowly obovate to oblong, acute or obtuse, 3-6 lines long, stipules triangular-ovate, acuminate, sheathing peduncles equalling the leaves, 3-5-flowered; calyx narrowly cylindrical, with unequal teeth, one-fifth as long as the tube; corolla ochroleucous tipped with purple, 10-12 lines long: pods 8-10 lines long, coriaceous, white-pubescent with long stiff hairs, sessile, oblong, slightly arcuate, 1-celled, but with the ventral suture somewhat intruded, lined within with cobwebby hairs which traverse the cavity, few to many-seeded. On dry hillsides and plains, eastern Oregon and Washington.

A. Purshii Dougl. Hook. Fl. i, 152. Very hirsute, stems short, diffuse: leaflets 13-17, oblong; stipules lanceolate, acuminate: peduncles half as long as the leaves: flowers in loose heads, spreading; bracts linear-lanceolate, twice as long as the pedicels; calyx elongated, membranaceous, its subulate teeth half as long as the tube, equal; corolla yellow, 18 lines long, upper petal obovate, equalling the narrow lateral ones, keel purple-tipped; ovary subsessile, linear, very hirsute. Brit. Columbia to California and Utah.

A. Utahensis T. & G. Pac. R. Rep. ii, 120. Canescent with a long and dense soft-woolly appressed pubescence: subcaulescent, the short stems 2-6 inches long, prostrate: leaflets 11-17, suborbicular, 2-4 lines in diameter: flowers violet; pods oblong, obcompressed, densely woolly, moderately incurved, slightly sulcate. Union Co. Oregon to Salt Lake Utah.

A. allanaris Sheld. l. c. 141. Pubescent throughout with white loose hairs: cespitose, nearly acaulescent or with very short erect, simple hidden stems, from the crown of a stout perennial root: leaves 2-5 inches long, erect, pubescent with sparse spreading hairs, the rachis slightly channelled, but nearly terete; stipules ovate-lanceolate, long-acuminate, usually closely imbricated; leaflets 7-11, 4-6 lines long, elliptical to lanceolate, acute, pubescent both sides; peduncles 1-2 inches long, 2-flowered; flowers narrow, each subtended by a black-bordered bract; calyx tubular-cylindrical, oblique at base, spreading-pubescent, striate, the lanceolate teeth nigrescent-margined, much shorter than the tube: corolla purplish, tinged with green: pods 6-7 lines long, ovate-arcuate, acute or shortly acuminate pointed, incurved, coriaceous, sessile, white-pubescent, 1-celled the dorsal suture slightly impressed, few-seeded, Eastern Washington.

§ 10. INFLATI Gray l. c. 213. Pod membranaceous, inflated, globose, egg-shaped or semi-ovate, usually large, finely reticulated, glabrous or glabrate, neither suture inflexed or rarely the ventral only and slightly.

* Perennial; pod not mottled. Caulescent, rather tall, leafy: racemes or spikes usually many-flowered.

A. Suksdorffi Howell Eryth. i, 111. Cinereously pubescent throughout: stems many from a stout perennial root, slender, ascending, 8-12 inches long: stipules foliaceous, ovate-lanceolate, acute, about a line long: leaflets 9-11 cuneate-oblong, obtuse or retuse, 3-4 lines long: peduncles very slender, shorter than the leaves; flowers in compact clusters white or yellowish, on slender pedicels; bracts lanceolate, about half as long as the pedicels; calyx campanulate, its subulate teeth about equalling the tube; upper petal far exceeding the lateral ones and twice the length of the keel, entire: pods of firm texture, sessile, obliquely ovate, acuminate, 6 lines long or less, finely appressed-pubescent. In loose volcanic soil near the base of Mount Adams, Washington. (Suksdorf).

A. diurnus Watson Proc. Am. Acad. xxi, 450. Minutely appressed-pubescent throughout: stems numerous from a thick perennial root sparingly branched below or simple, 4-10 inches high, slender, ascending or erect: leaves about 2 inches long; leaflets 7-11, obovate, obtuse or retuse, glabrous above, pubescent beneath, 1-3 lines long: peduncles shorter than the leaves, slender, few-flowered; bracts about equalling the pedicels, subulate: flowers spreading or reflexed, pale yellow or lined with purple, 3 lines long; calyx turbinate-campanulate, the slender teeth as long as the tube: pods inflated, membranaceous, sessile, obliquely oblong-ovate to oblong, the ventral edge nearly straight, or somewhat incurved, somewhat compressed, finely-pubescent, 6-10 lines long. On gravelly bars of the John Day river at Dayville, eastern Oregon.

* * Root perennial; pod mottled, short-stipitate, the stipe equaling the calyx: flowers few, rather small, light-colored, keel with the inflexed apex somewhat produced.

A. Hookerianus Gray l. c. 215. Canescently pubescent: stems much branched from the base, ascending, 5-6 inches high, from a perennial root: stipules lanceolate, membranaceous; leaflets 15-19, oblong or linear-oblong, slightly petiolulate, rather rigid: peduncles scarcely as long as the leaves; bracts setaceous, about as long as the very short pedicels; calyx pubescent with whitish and black hairs intermixed, its subulate

teeth shorter than the tube: ovary canescent; pods very large, inflated, obovoid, obtuse, tapering into a very short stipe, glabrous, thin and membranaceous, whitish and beautifully mottled with purple, nearly 2 inches long. Oregon to California and Nevada.

A. ceramius Sheld. l. c. 19. *A. pictus* Gray, not Steud. Hoary with a loose silky pubescence: stems erect, slender, branching, from filiform roots, ascending, 10-12 inches high: lower petioles short, pinnately 3-5-foliolate, with narrowly linear leaflets, the upper ones elongated and filiform, mostly leafless; stipules lanceolate-subulate, the lowermost united, the upper ones distinct: racemes on filiform peduncles shorter than the leaves, 7-10-flowered: pods 6-18 lines long, ovoid, scarcely pointed, membranaceous and much inflated, stipitate, pendent. Idaho to Nebraska and New Mexico.

A. Cusickii Gray Proc. Am. Acad. iii, 370. Many-stemmed from a thick perennial root, strict, smooth or nearly so: stipules scarious, triangular, acuminate, slightly connate; leaflets 13-17, remote, linear, 5-7 lines long: peduncles exceeding the leaves, bearing few to several white or yellowish flowers in a loose raceme; calyx cylindrical, more or less dark-pubescent, the short triangular teeth not $\frac{1}{4}$ as long as the tube: pods oblong, with a short incurved acute beak, an inch long or less, contracted at base to a short stipe about equalling the calyx, glabrous. Powder river valley eastern Oregon.

* * * Annual: pod sessile, not mottled; flowers small, ochroleucous or purplish. Low; leaflets linear or linear-oblong, grey with strigulose hairs.

A. Geyeri Gray l. c. 214. Subcanescent with an appressed hairy pubescence: stem somewhat simple, 3-6 inches high, annual: leaflets linear or oblong, obtuse, glabrous above: peduncles shorter than the leaves, 3-5-flowered; calyx campanulate, its subulate teeth about equalling the tube; corolla 3 lines long, ochroleucous; pods 8-9 lines long, membranaceous, inflated, ovate-lunate with an incurved acumination, sessile, not mottled, finely reticulated, glabrous, 1-celled. Montana and southern Idaho to Nevada and California.

§ 11. **MICROCYSTEI** Gray l. c. 219. Pod membranaceous or chartaceous, small, globose or ovate, inflated, sessile, neither suture intruded. Diffuse or procumbent perennials, mostly small and slender; flowers small and usually few.

A. microcystis Gray l. c. 220. Cinereous-pubescent: stems slender, procumbent, from a woody root, much branched: stipules scarious, connate or the uppermost nearly distinct; leaflets 9-13, oblong or oblong-lanceolate, obtuse: racemes slender, 5-12-flowered; calyx hairy, the setaceous-subulate teeth about as long as the short-campanulate tube; corolla violet or whitish, the deeply emarginate upper petal slightly exceeding the lateral ones, twice as long as the incurved keel: pods globose-ovate, 3 lines long, thin-membranaceous, gray-pubescent. Brit. Columbia to Washington, Idaho, Wyoming and Montana.

§ 12. **SCYTOCARPI** Gray l. c. 222. Pod coriaceous, ovate or oblong, rarely cylindrical, turgid, not sulcate and neither suture intruded.

A. Chamæleuce Gray Ives Rep. 10. Perennial; silvery-canescens with a dense silky pubescence: stems numerous, 1-6 inches long, prostrate, or nearly acaulescent: stipules ovate, membranaceous, free; leaflets 3-7, 2-4 lines long, oblong, obovate or oval: peduncles shorter than the leaves, slender, 3-8-flowered; calyx cylindrical, its subulate teeth much shorter than the tube: corolla light violet, 9 lines long: pods 6-12 lines long

thick-coriaceous, sessile, ovate-oblong, acuminate, somewhat arcuate, terete or somewhat obcompressed and frequently sulcate ventrally, rugosely reticulated and subpubescent, 1-celled, many-seeded. Idaho to New Mexico and Arizona.

A. reventus Gray l. c. xv, 46. Stems short, numerous, from a thick perennial root, much branched from the base, glabrate: stipules scarious, connate lanceolate, 2-3 lines long; leaves numerous, 4-6 inches long or more, leaflets 21-23, linear-oblong to oblong, emarginate, pubescent beneath, smooth above, 5-6 lines long: peduncles at length exceeding the leaves; flowers whitish, in a dense short-oblong raceme, erect in bud but soon reflexed; bracts scarious, triangular, a line long or more, a little longer than the pedicels; calyx campanulate, pubescent with blackish hairs, its subulate teeth not more than half as long as the tube: pods sessile or nearly so, erect on stout pedicels, cartilaginous, reticulated, 8-10 lines long, glabrous, ovate-oblong, turgid, acuminate, obcompressed but the sutures prominent, several-seeded. Open plains and hillsides, eastern Oregon and Washington.

A. conjunctus Watson Proc. Am. Acad. xvii, 371. Stems short, numerous, from a stout perennial root, erect or assurgent, sparingly appressed-pubescent: leaves 6-12 inches long; leaflets 11-21, on an elongated rachis, linear, 4-6 lines long: peduncles elongated, 6-12 inches long, but little or not at all surpassing the leaves, bearing an open few-flowered raceme; bracts subulate, about equalling the very short pedicels; calyx narrowly tubular, 3-4 lines long, pubescent with dark-colored hairs, the narrow teeth not half as long as the tube; petals purple, 6-8 lines long: pods erect, sessile, coriaceous, rugose narrowly oblong, nearly straight, acuminate, 1-celled, the dorsal suture impressed, 9-12 lines long. On dry rocky ridges, John Day valley, Eastern Oregon.

A. Hoodianus Howell Eryth. i, 111. Canescent with a short appressed pubescence: stems strictly erect, 4-6 inches high, from a stout perennial root; leaves 6-8 inches long; leaflets 21-29, linear to narrowly lanceolate, very shortly petiolulate, 6-8 lines long; stipules subulate, 3-4 lines long; peduncles very stout, 10-16 inches long; flowers whitish, in a rather short raceme, 8-10 lines long; bracts setaceous, twice as long as the stout pedicels; calyx cylindrical, 4-5 lines long, pubescent with white appressed hairs, its setaceous teeth nearly as long as the tube: mature pods pubescent, oblong, shortly acuminate, sessile, 8-10 lines long, erect. Open woods and plains, Oregon and Washington, near The Dalles.

A. Palousensis Piper Bot. Gaz. xxi, 489. Perennial, from a stout woody caudex: 16-24 inches high, simple, or branched above, striate, sparingly pubescent with short appressed hairs, these white below and blackish above: leaves 4-8 inches long; stipules deltoid-acuminate; leaflets 25-31, elliptical or lanceolate, obtuse or truncate, appressed-pubescent beneath, glabrous above, 6-10 lines long, nearly sessile: petioles sparsely hirsute; racemes elongated, 3-7 inches long, flowers 20-25, erect on short pedicels, 8 lines long; bracts lanceolate, shorter than the calyx: calyx obliquely campanulate, the slender teeth nearly as long as the tube, pubescent with short appressed black hairs: corolla pale yellowish, with or without a black spot on the lateral petals: pods 10 lines long, crustaceous, narrowly oblong, tipped with a slender short beak, its surface transversely reticulated and sparsely pubescent with short white hairs, on a stipe as long as the calyx tube or shorter. Common on rich loess hillsides about Pullman, Washington.

§ 13. **PODO-SCLEROCARPI**. Gray l. c. 225. Pod thick-cartilaginous or coriaceous, exsertly stipitate, compressed or turgid, incurved; sutures not intruded, sometimes thickened and separating from the valves. Perennial, branched, ashy-puberulent; stipules small, distinct.

A. sclerocarpus Gray l. c. Cinereous with a very short appressed pubescence, much branched: leaflets 13-19, linear, 4-6 lines long: peduncles exceeding the leaves, loosely rather few-flowered; calyx cylindrical, pubescent with black hairs, 3 lines long, its short triangular teeth not half as long as the tube: pods canescent-puberulent, lanceolate, acuminate, falcate or nearly hamate, an inch or more long, attenuate at base to a stipe an inch or more long. On sandy banks and plains, along the Columbia river above The Dalles.

A. speirocarpus Gray l. c. Stems slender, decumbent or ascending, 10-12 inches long, cinereous: stipules very small, triangular, obtuse; leaflets 9-13, oblong or cuneate, obtuse or retuse, 1-4 lines long, pubescent both sides: peduncles about equalling the leaves, loosely rather many-flowered; flowers yellowish-white, on very short pedicels, soon deflexed; calyx cylindrical, 3-4 lines long, pubescent with black hairs, its short triangular teeth not half as long as the tube: pods linear, acuminate, pubescent, coiled into a short spiral, attenuate at base to a stipe a little longer than the calyx. Along the Columbia river above The Dalles.

Var. falciformis Gray Bot. Cal. i, 152. Stipe filiform, 6-9 lines long, nearly the length of the thinner-walled and less turgid falcate or merely hooked pod. Brit. Columbia to Washington, Nevada and California.

A. Gibbsii Kell. Proc. Cal. Acad. ii, 161. Cinereous-pubescent: stems many from a thick perennial root, rather stout, 10-12 inches high: leaflets 11-15, oblong with a cuneate base, truncate or retuse, 6-8 lines long: peduncles exceeding the leaves; flowers numerous, in a rather dense raceme, reflexed on short spreading pedicels; calyx cylindrical, gibbous at base, 5-6 lines long, the triangular teeth not more than $\frac{1}{3}$ as long as the tube: pods linear, about an inch long, curved or annular, very acute, finely pubescent, attenuate at base into a stipe twice as long as the calyx. Plains and hillsides, eastern Oregon and Idaho to Nevada.

§ 14. **HOMALOB** Gray l. c. Pod flattened or compressed, straight, margined by the nerve-like sutures, coriaceous or chartaceous, sometimes stipitate.

A. collinus Dougl. in G. Don. Gen. Syst. ii, 256. Stems erect or diffuse, 6-12 inches long, numerous, from a stout perennial root, grayish-pubescent: leaflets 19-23, linear or oblong-linear, obtuse, attenuate at base, 6-12 lines long; stipules very small, oblong, acuminate; peduncles twice the length of the leaves; flowers whitish, in dense oblong racemes refracted on suberect pedicels; calyx tubular, densely hirsute; 4-6 lines long, its triangular teeth about half as long as the tube: pods pubescent, linear-oblong, attenuate at base to a stipe, somewhat turgid, an inch long with the stipe reflexed. In rocky gulches and hillsides of the Blue Mountains of Oregon.

A. Californicus Greene Bull. Cal. Acad. i, n. 3, 157. Stems numerous, from a stout perennial root, rather slender, 8-12 inches high, usually simple, minutely pubescent: leaves 2-4 inches long: stipules triangular, 2 lines long, nearly as broad; leaflets 11-19, cuneate-oblong to linear, obtuse, pubescent both sides with white hairs, 4-6 lines long by 1-3 broad, petiolulate: peduncles longer than the leaves; flowers ochroleucous, 6-8 lines long, pendent, on erect pedicels in dense oblong racemes: bracts lanceolate longer than the pedicels; calyx tubular, 3-5 lines long, pubescent with minute brownish hairs, its short triangular teeth about a line long: pods 1-2 inches long by 2 lines broad, acute, attenuate below to a slender stipe as long as the calyx, strongly reticulated and very minutely pubescent, compressed or somewhat turgid. In rich alluvial soil, valley of the Klamath river near Yreka, California, no doubt in adjacent Oregon.

A. Tweedyi Canby Bot. Gaz. xi, 150. Stems erect, 12-18 inches high,

from a perennial root, branching, sparsely cinereous-pubescent: stipules subulate, acuminate, 2-3 lines long; leaflets 13-17, linear to linear-spatulate, 6-8 lines long: peduncles much exceeding the leaves; racemes many-flowered, dense; flowers yellowish-white, spreading, on very short erect pedicels: calyx cylindrical, subgibbous at base, 3-4 lines long, white-pubescent, the short teeth triangular: pods oblong, turgid, acute at both ends, slightly curved, 6-8 lines long, erect on a long slender stipe. On alluvial hillsides along the Columbia river and its tributaries above The Dalles.

A. filipes Torr. Bot. Wilkes 278. Stems slender, erect, 1-2 feet high: stipules triangular, a line long, acute; leaves 3-6 inches long, the slender rachis channelled; leaflets 7-15, remote, linear, 4-8 lines long, less than a line broad, finely pubescent: peduncles much longer than the leaves; flowers numerous, in an elongated narrow raceme, yellowish to nearly white, erect or spreading on slender pedicels; bracts subulate, not as long as the pedicels; calyx cylindrical, 2 lines long, pubescent with minute black hairs, the narrow teeth about $\frac{1}{4}$ as long as the tube: pods elongated-oblong, 9-15 lines long by 2 lines or more broad, abruptly acute at both ends, straight, on a slender stipe 6-8 lines long, glabrous and shining, finely reticulated, flat, spreading or pendent. Plains and hillsides, eastern Oregon and Washington to Nevada.

A. Bourgovii Gray l. c. 227. Stems short, numerous, from a thick perennial root, thinly strigose-pubescent: leaflets 11-13, lanceolate, pubescent beneath, smooth above, 1-2 lines long: peduncles much longer than the leaves, loosely 3-7-flowered; calyx cylindrical, 2-3 lines long, pubescent, the subulate teeth half as long as the tube: pods oblong, somewhat obcompressed, curved downward, mottled, pubescent, obliquely rounded at summit, 6-8 lines long, on a stipe shorter than the calyx. On rocky hillsides, eastern Oregon to Brit. Columbia.

A. multiflorus Gray l. c. 226. Perennial, somewhat glabrous: stems a foot high, numerous, ascending, slender, branched: stipules dark-colored, the lower ones sheathing; leaflets 13-21, 3-6 lines long, linear or narrowly oblong, acute or obtuse: peduncles not exceeding the leaves, loosely few-flowered; flowers ochroleucous, small, 2-3 lines long; calyx campanulate, the teeth shorter than the tube: pods 4-6 lines long, chartaceous, flat, glabrous, oblong on a stipe about as long as the calyx-tube, reflexed, 6-ovuled, 2-4-seeded. Eastern Oregon to Brit. Columbia, Minnesota, Colorado and California.

A. tegetarius Watson Bot. King 76. Canescent with a silky pubescence: stems cespitose, 2-6 inches long, numerous, branched, from a much branched perennial caudex, procumbent: stipules membranaceous, mostly acuminate, sheathing; leaflets 7-9, 2-3 lines long, linear, acute: peduncles slender, about equalling the leaves, 1-3-flowered: flowers small, 2-3 lines long, ochroleucous, the keel purplish; calyx-teeth as long as the campanulate tube: pods 2-3 lines long, chartaceous, sessile, compressed, pubescent, ovate-oblong, straight, erect, 1-celled, 6-ovuled, 1-2-seeded. On high mountains, Montana, Wyoming, Idaho and Nevada.

A. miser Dougl. Hook Fl. i, 153. Cinereous-pubescent: stems diffuse, 8-10 inches long, slender, loosely leaved: stipules rather large, the upper ones connate to the middle; leaflets broadly-linear to oblong, mostly obtuse: peduncles much exceeding the leaves, loosely 5-7-flowered: young pods ovate-oblong, canescent. In the Spokane country, Washington.

A. serotinus Gray Pac. R. Rep. xii, 51. Cinereous with a minute strigulose pubescence: stems branching from the perennial root, ascending, slender, often flexuous, 8-15 inches high: stipules triangular, acuminate; leaflets 9-21, linear to oblanceolate, mucronate, not rigid, glabrous or nearly so above: peduncles exceeding the leaves; racemes virgate; calyx campanulate, minutely pubescent, its teeth very short: pods sessile, linear, acute, glabrous or minutely pubescent, 8-10-seeded. Northeastern Washington.

12 OXYTROPIS DC. Astragal. 24 t, 2-6.

Perennial, very rarely annual, herbaceous, or sometimes suffrutescent, often acaulescent plants with unequally pinnate leaves and axillary or radical pedunculate spikes of various colored flowers. Calyx 5-toothed. Keel with a subulate point. Pods partly 2-celled by the introflexion of the upper or placental suture.

O. viscida Nutt, T. & G. Fl. i, 341. "Stemless, cespitose, hairy and viscid; leaflets numerous (16-29 pairs), oblong-lanceolate, somewhat acute; peduncles longer than the leaves, about 14 inches high; stipules pilose, membranaceous, with a long acumination: spikes subcylindrical; bracts as long as the calyx; teeth of the calyx subulate, about the length of the tube; legumes short, terete, pubescent, acuminate." Eastern Oregon to the Rocky Mountains.

13 GLYCYRRHIZA Tourn. L. Gen. n. 882. (LIQUORICE).

Erect perennial herbs with unequally pinnate leaves deciduous stipules, the flowers in dense axillary pedunculate spikes with caducous bracts. Calyx tubular, gibbous at base, 5-cleft, the two upper segments partly united. Upper petal ovate-lanceolate, straight, the lateral ones acute, united at the tip, keel not pointed. Stamens diadelphous. Pod ovate or oblong, compressed, often echinate, 1-celled, few-seeded, scarcely dehiscent, sessile. Rootstock rather large, sweet.

G. lepidota Nutt. Gen. ii, 106. Tall and stout, 2-5 feet high, somewhat glandular-puberulent or the younger leaves slightly silky; leaflets punctate, 6-8 pairs, oblong-lanceolate, mucronate, often acuminate, usually 1-2 inches long; stipules linear-subulate: peduncles about equalling the leaves; spikes short; bracts lanceolate, acuminate; flowers ochroleucous, nearly 6 lines long; calyx half as long, the slender teeth much longer than the tube: pod thickly beset with hooked prickles, oblong, 6 lines long, 2-6-seeded. On sandy plains and river banks, Brit. Columbia to California, Missouri and Arkansas.

G. glutinosa Nutt. T. & G. Fl. i, 298. Stems rather stout, from long running rootstocks, 2-4 feet high; glandular-pubescent leaflets oblong to oblong-lanceolate, strigose with scaly glands: peduncles much shorter than the leaves, very glandular: spikes short; bracts lanceolate with a long acuminate point; calyx very glandular, the teeth nearly equal: pods densely beset with hooked bristles, 2-6-seeded. On sandy river banks, Brit. Columbia to California.

Tribe 7. Hedysaræ, DC. Prodr. ii, 307. Herbs or shrubs with 1-many-foliolate or simple usually stipellate leaves and racemose, spicate or umbellate axillary or terminal inflorescence. Corolla papilionaceous. Stamens 10, monadelphous or diadelphous. Pods usually transversely divided into 1-seeded indehiscent joints. Cotyledons plain, foliaceous after germination. Radicle incurved.

14 HEDYSARUM Jeaum in Desv. Journ. Bot. iii, 61, L. gen. n. 887.

Herbs with unequally pinnate leaves, scarious stipules, entire usually pellucid-punctate exstipellate leaflets and purple, white or yellow flowers in axillary pedunculate racemes with scarious or setaceous bracts. Calyx 5-toothed or -parted, the linear-sub-

ulate lobes subequal. Corolla with the upper petal ample, free from the stamens, keel oblique, truncate, longer than the wings. Stamens diadelphous. Pod flattened, transversely articulated into several equal-sided roundish 1-seeded indehiscent joints that are connected in the middle.

H. Mackenzii Richard Frankl. Journ. 17. Stems suberect, simple or branched, 1-2 feet high, minutely pubescent: stipules broadly subulate, the lower ones connate: leaflets 5-8 pairs, canescently pubescent, oblong or lanceolate, nearly glabrous above, 3-12 lines long: peduncles longer than the leaves; loosely 7-30-flowered; bracts subulate, longer than the pedicels; flowers 6-9 lines long, light purple; teeth of the calyx^{*} subulate, about as long as the tube; pods 3-4-jointed, minutely pubescent. Washington to the Rocky Mountains and far northward.

H. flavescens Coult. & Fish. Bot. Gaz. xviii, 300. Stems slender, a foot or more high, puberulent: stipules lanceolate, acuminate, the lower ones connate; leaflets 9-15, oblong to lanceolate, 8-12 lines long: peduncles longer than the leaves, loosely many-flowered; calyx campanulate, 2 lines long, the somewhat unequal teeth about as long as the tube; flowers cream-color, 8 lines long, the broad keel conspicuously longer than the wings and banner, on slender pedicels: joints of the pods 2-3 lines broad, usually only 2 maturing, the lowest one aborting and serving as a stipe. Idaho to Montana and Wyoming.

Tribe 8. Viciæ, Bronn. Diss. 133. Herbs with abruptly pinnate leaves, the common petiole not articulated with the stem, produced at the apex into a tendril or bristle. Corolla papilionaceous. Stamens diadelphous. Pod continuous, not articulated, dehiscent, Radicle inflexed. Cotyledons thick, farinaceous, remaining underground and unchanged in germination.

15 VICIA Tourn. Inst. t. 221. L. Gen. n. 873. (VETCH; TARES.)

Weak herbs with angled stems, more or less climbing by branched tendrils that terminate the leaves, pinnate leaves, semi-sagitate usually foliaceous stipules, and numerous, rarely few or solitary, flowers in loose peduncled axillary racemes. Calyx 5-cleft or toothed, usually unequal. Wings of the corolla adherent to the middle of the short keel, the banner obovate or oblong, free. Stamens diadelphous or nearly so, the mouth of the sheath oblique; anthers uniform. Ovary two to many-ovuled; style filiform, bent at right angles to the ovary, the apex surrounded by hairs or hairy on the outside. Pod flat, two-valved, short-stipitate or sessile, not jointed. Seeds globular, the stalk expanded above to cover the linear hilum.

* Perennials: flowers in pedunculate secund racemes.

V. gigantea Hook. Fl. i, 157. Stout and tall, climbing several feet high, somewhat pubescent or puberulent: leaves 6 inches long or more; stipules narrow, deeply and sharply toothed in the middle: leaflets 10-15 pairs, oblong-lanceolate, obtuse, mucronate, 1-2 inches long, entire: peduncles shorter than the leaves, 5-18-flowered; flowers ochroleucous, reflexed on short pedicels, 6 lines long; upper calyx-teeth very short, triangular, the lower longer, subulate: pods broadly oblong, 16-18 lines long, glabrous, 3-4-seeded, black when mature. Common: in woods and moist places, California to Alaska, near the coast.

V. semicincta Greene Eryth. iii, 17. Stoutish, very leafy, probably several feet high, the stem very prominently striate-angled and puberulent: leaflets 20-24, approximate, about 1 inch long, oblong-linear, mucronate, glabrous above, beneath silky-puberulent: peduncles far surpassing the leaves, the flowers probably in a short and dense raceme: pods obliquely oblong-linear, less than 9 lines long, glaucescent, not blackening in maturity, few-seeded: seeds globose, $1\frac{1}{2}$ lines thick, dull black, nearly half encircled by the hilum. On Crane Creek, southeastern Oregon. (Mrs. R. M. Austin, 1893.)

V. Americana Muhl. Willd. Sp. iii, 1096. Glabrous throughout: stems 1-4 feet high, from creeping jointed rootstocks: leaflets 4-8 pairs, variable,* usually oblong to oblong-lanceolate, obtuse or truncate, mucronate, entire, somewhat coriaceous, prominently veined and reticulated, 6-12 lines long: peduncles shorter than the leaves, 4-8-flowered; flowers purple, 6-9 lines long; calyx tubular, the 2 upper teeth very short or obsolete, the lateral ones broadly subulate, the lower one narrow, not half as long as the corolla; style very villous at the top: pods oblong, glabrous, an inch or more long, 3-6-seeded; seeds dark purple, $1\frac{1}{2}$ lines in diameter. Common in copses, Oregon and Washington to the Atlantic States and Canada.

V. truncata Nutt. T. & G. Fl. i, 270. Somewhat pubescent: stems 1-2 feet high, weak: leaflets 5-6 pairs, oblong-linear, usually truncate, serrate or tridentate at the apex, 10-12 lines long by 1-4 lines broad, the lowest ones often simply acute and apiculate; stipules lunate, incisely serrate: peduncles 4-7-flowered, rather shorter than the leaves; lower teeth of the calyx lanceolate, acuminate, the upper ones very short, triangular; style very villous at the apex: pods oblong, an inch long, 1-8-seeded: seeds globular, $1\frac{1}{2}$ lines in diameter. Common in copses, Brit. Columbia to California.

V. Californica Greene Fl. Fr. 3. Villous-pubescent: stems erect or decumbent, 6-12 inches high, scarcely climbing, the tendrils usually short and stiffish, not branching: leaflets 8-14, delicately feather-veined, cuneate oblong to oblong or orbicular, truncate, or retuse, mucronate, 2-7 lines long, more or less dentate toward the apex: peduncles 3-5-flowered; upper teeth of the calyx triangular, the lower ones subulate; corolla 6-9 lines long, deep purple: pods oblong, pubescent, 2-10-seeded. In copses, southern Oregon to California.

* * Few-flowered annuals.

V. exigua Nutt. T. & G. Fl. i, 272. More or less pubescent: stems slender, 4-18 inches high, branching: leaflets 6-8, oblong to linear, obtuse, often tridentate at the apex, 2-12 lines long: peduncles filiform, 1-2-flowered, shorter than the leaves; teeth of the calyx lanceolate, broad at the base, shorter than the tube; corolla white or purple, 3 lines long: pods oblong, nearly sessile, 8-12 lines long, glabrous, 2-8-seeded. Southern Oregon to California.

* * * Annuals: flowers 3-6, on elongated peduncles.

V. HIRSUTA Koch Syn. 191. Stems weak and slender, branching: leaflets 4-10 pairs, linear, truncate or retuse at the apex, mucronulate: peduncles 3-6-flowered, about the length of the leaves; flowers white, 2 lines long; calyx hairy, the subulate teeth nearly equalling the petals, all nearly alike: pods oblong, 4-6 lines long, torulose, hirsute, 2-seeded; seeds subglobose, somewhat compressed. In fields and roadsides, western Oregon and Washington. Introduced from Europe.

* * * Annuals; flowers 1-2, sessile in the axils of the upper leaves.

V. SATIVA L. Sp. 736. (TARES). Rather stout, somewhat pubescent:

leaflets 5-6 pairs, obovate-oblong to linear, retuse, long-mucronate; flowers 1 or 2, 10-12 lines long, red purple: pods linear, several-seeded, black when mature; seeds black, globose, 1-2 lines in diameter. Common in fields and waste places. Introduced from Europe.

16 LATHYRUS L. Sp. 872. (PEA).

Herbs with angled stems, more or less climbing by tendrils that terminate the pinnate leaves, usually foliaceous stipules and flowers in loose axillary racemes. Calyx campanulate, 5-toothed, the two upper ones more or less shorter than the others. Corolla with the lateral petals but slightly if at all coherent to the keel, the upper one free. Stamens diadelphous or nearly so, sheath of the filaments scarcely oblique. Style usually somewhat flattened and dilated above, bent nearly at a right angle with the ovary, pubescent or villous in a line along the inside, next the free stamen. Pods oblong, compressed, two-valved, one-celled, not jointed, many ovuled. Seeds globular or angular.

* Rachis of the leaves tendril-bearing: peduncles mostly equalling or exceeding the leaves: pods sessile: perennials: racemes several-flowered.

+ Stipules large, ovate or somewhat semihastate with broad lobes: calyx-teeth ciliate. Stems not winged.

L. maritimus Bigel. Fl. Bost. ed. 2, 268. Glabrous throughout: stems stout, 1-2 feet high, from long slender rootstocks: stipules broadly ovate, hastate, acute, 12-18 lines long; leaflets 3-5 pairs, ovate-oblong, 1-2 inches long, obtuse or acutish, nearly sessile: peduncles a little shorter than the leaves, 6-10-flowered; flowers purple and white, 9 lines long; calyx-teeth sparingly ciliate, the upper ones triangular, half as long as the narrowly subulate lower one: pods linear-oblong, 2 inches long, about 10-ovuled, glabrous or pubescent, straight. On sandy banks near the sea, northern California to Alaska and the Atlantic coast: and Europe.

L. polyphyllus Nutt. T. & G. Fl. i, 274. Glabrous throughout: stems stout, 2-4 feet high, branching: stipules triangular, as broad or broader than long, acuminate, often more or less dentate; leaflets 6-10 pairs, thin, oblong, obtuse or acutish, distinctly petiolulate, 1-2 inches long: peduncles slender, shorter than the leaves, 6-10-flowered; flowers purple, 6-8 lines long; calyx teeth ciliate, the upper pair short, triangular, the other three nearly equal, subulate, 3-4 lines longer: pods linear-oblong, 2 inches long, 2-10-seeded. In forests, Puget Sound to California, near the coast.

L. ochroleucus Hook. Fl. i, 159. Glabrous and a little glaucous: stems slender 1-3 feet high: leaflets 3-4 pairs, ovate or ovate-lanceolate, distinctly petiolulate; stipules semicordate, entire or obtusely toothed below: peduncles 7-10-flowered; flowers ochroleucous, 5-6 lines long; calyx somewhat truncate above, the upper teeth broadly triangular, scarcely half the length of the oblong or lanceolate lateral ones, the lower one lanceolate and a little the longest: pods glabrous, linear-oblong. In forests, Puget Sound to the Arctic Circle and across the continent.

L. sulphureus Brewer in Gray Proc. Am. Acad. vii, 399. Rather stout, 1-4 feet high, glabrous: stipules semisagittate, acuminate, 6-10 lines long, the lower half sometimes toothed; leaflets 3-5 pairs, oblong to elliptical, obtuse to acute, 9-18 lines long, very shortly petiolulate: peduncles longer than the leaves, few-many-flowered; flowers sulphur-yellow, 6 lines long; calyx teeth ciliate or glabrous, the upper pair very short, triangular, the other three subulate, nearly as long as the corolla: pods

linear-oblong, 1-2 inches long. Edges of copsis, Western Washington to California.

L. pauciflorus Fernald Bot. Gaz. xix, 335. Glabrous throughout: stems rather slender, 2-3 feet high: stipules semisagittate, acuminate, 8-12 lines long, coarsely toothed below; leaflets 4-5 pairs, oblong, 6-18 lines long, 4-6 lines broad, acutish, spinulose apiculate, nearly sessile: peduncles about equalling the leaves, 2-5 flowered; corolla 6-8 lines long; upper teeth of the calyx triangular, acuminate, nearly as long as the subulate lateral ones, the lower one setaceous and nearly as long as the keel of the corolla: fruit not seen. In copsis, southern Oregon to Utah and Idaho.

+ + Stipules narrow, semisagittate, the lobes usually lanceolate, acuminate: flowers purple or purplish.

++ Leaflets 4-6 pairs: peduncles rather many-flowered.

L. Bolanderi Watson Proc. Am. Acad. xx, 363. Stems usually stout and tall, wingless: glabrous throughout or the calyx only ciliate; stipules semisagittate, often toothed: leaflets 3-5 pairs, oblong-lanceolate to broadly ovate, obtuse or retuse to acute, 6-18 lines long or more: racemes about equalling the leaves, 8-10 flowered; calyx-teeth broad, the lowest elongated: petals purple, 6-9 lines long: pods linear, attenuate to the base, 2-2½ inches long, 3-4 lines broad. Oregon and California.

L. lanceolatus. Stems rather slender, 1-2 feet high, not winged, pubescent with small soft hairs intermixed with minute dark-colored glands; leaflets 4-5 pairs, lanceolate, acute, 6-12 lines long, pubescent beneath, smooth above; stipules small, semisagittate, acuminate, 6-8 lines long, 2-3 lines broad: peduncles about equalling the leaves, 3-6 flowered; flowers blue or violet, 8-10 lines long; calyx dark purple, pubescent, the tube 3-4 lines long, the lateral teeth triangular, 2 lines long, the lower one setaceous, but little longer; ovary glabrous, 10-16 ovuled: fruit not seen. In forests at Glendale, southern Oregon.

L. Nuttallii Watson l. c. xxi. 450. More or less pubescent throughout with loose wooly hairs; stems rather stout, 1-2 feet high: stipules narrow, semisagittate: leaflets 3-6 pairs, variable, narrowly to broadly elliptical, usually acute or acutish at both ends, apiculate, 1-2 inches long: peduncles shorter than or equalling the leaves, calyx light purple, 3-4 lines long, the 4 upper teeth triangular, acuminate, the lower one subulate, but little longer than the lateral ones; petals reddish purple, 6-8 lines long: pods glabrous, oblong, attenuate to a very short thick stipe, 1-1½ inches long by 4 lines broad; seeds globose, brown. In copsis, Brit. Columbia to California.

L. vestitus Nutt. T. & G. Fl. i, 276. Stems erect and rigid or a little climbing, silky-canescens, 1 foot or more high: leaflets 5-7 pairs, small, elliptical or oval, cuspidate, 6-7 lines long by 2-3 broad, silky pubescent beneath, smooth above; stipules broadly semisagittate, acuminate, slightly toothed below, about the size of the leaflets: peduncles about the length of the leaves, 4-6-flowered; flowers large, purple: calyx attenuate at base, the lower segment narrowly lanceolate, acuminate, rather longer than the tube: pods flat, pubescent, attenuate at each end. Plains of the Oregon toward the sea. Nuttall, not since reported.

++ ++ Leaflets 4-8; peduncles 2-6-flowered.

L. coriaceus White Bull. Torr. Club, xxi. 452. Glabrous or minutely papillose throughout: stems erect, 6-18 inches high, rather stout, flexuous, quadrangular or terete, wingless, scarcely striate: stipules semisagittate, lanceolate, acuminate, 4-12 lines long: leaflets 3-6 pairs, sub-opposite, thick and coriaceous, strongly venulose on both sides, elliptical to linear-lanceolate, obtuse or acute, 1½-3 inches long by 2-8 lines broad: pedun-

cles much shorter than the leaves, 3-10-flowered; upper teeth of the calyx short, triangular, about half as long as the subulate lateral ones, petals 5-7 lines long, dark purple; ovary glabrous, 6-8-ovuled; pods not seen. Base of Stein's Mountain, southeastern Oregon to the Wahsatch Mountains in Utah.

L. parvifolius Watson l. c. xvii, 345. Glabrous throughout: stems rather stout, not winged: stipules more or less broadly semisagittate; leaflets 4-6 pairs, rhombic-oblong to ovate, acute, 6-12 lines long: peduncles exceeding the leaves, loosely 6-12-flowered, calyx-teeth triangular, much shorter than the tube; corolla purple, 6-8 lines long: pods sessile, linear, 2 inches long by about 3 lines broad. Eastern Washington to Mexico and the Rocky Mountains.

L. Cusickii Watson l. c. 371. Glabrous or sparingly pubescent, slender, from a slender perennial rootstock, 6-24 inches high; stipules narrowly semisagittate, subulate, 4-6 lines long: leaflets 2 or 3 pairs, linear-lanceolate to narrowly linear, acute or acutish and mucronate, 2-3 inches long: peduncles equalling or exceeding the leaves, 2-4-flowered: corolla white, 10-12 lines long: calyx 3-4 lines long, with nearly equal teeth: pods attenuate to a narrow base, $1\frac{1}{2}$ -2 inches long by 3 lines broad: hilum short. On dry mountain slopes, eastern Oregon and Washington.

L. Nevadensis Watson l. c. xi, 133. Slender, usually 8-10 inches high, finely pubescent or nearly glabrous: stipules semisagittate, the lobes narrowly acuminate; leaflets thin, 2-4 pairs, ovate to ovate-oblong, 1-2 inches long, obtuse or acute; flowers large, 7-12 lines long, purple; calyx-teeth shorter than the tube, pods linear, $1\frac{1}{2}$ -2 inches long by 2-3 lines broad, obliquely acute, attenuate at base to a short stipe. On dry wooded hillsides, Washington to California and Nevada.

L. rigidus White l. c. 455. *L. albus* Watson not Kittle. Glabrous and somewhat glaucous: stems numerous, from a thick perennial rootstock, erect, a foot or less high: stipules semisagittate, lanceolate, 6-8 lines long by 2-3 broad, the lower lobe small and subulate: leaflets 3-5 pairs, linear to oblong, acute at each end, cuspidate, 7-10 lines long: peduncles about equalling the leaves, 2-3-flowered; flowers white, 8-9 lines long: upper teeth of the calyx deltoid, the lower one setaceous, all nearly equal and shorter than the tube: pods 18-20 lines long by 4 lines broad, attenuate below to a short stipe; seeds olive-yellow, 2 lines in diameter or more, with very small somewhat sunken hilum. On open hillsides of the Blue Mountains of Oregon.

L. decaphyllus Pursh Fl. 471. *L. polymorphus* Nutt. Mostly glabrous: stems erect, a little woody at the base, much branched, short; branches quadrangular: leaflets 2-5 pairs, elliptical-lanceolate or linear-oblong, somewhat glaucous, rigid and very strongly veined, 1-2 $\frac{1}{2}$ inches long, mostly obtuse at each end; stipules lanceolate, subfalcate, minutely semisagittate at base, very variable in size, acute, sometimes almost subulate: peduncles a little longer than the leaves, 3-5-flowered; flowers an inch long or more, very showy, purple; teeth of the calyx lanceolate-subulate, somewhat unequal, nearly as long as the tube: pods large, glabrous. Grassy alluvial plains, Idaho to the Missouri river, Colorado, Arizona and New Mexico.

L. Oregonensis White l. c. 456. Sparingly pubescent throughout: stems erect, 8-16 inches high, flexuous, terete or quadrangular, wingless, rigid; stipules narrowly semisagittate or semihastate, acuminate at each end, entire, the lower lobe often quite short, $\frac{1}{3}$ - $\frac{1}{4}$ the length of the adjacent leaf; leaflets mostly 4-7 pairs, opposite, lanceolate, obtuse, 8-20 lines long, by 2-4 broad, coriaceous, sparingly pubescent on both sides: peduncles shorter than the leaves, 3-8-flowered; flowers purple, veined, 6-8 lines long; calyx-teeth subequal, the upper slightly shorter, all shorter than the dilated pubescent tube: pods compressed, abruptly terminated at the

apex, short-stipitate, brown, $1\frac{1}{2}$ -2 inches long, $\frac{1}{4}$ as broad, 4-6-seeded; seeds brown, orbicular. In the mountains of eastern Washington and Oregon.

L. bijugatus White l. c. 457. Stems slender, wingless, round or quadrangular, slightly flexuous, erect or slightly decumbent, 1-2 inches high, glabrous throughout: stipules minute, linear-subulate, semisagittate; leaflets 2 pairs, sometimes only 1 pair, elliptical to obovate, obtuse, thin, paler green beneath, 1-2 inches long, 1-5-1-3 as broad: peduncles about as long as the rachis of the leaves, 2-flowered; flowers purplish, about 2 lines long, calyx-teeth very short, triangular, subequal, much shorter than the tube: pods brown, compressed, about 6-seeded. Northern Idaho and adjacent Washington.

L. Sandbergi, *L. bijugatus Sandbergi* White l. c. Glabrous throughout: stems very slender, flexuous, 2-3 inches high, wingless: stipules setaceous, 2-4 lines long, semisagittate, the lower lobe minute; leaflets 1 or 2 pairs, linear to linear-lanceolate or -spatulate, 2-3 $\frac{1}{2}$ inches long by $\frac{1}{2}$ -1 line broad: peduncles filiform, an inch long, 2-3 times longer than the rachis of the subtending leaf, 2-flowered; calyx attenuate at base, the triangular teeth much shorter than the tube: fruit not seen. Northern Idaho.

L. Torreyi Gray Proc. Am. Acad. vii. 337. Minutely villous throughout: stems very slender, 6-18 inches high, from slender creeping rootstocks, branching: stipules lanceolate, acuminate, 4-6 lines long by 1-2 broad, semisagittate, the lower lobe small; leaflets thin, 4-6 pairs, ovate to oblong or lanceolate; 3-6 lines long by 2-6 broad: peduncles filiform, 6-12 lines long, much shorter than the leaves, 1-flowered, rarely 2-flowered; calyx campanulate, the two upper teeth triangular, acuminate, about as long as the tube, about half as long as the subulate lower ones; upper petal purple, the others yellowish-white; pods linear-oblong, pubescent, 3-5-seeded. In open forests, Washington to California west of the Cascade Mountains.

* * Rachis of the leaves not tendril-bearing: pod broad, shortly stipitate.

L. littoralis Endl. in Walp. Rep. i, 722. Densely silky-villous throughout: stems numerous, from creeping perennial rootstocks, stout $\frac{1}{2}$ -2 feet high, decumbent to assurgent, diffusely branched: stipules ovate to oblong or lanceolate, 6-12 lines long; leaflets 1-5 pairs with a small linear terminal one, cuneate-oblong, 4-12 lines long; peduncles stout, much longer than the leaves, 4-10-flowered; calyx truncate at base, the triangular-subulate teeth nearly equal, longer than the tube; upper petal bright purple, 6-8 lines long, exceeding the paler wings and keel; style flattened for most of its length: pods 10-18 lines long by 6-8 broad, nearly semicircular in outline, villous, 3-5-seeded; seeds nearly 3 lines broad. On sand-hills and -banks along the coast. Washington to California.

ORDER XXVII. AMYGDALACEÆ Reichb. Consp. 177.

Shrubs or trees with alternate simple leaves, small caducous stipules and usually perfect, regular flowers. Calyx tubular or campanulate, free from the ovary, the tube lined with a disk, deciduous, the limb 5-lobed, imbricate in the bud. Petals 5, perigynous. Stamens about 20, inserted into the disk of the calyx-tube. Pistil 1, rarely 5; style simple. Ovary 1-celled, usually with two collateral ovules, becoming a mostly 1-seeded drupe. Seed pendulous, without albumen. Cotyledons large, thick, fleshy, containing hydrocyanic acid.

1. **Prunus.** Flowers perfect: carpel solitary: leaves convolute in the bud.
2. **Cerasus.** Flowers perfect: carpel solitary: leaves conduplicate in the bud.
3. **Osmaronia.** Flowers polygamo-dioecious: carpels 5, becoming 5 drupes, or by abortion fewer or none.

1 PRUNUS Juss. Gen. 341. (PLUM. PRUNE).

Leaves convolute in the bud. Flowers in umbellate clusters from lateral buds, appearing before or with the leaves. Drupe ovoid, glabrous and glaucous; the thick sarcocarp pulpy. Putamen (stone) bony, smooth, compressed, acutely edged on one margin, grooved on the other.

P. subcordata Benth. Pl. Hartw. 308 (?). A much branched shrub, 3-12 feet high, with ashy-gray bark: young branches and leaves finely pubescent, becoming glabrous: stipules narrowly-lanceolate, laciniate-dentate, 1-2 lines long; leaves elliptical to ovate, cordate to cuneate at base, obtuse or acute, sharply and finely serrulate, about an inch long, short-petioled: umbel 2-4-flowered; pedicels 3-6 lines long; calyx campanulate, the oblong obtuse minutely dentate lobes about as long as the tube; petals white, obovate, rounded at the apex, 4-5 lines long by 2-3 lines broad: fruit 8-10 lines long, oblong, subacid. On dry rocky hills and open woods, Umpqua valley, Oregon, to California.

P. Oregona Greene Pitt. iii, 21. "Evidently allied to *P. subcordata*, but leaves little more than an inch long, subcoriaceous, pubescent on both faces, in outline oval or broadly elliptic, never subcordate, commonly acutish at both ends, serrulate: flowers unknown: fruits in pairs or threes, on pedicels 6 lines long or more, densely tomentose when very young, more thinly so, yet distinctly tomentulose when half-grown. Known only from specimens collected on the Yainax Indian reservation in southeastern Oregon, by Mrs. Austin, in 1893. * * *"

2 CERASUS Juss. gen. 340. (CHERRY.)

Trees or shrubs with alternate simple leaves that are conduplicate in the bud and corymbose or racemose flowers from lateral buds, appearing before or with the leaves. Calyx campanulate, deciduous, the limb 5-parted, regular. Petals 5, spreading. Stamens 15-30. Ovary solitary, 1-celled, with two collateral pendulous ovules. Drupe globose, fleshy, destitute of bloom; stone mostly globose, smooth, not prominently margined.

§ 1. **EUCERASUS** T. & G. Fl. i, 409. Flowers from lateral leafless buds, appearing before or with the leaves; pedicels umbellate-fascicled, corymbose, or racemose.

C. emarginata Dougl. Hook. Fl. i, 169. *Prunus emarginata* Walp. Shrub 3-12 feet high, diffusely branched from the base and clothed throughout with a smooth shining bark: leaves oblong-obovate to oblanceolate, mostly obtuse, rarely emarginate, crenately serrulate, 1-3 inches long, with a single or a pair of glands at or above the junction of the petiole and blade, pubescent beneath, nearly smooth or puberulent above: inflorescence pubescent; racemes few-flowered: calyx campanulate, the oblong obtuse lobes soon reflexed, scarcely equalling the tube, about a line long; petals orbicular-ovate, 2 lines long, minutely pubescent outside: drupe 3-4 lines in diameter, dark-red, intensely bitter and astringent. Common in mountainous districts, Brit. Columbia to California, east of the Cascade Mountains.

C. mollis Dougl. l. c. *Prunus emarginata* var. *mollis* Brew. A small straight graceful tree 20-50 feet high by 2-20 inches in diameter, with reddish, characteristic cherry bark and slender ashy-gray or reddish branchlets: young branches and inflorescence soft-pubescent: stipules lanceolate, pectinate, 1-2 lines long; leaves obovate to oblong or oblanceolate, mostly acutish, crenately serrulate, 1-3 inches long, narrowed below to a short petiole, pubescent beneath, nearly smooth above: corymbs 5-10-flowered; calyx turbinate, the oblong, obtuse, entire lobes soon reflexed, not more than half as long as the tube; petals obovate, on short claws, 2 lines long; fruit bright red, about 3-4 lines long, intensely bitter: stone wrinkled, carinate on one edge, rounded or barely acute on the other. Common in forests, Brit. Columbia to California.

§ 2. PADUS T. & G. l. c. 410. Flowers in racemes terminating leafy branches, appearing after the evolution of the leaves: leaves deciduous.

C. demissa Nutt. T. & G. Fl. i, 411. *Prunus demissa* Walp. An erect slender shrub 2-20 feet high: leaves obovate or oblong-ovate, usually broadest above the middle, abruptly acuminate, mostly rounded or somewhat cordate at base, sharply serrate with straight slender teeth, more or less pubescent beneath, 2-4 inches long, the petiole usually biglandular just below its summit: racemes 3-4 inches long, many-flowered, longer than the leaves, usually nodding; calyx hemispherical, the lobes short and obtuse, glandularly ciliate, much shorter than the tube; petals white, orbicular to elliptical, 2-3 lines long; fruit globose, purplish-black or red, sweet and edible but astringent: stone globose. On rocky hills and river banks, Brit. Columbia to California and the Rocky Mountains.

3 OSMARONIA Greene Pitt. ii, 189.

NUTTALLIA T. & G. H. & A. Bot. Beech. Supp. 336 t. 82.

Shrubs with simple alternate deciduous leaves without stipules and polygamo-diœcious white flowers in loose nodding bracted racemes which appear with the branchlets from the same buds. Calyx 5-lobed, deciduous. Petals 5, alternate with the lobes of the calyx. Stamens 15, in two rows, 10 inserted with the petals and 5 lower down upon the disk that lines the calyx-tube, those of the fertile flowers all with abortive anthers. Carpels 5, inserted upon the persistent base of the calyx, free; styles lateral, jointed at base; ovules two in each carpel, pendulous. Fruit 1-5, 1-seeded drupes with thin pulp and smooth bony stone. Cotyledons convolute in the bud.

O. cerasiformis Greene l. c. 191. *Nuttallia cerasiformis* T. & G. Shrubs with clustered stems 2-15 feet high, dark brown bark and rather slender glabrous branches: leaves broadly oblanceolate, acute or acutish, attenuate to a short slender petiole, entire, smooth above, soft-pubescent beneath, 2-4 inches long: racemes short-peduncled, shorter than the leaves; bracts spatulate, equalling the calyx-tube; deciduous; pedicels 6-7 lines long, with a pair of linear, acuminate bractlets near the base of the calyx; calyx campanulate, the short triangular lobes about half as long as the tube: petals spatulate, twice as long as the calyx-lobes, those of the fertile flowers smaller: drupes blue-black with a bloom when fully mature, 5-8 lines long, oblong, with a slight furrow on the inner side; stone smooth, somewhat compressed. Common in wooded districts, Brit. Columbia to California. Flowering in very early spring.

ORDER XXVIII. POMACEÆ Loiseleur-Deslongchamps Man.
Pl. Us. i, 211.

Trees or shrubs with alternate, simple or unequally pinnate leaves, caducous free or nearly free stipules and perfect, regular white or reddish flowers in racemes or corymbosely clustered. Calyx-tube urceolate or campanulate, more or less coherent with the ovary, the usually short, free portion lined with an annular or laminar disk, the limb 5-lobed, imbricate in the bud. Petals 5, perigynous. Stamens mostly 20, inserted on the disk of the calyx. Ovary compound, composed of 2-5 carpels with two collateral ascending ovules in each, becoming a pome; styles as many as the carpels. Seeds usually two in each cell, without albumen.

* Carpels 1-celled, not divided by a partition from the back.

1. **Cratægus.** Fruit drupaceous: ovary 2-5-celled, becoming 2-5 1-seeded nutlets, either separable or united into one.

2. **Sorbus.** Shrubs or small trees with unequally pinnate leaves: fruit a proper pome, with coriaceous undivided 1-seeded cells.

3. **Malus.** Trees or shrubs with simple leaves: fruit a proper pome with chartaceous 2-seeded undivided cells.

** Carpels more or less spuriously 2-celled by a partition from the back of each carpel.

4. **Amelanchier.** Shrubs or small trees with simple leaves: fruit a proper pome, 5-carpeled or by abortion 3 or 4-carpeled: carpels coherent, incompletely 2-celled by a partition from the back.

5. **Peraphyllum.** Small shrubs with simple leaves: fruit a proper pome; 2- rarely 3-carpeled; carpels nearly distinct, 2-celled by a partition from the back.

1 CRATÆGUS Tourn. L. Gen. n. 622.

Thorny shrubs or small trees with simple toothed or lobed leaves, and mostly white, heavy-scented flowers in terminal corymbs. Calyx-tube urceolate, the limb 5-parted. Petals 5, spreading. Stamens 5-20. Carpels 2-5, becoming bony 1-seeded nutlets, contiguous or united: styles distinct. Fruit drupe-like, globose or ovoid, crowned with the calyx-teeth.

C. Douglasii Lindl. Bot. Reg. t. 1810. *C. rivularis* Nutt. (?). A stout shrub or small tree, 20-40 feet high: spines stout, 6-12 lines long: leaves elliptical to obovate, usually cuneate at base, irregularly serrate, those of the young shoots often incisely lobed, 1-3 inches long, somewhat pubescent on both sides: inflorescence tomentose; lobes of the calyx entire, a line long, about half as long as the tube, pubescent inside; petals orbicular, 3-4 lines long: fruit black, 4-5 lines in diameter, often only 3-carpeled; carpels distinct. Along water courses, Brit. Columbia to California, west of the Cascade Mountains.

C. Columbiana. A much branched shrub or small tree, 6-15 feet high: spines stout, 1-2 inches long: leaves cuneate-obovate, 1-2 inches long, incisely 5-9-lobed above the middle, acute, serrate, the teeth often vland-tipped, especially below, sparingly pubescent or glabrate, attenuate below to a short petiole: corymbs rather many-flowered, sparingly pubescent or

glabrate; lobes of the calyx triangular, acute, often serrate, about as long as the tube, dark red, petals orbicular, 3-4 lines long: fruit scarlet, obovoid, 4-6 lines long; carpels distinct. Common along the Columbia river and its tributaries east of the Cascade Mountains.

2 SORBUS Tourn. L. Gen. n. 623.

Shrubs or small trees with unequally pinnate deciduous leaves and small flowers in terminal compound cymes. Calyx urceolate, 5-lobed. Petals 5, alternate with the lobes of the calyx. Stamens 20. Styles 3-5, distinct. Carpels 3-5, coriaceous, 1-celled, 2-ovuled, 1-seeded. Fruit small, globose or pyriform.

S. sambucifolia Roem. Syn. Monogr. iii, 39. *Pyrus sambucifolia* Cham. & Schlecht. A shrub, 4-12 feet high with coarse ascending branches: nearly glabrous, the leaf-buds and inflorescence usually sparingly villous: leaflets 4-8 pairs, oblong to lanceolate, acute; sharply serrate from near the base, 1-2 inches long: cymes flattish, often 4 to 6 inches in diameter and many-flowered; lobes of the calyx broadly subulate, 1-2 lines long; petals white, orbicular, attenuate below to a short claw, 2-3 lines long, fruit globose, about three lines in diameter, coral-red, bitter. On high mountains, Oregon to Alaska.

S. occidentalis Greene Fl. Fr. 54. *Pyrus occidentalis* Watson Proc. Am. Acad. xiii, 263. A shrub 2-6 feet high with rather coarse erect branches; glabrous throughout or the inflorescence partly hairy: leaflets 3-5 pairs, oblong-elliptical, obtuse, sometimes mucronate, dentate usually only toward the apex, rarely below the middle, sometimes entire, 6-20 lines long: cymes small, usually rather few-flowered; calyx glabrous, with short triangular lobes: petals white, 1-2 lines long, orbicular, abruptly narrowed below to a short claw; styles villous at base: fruit pyriform, red, 4 lines long. On high mountains near perpetual snow, Washington to California and the Rocky Mountains.

3 MALUS Tourn. (APPLE).

Small deciduous trees with simple more or less serrate leaves and reddish or white flowers in simple corymbose cymes at the ends of short lateral branchlets. Calyx tube urceolate, the limb 5-lobed, petals 5, usually rather large. Stamens 20. Styles 5, more or less united at base. Carpels 5, chartaceous in fruit, 2-seeded, 1-celled, wholly covered by the adnate calyx-tube. Fruit globose to oblong, depressed at both ends, the flesh containing malic acid and destitute of grit-cells.

M. rivularis Roem. Syn. Monogr. ii., 215. *Pyrus rivularis* Dougl. A small tree 15-30 feet high: leaves ovate-lanceolate, sharply serrate, sometimes obscurely 3-lobed, more or less woolly-pubescent, 1-3 inches long; stipules setaceous: cymes shortly racemose, leafy at base; pedicels slender, 1-2 inches long, pubescent; calyx pubescent, the limb at length deciduous, the lanceolate acuminate lobes as long as the tube; petals orbicular, abruptly contracted below to a short claw, 4-6 lines long, white; styles 2-5, united at base: fruit oblong, 4-6 lines in diameter. Common in swales and along streams, northern California to Alaska.

4 AMELANCHIER Lobelius; Lindl. Linn. Trans. xiii, 100.
(SERVICE-BERRY).

Shrubs or small trees with simple alternate deciduous leaves, small racemes of white flowers and black or purplish edible fruit.

Calyx campanulate, the limb 5-parted, persistent. Petals 5. Stamens 20, much shorter than the petals. Styles 3-5, coalescent at base or distinct. Carpels 3-5, becoming membranaceous, incompletely 2-celled by a partition from the back, 1-seeded. Wholly covered by the adnate calyx-tube. Fruit small, berry-like, crowned with the persistent calyx-lobes, the pulp sweet. Seeds small, with a thin black testa.

A. alnifolia Nutt. Journ. Philad. Acad. vii, 22. Stem slender, 3-30 feet high, with slender erect flexuous branches: leaves thin, elliptical to obovate, obtuse at each end or often cordate, serrate toward the apex, entire below, 1-2 inches long, more or less densely tomentose beneath, smooth, or nearly so above: racemes many-flowered; bracts setaceous, long-woolly, longer than the pedicels, caducous: calyx densely tomentose, the triangular-lanceolate lobes closely reflexed, about as long as the broadly turbinate tube; petals spatulate, 6-12 lines long by 2 lines broad, obtuse; stamens very short: fruit globose, 3-4 lines in diameter. Common along streams and swales, Brit. Columbia to California and the Rocky Mountains.

A. florida Lindl. Bot. Reg. xix, t. 1589. Stems stoutish, erect cespitose, 2-10 feet high with erect somewhat cinereous branchlets: leaves thickish, orbicular to elliptical or ovate, 12-14 lines long, rounded to acute at the apex, coarsely serrate above the middle, entire and rounded or cordate at base, glabrous, or sparingly tomentose on the midrib and veins beneath: stipules subulate, setaceously acuminate: racemes rather loosely several-flowered; bracts setaceous, ciliate with long straight hairs; calyx somewhat tomentose, the subulate lobes longer than the tube, reflexed, densely tomentose inside; petals oblong, 6-7 lines long by 2-4 lines broad, rounded at the summit; stamens shorter than the lobes of the calyx: fruit globose, 3-4 lines in diameter. In wooded districts, Washington and Oregon east of the Cascade Mountains.

A. pallida Greene Fl. Fr. 53. Stems clustered and bushy, 3-6 feet high, with an ashy bark, rigid and somewhat intricately branched: leaves rather thick, oblong-lanceolate to oblong or elliptical obtuse or retuse, sparingly dentate towards the apex, entire and usually rounded below, often entire and cuspidate, 6-10 lines long, somewhat tomentose: racemes short and somewhat corymbose, the lower pedicels elongated; calyx more or less tomentose, the lobes triangular, acute, erect; petals obovate or obovate-oblong, slightly concave, 3-6 lines long: stamens shorter than the calyx. Common on dry hillsides, southern Oregon and northern California.

5 PERAPHYLLUM Nutt. T. & G. Fl. i, 474:

Low much branched shrubs with deciduous leaves crowded at the ends of the branchlets, and 2-4-flowered corymbs of white flowers. Calyx-tube urceolate, the limb 5-lobed. Petals 5, obovate, unguiculate. Stamens about 20, exserted. Styles 2, rarely 3, coherent below. Fruit a small pome containing 2, rarely 3 almost distinct carpels, each 2-celled by a spurious partition, the cells 1-seeded. Seeds angular, compressed, with a cartilaginous testa, erect, with the radicle at the base.

P. ramosissimum Nutt. l. c. A shrub 4-6 feet high with hard white wood and grayish bark: branches slender, recurved and more or less tortuous, spreading widely: leaves linear-lanceolate, acute, 1-2 inches long, entire or obsoletely serrulate, smooth and shining above, very minutely pubescent beneath: calyx urceolate, the tube wholly adnate to the ovary,

the triangular lobes shorter than the tube, reflexed, pubescent within; petals broadly obovate, rounded at the apex, 4-6 lines long, white; stamens about equalling the calyx-lobes, persistent; styles filiform, thickened toward the summit, longer than the stamens, united and pubescent below; fruit globose, 4-5 lines in diameter, crowned with the persistent calyx-lobes. On dry hillsides, eastern Oregon to California.

ORDER XXIX. ROSACEÆ Juss. Hort. Trian., Endl. Gen. 1240.

Herbs or shrubs with alternate simple or compound leaves, mostly foliaceous commonly adnate stipules and perfect or unisexual flowers in cymes, corymbs, panicles or solitary. Calyx free from the ovary, 4-5-cleft, the segments mostly valvate in the bud, commonly persistent. Petals perigynous, as many as the lobes of the calyx and alternate with them, or none. Stamens five to many, perigynous, rarely hypogynous. Pistils one to many; ovary usually one-celled and one-valved, sometimes many-ovuled; ovules pendulous or ascending. Styles as many as the ovaries, inserted terminally or laterally, persistent or deciduous. Fruit achenes drupelets or follicular. Seeds mostly anatropous, with little or no albumen.

TRIBE I. ROSEÆ. Carpels many, becoming bony achenes, enclosed and concealed in the globose or urn-shaped fleshy calyx-tube which resembles a pome.

1. **Rosa.** Erect, usually prickly shrubs with pinnate leaves and large flowers.

TRIBE II. SANGUISORBEEÆ. Carpels 1-3, becoming achenes, completely enclosed in the dry and firm calyx-tube, the throat of which is constricted or sometimes nearly closed: ovule suspended, solitary. Ours are herbs with compound or lobed leaves.

2. **Sanguisorba.** Calyx-lobes petaloid, deciduous; the tube 4-angled, naked; petals wanting: carpels 1-2: herbs with compound leaves and red or white flowers in dense spikes.
3. **Agrimonia.** Calyx turbinate, surrounded by a margin of hooked prickles: stamens 5-15: carpels 2: perennial herbs with pinnate leaves and yellow flowers in spicate racemes.
4. **Alchemilla.** Calyx urceolate, naked, minutely bracteolate: petals wanting: stamens 1-4: small annuals with minute flowers in axillary clusters.

TRIBE III. DRYADEÆ. Carpels numerous, several or solitary, 1-ovuled, becoming dry achenes: calyx not enclosing or at least not constricted over the fruit: seeds erect or ascending.

* Shrubs: carpel solitary: style not elongated in fruit; stigma decurrent: calyx imbricated, without bractlets: radicle inferior.

5. **Kunzia.** Diffusely branched shrubs with mostly fasciated leaves and solitary yellow flowers, terminal on the short branchlets.

** Trees or shrubs: carpels solitary: style elongated and plumose in fruit: calyx imbricated, without bractlets: seeds erect.

6. **Cercocarpus.** Small trees or shrubs with simple leaves and axillary

solitary or somewhat fascicled flowers: calyx-tube long-cylindrical, the limb deciduous; petals wanting: carpel usually solitary.

* * * Herbs: carpels few-many: calyx valvate in the bud, with a set of bractlets alternating with the lobes.

+ Seeds erect from the base of the cell: style terminal, often geniculate in the middle.

7. **Geum.** Carpels numerous, on a dry receptacle: the elongated style in fruit mostly geniculate and articulated near the middle or plumose.

+ + Seed suspended or ascending: radicle superior: style small, naked, not geniculate.

8. **Fragaria.** Petals broad and conspicuous, sessile: carpels numerous, scattered on a large fleshy, becoming pulpy, receptacle; style lateral: leaves trifoliolate.

9. **Comarum.** Carpels very numerous, on a large fleshy or spongy convex receptacle: style inserted below the apex of the ovary: leaves pinnate: coarse marsh perennials.

10. **Sibbaldia.** Petals narrow and minute, sessile: stamens 5; filaments very short, filiform: carpels 5-10, on a dry receptacle: leaves trifoliolate.

11. **Potentilla.** Petals usually conspicuous, sessile: stamens usually 20 or more; filaments narrow or filiform: carpels mostly numerous, on a dry receptacle: leaves pinnate or digitate; leaflets not confluent.

12. **Horkelia.** Petals conspicuous, with claws: stamens 10 or more; filaments more or less dilated or subulate: carpels usually many, on a dry nearly naked receptacle: leaves pinnate; leaflets many, the upper ones often confluent.

13. **Ivesia.** Petals with claws: stamens 5-20; filaments filiform: carpels 1-15, on a dry villous receptacle: leaves pinnate; leaflets cleft or parted, often small and very numerous, closely imbricated.

TRIBE IV. RUBEÆ. Calyx open, without bractlets: stamens numerous: carpels several or numerous, on a spongy receptacle, becoming pulpy-coated achenes in fruit: ovules 2, pendulous, but one maturing.

14. **Rubus.** Carpels 2-many, crowded on an elevated receptacle, ripening into a coherent body of small drupes.

TRIBE V. SPIRÆÆ. Calyx campanulate, imbricate or sometimes valvate in the bud: carpels few, mostly 5, rarely solitary, becoming follicles or dehiscent 2-valved pods: styles terminal: seeds 1-10 in each carpel, pendulous or ascending.

§ 1 Carpels becoming 1-seeded achenes.

15. **Holodiscus.** Carpels membranaceous, woolly, 1-seeded: shrubs with simple lobed leaves without stipules.

§ 2 Carpels becoming follicles or 2-valved capsules, usually several-seeded.

* Seeds in ours not known: carpels distinct: ovules 2, one above the other, pendulous: herbs with pinnately divided stipulate leaves.

16. **Filipendula.** Carpels membranaceous, 1-celled, distinct: leaves pinnate, the terminal leaflet large and lobed.

* * Seeds with shining stony testa: albumen very distinct: stipules membranaceous, caducous.

17. **Opulaster.** Carpels membranaceous, inflated, 2-valved, distinct, often stipitate: flowers perfect, corymbose: leaves lobed.

* * * Seeds with membranous testa and no albumen: stipules none.

+ Calyx persistent: stamens perigynous: carpels several-seeded.

18. **Spiræa.** Carpels cartilaginous, follicular, distinct: flowers perfect, rarely polygamous: shrubs with simple serrate or incised leaves.

19. **Luetkea.** Carpels membranaceous, 2-valved, distinct: low herbs with biternately parted leaves and perfect flowers.

+ + Calyx marcescent: stamens hypogynous: carpels few-seeded.

20. **Aruncus.** Carpels cartilaginous, 1-valved, distinct: tall herbs with ternately compound leaves and dicecious flowers.

Tribe 1. Roseæ Juss. Carpels many, with two suspended ovules, one above the other, becoming crustaceous, indehiscent, one-seeded achenes, inserted on the whole inner surface of the thickened torus or disk which lines the tube of the calyx.

1 ROSA Tourn. L. Gen. n. 631. (ROSE).

Prickly shrubs with unequally pinnate leaves, adnate stipules and large flowers in corymbs or solitary. Calyx urceolate, the tube contracted at the mouth, at length fleshy or baccate, enclosing the numerous distinct ovaries. Ovaries one-celled, with two suspended ovules, one above the other, becoming one-seeded indehiscent crustaceous or bony achenes, inserted on the whole inner surface of the thickened disk that lines the tube of the calyx, style terminal or nearly so, somewhat exserted, distinct or connate above.

* Sepals connivent after flowering and persistent.

R. Nutkana Presl. Epimel. Bot. 203. Stems stout, 1-10 feet high, armed with stout straight or recurved spines, the branches sometimes unarmed and the young shoots usually prickly: stipules rather broad, glandular-ciliate; leaflets 5-9, broadly elliptical to ovate or oblong or lanceolate, usually rounded at base, serrate above the middle, $\frac{1}{2}$ -2 inches long, finely pubescent and more or less resinous beneath: flowers solitary or 2-3 together; calyx-lobes lanceolate, acuminate and tipped with a lanceolate entire foliaceous appendage, the whole 12-18 lines long, densely tomentose inside, smooth or more or less glandular outside: petals broadly obovate or orbiculate, 12-16 lines long, nearly as broad: fruit globose, 6 lines long or more, not contracted above into a neck. Common from Brit. Columbia to California, Montana and Utah.

R. blanda Ait. Hort. Kew. ii, 202. Stems 1-2 feet high, wholly unarmed, or usually with a few slender straight scattered prickles, sometimes more densely prickly: stipules dilated, naked and entire, or slightly glandular toothed above; leaflets 5-7, usually oblong-oblancheolate, mostly cuneate at base and shortly petiolulate, coarsely and simply toothed, glabrous above, paler and glabrous or more or less pubescent beneath, not resinous or very rarely slightly so, usually large, the terminal one $\frac{3}{4}$ -2 $\frac{1}{2}$ inches long; rachis pubescent, sometimes sparingly prickly: flowers large, corymbose or often solitary: sepals entire, shortly hispid or sometimes naked: fruit globose or with more or less of a neck below the calyx, sometimes

oblong-obovate by a more gradual attenuation of the base, 4-6 lines long. On rocky ridges and canyons, Idaho to the Eastern States and Canada.

R. spithamæa Watson Bot. Cal. ii, 444. Stems slender, 2-12 inches high, sparingly branched: stipules narrow, acuminate, glandular-ciliate: rachis of the leaves glandular and more or less prickly; leaflets 5-9, elliptical or oblong, smooth, rather coarsely and doubly serrate, 6-18 lines long: flowers 12-18 lines broad, in few-flowered corymbs, pedicels receptacle and calyx usually densely glandular-hispid; sepals lanceolate, with or without a foliaceous serrate appendage, 6-10 lines long; petals broadly obovate, 8-12 lines long; fruit not seen. Common on wooded hillsides, southwestern Oregon and northern California.

R. pisocarpa Gray Proc. Am. Acad. viii, 382. Stems slender, armed with straight, stout or slender, ascending or spreading spines, sometimes naked, not prickly: leaflets 5-9, oblong to oblong-ovate, shortly acuminate to obtuse, rounded or subcuneate at base, sessile or nearly so, smooth above, paler and pubescent beneath, simply toothed, 4-12 lines long: flowers small, corymbose or often solitary, on short branches; pedicels slender, smooth or rarely sparingly hispid: sepals more or less glandular-hispid, triangular acuminate, with entire lanceolate appendages; petals obovate, 6-8 lines long: fruit globose, 3-5 lines in diameter, contracted above to a very short neck. Common in low places, Brit. Columbia to Oregon.

R. Californica Cham. & Schlecht. Linnæa ii, 35. Stems often tall, with usually stout more or less recurved or sometimes straight spines, frequently scattered or wanting, often prickly: stipules mostly narrow, usually naked, sometimes glandular-ciliate: rachis of the leaves pubescent or prickly; leaflets 3-7, round or broadly elliptical to oblong-ovate, usually sessile, slightly pubescent or glabrous above, villous or tomentose beneath, simply toothed, 6-18 lines long: flowers corymbose or sometimes solitary, on slender usually short and naked pedicels; sepals and receptacle glabrous or villous or rarely hispid; petals 5-6 lines long: fruit ovate-globose, with a usually prominent neck, about 6 lines long by 4 broad. Brit. Columbia to California.

R. Fendleri Crepin Bull. Soc. Bot. Belg. xv, 452. Stems often tall, with mostly rather slender straight or recurved spines, often scattered or wanting: stipules mostly narrow, usually naked; rachis pubescent or prickly; leaflets 5-9, oblong or oblong-obovate, more or less cuneate at base often petiolulate, usually glaucous, very finely pubescent beneath or glabrous or somewhat resinous, serrate with usually simple teeth, 6-18 lines long: flowers small, often solitary: the short pedicels receptacle and sepals glabrous; sepals lanceolate, with linear-lanceolate entire appendages: fruit globose or broadly ovate, with little or no neck. From the Columbia river to New Mexico and Texas, and north to beyond the British boundary.

* * Styles few, distinct, deciduous with the entire calyx from the very contracted top of the neck of the receptacle: sepals short and entire.

R. gymnocarpa Nutt. T. & G. Fl. i, 461. Stems slender and rather weak, 2-10 feet high, with straight slender infrastipular and scattered spines and more or less prickly: stipules usually narrow, glandular ciliate: rachis prickly and more or less glandular; leaflets 5-9, usually 7, from round elliptical and obtuse to narrowly oblong and acute, glabrous, rarely somewhat tomentose or resinous, doubly glandular-serrate, sessile or nearly so, usually small, 4-12 lines long: flowers in 1-few-flowered corymbs, on hispid or sometimes glabrous pedicels; sepals usually 3-4 lines long, lanceolate, the outer ones often glandular-ciliate all aristate and usually smooth; petals broadly obovate, 6-8 lines long: fruit smooth; oblong-obovate to globose, few-seeded. Common in forests and wooded districts, Brit. Columbia to California and Montana.

* * * Naturalized species.

R. RUBIGINOSA L. Mant. 564. (SWEET BRIER). Stems stout, armed with stout, recurved spines, without prickles, 4-6 feet high: stipules often dilated: leaflets 5-7, elliptical or oblong-ovate, densely resinous beneath and aromatic, doubly serrate: flowers small, on short hispid pedicels; sepals pinnatifid, hispid: fruit large, subglobose to oblong ovate, 6-8 lines long. Becoming common throughout western Washington and Oregon.

Tribe II. Sanguisorbæ Juss. Calyx-tube mostly indurated and contracted at the mouth; the segments valvate or rarely imbricate in the bud. Petals often wanting. Stamens 1-15, rarely more. Carpels 1-2, rarely 3-4, dry: style terminal or lateral: stigma often plumose. Seed suspended very rarely ascending. Radicle superior.

2 SANGUISORBA L. Gen. n. 146.

Herbs with pinnate leaves petiolulate leaflets adnate stipules and polygamous or perfect flowers in dense long-peduncled spikes. Calyx-tube turbinate, contracted at the throat, persistent, 2-3-bracteolate, the limb 4-parted, petaloid, deciduous. Petals none. Stamens 4-12 or none. Carpels 1-3, free from the calyx; styles terminal; stigma tufted, ovule solitary, suspended. Achenes dry included in the indurated 4-winged calyx-tube.

S. officinalis L. Sp. 169. Stem simple, usually glabrous, 1-2 feet high, much longer than the leaves, from a stout perennial root: leaflets about 4 pairs, ovate or oblong, cordate at base, coarsely serrate, $\frac{1}{2}$ -2 inches long, on petioles 2-6 lines long: flowers deep purple or red, polygamous, in oblong spikes 6-12 lines long or more; bracts often pubescent; calyx-lobes ovate-lanceolate, often acute, 1 line long; stamens but little if any longer than the sepals: filaments filiform: fruit a line long. Common in cold mountain marshes, Alaska to California and the Rocky Mountains. Also Europe.

S. media L. Sp. ed. 2, 169. Stems slender, simple, but little longer than the leaves, glabrous, 1-3 feet high, from a stout perennial root: leaflets elliptical to ovate or oblong, cordate with a deep narrow sinus, coarsely serrate with rounded glandular-apiculate teeth, 1-3 inches long, on stout petioles 1-2 inches long, the lowest ones smallest: flowers dark purple, in a dense oblong head; stamens longer than the sepals; filaments flat. In marshes, Alaska and Brit. Columbia, perhaps northern Washington.

S. Sitchensis C. A. Meyer Trautv. & Meyer Fl. Ochot. 34. Stem stout, 2-4 feet high, from a stout perennial root, paniculately branched above: leaves ample, 1-3 feet long; leaflets 13-21, oblong to ovate, 1-3 inches long, coarsely and often doubly serrate with acute gland-tipped teeth, on pedicels 6-12 lines long: flowers white or slightly tinged with purple, in a dense cylindrical spike 2-6 inches long; stamens 3-4 times longer than the sepals, filaments flat. In salt-marshes along the coast and islands of Alaska, to be looked for in northern Washington.

S. annua Nutt. T. & G. Fl. i. 429. *Poterium annuum* Nutt. Glabrous; stems slender, branching, 6-15 inches high from an annual root: leaflets 3-6 pairs, ovate to oblong, deeply pectinate-pinnatifid, 4-8 lines long, sessile or nearly so: flowers perfect, greenish-white, in dense ovoid or oblong heads 3-12 lines long; bracts scarious, ovate, a line long, persistent; stamens 2-4, much shorter than the calyx, fruit shorter than the bracts. In dry open places, Washington to California, Indian Ter. and the upper Missouri valley.

valis.
June 16, 1910

3 AGRIMONIA Tourn. Inst. t. 155. (AGRIMONY.)

Tall perennial herbs with oddpinnate leaves and long slender terminal racemes of small yellow flowers. Calyx-tube turbinate, persistent, somewhat contracted at the throat and surrounded by a dense border of hooked prickles, or rarely 5-bracteolate the limb 5-lobed, at length connivent. Petals 5, yellow. Stamens 5-15 in one row. Carpels 2, free and distinct; styles terminal, stigma dilated, 2-lobed; ovule pendulous. Achenes 1 or 2, enclosed in the indurated calyx-tube.

A. Eupatoria L. Sp. i, 448. Hirsute: stems 2-4 feet high, sparingly branched above: leaflets 5-7, usually 2-4 inches long with smaller ones intermixed, oblong-obovate, coarsely toothed, acute at each end; stipules large, semicordate, incised; calyx 2 lines long, becoming 3-4 lines long, the tube at length 10-sulcate above: petals longer than the lobes of the calyx: achenes solitary, subglobose, 1 line in diameter. Washington to California and across the continent. Europe.

4 ALCHEMILLA Tourn. L. Gen. n. 165.

Low herbs with palmately lobed or compound leaves, adnate stipules and small flowers in axillary corymbs. Calyx-tube obconic, contracted at the throat by an annular disk, the limb 4-5-parted, with as many bractlets. Petals in ours none. Stamens 1-4; filaments short. Carpels 1-4, stipitate or sessile in the bottom of the calyx-tube; style attached near the base of the ovary, filiform; stigma mostly capitate. Seed fixed near the base of the carpel, ascending, almost orthotropous. Radicle superior.

A. arvensis Scop. Fl. Carn. ed. 2, i, 115. Annual; somewhat strigose-pubescent: stems weak, 3-8 inches long, diffusely branched from the base: leaves rounded, cuneate at base, on short petioles, 2-6 lines long by 2-4 broad, deeply 3-lobed, segments 2-4 cleft; stipules large, 2-5 cleft; flowers fasciated in the axils of the leaves, $\frac{1}{2}$ of a line long, on slender pedicels or nearly sessile: bractlets very small: stamens 1-2: achene solitary, compressed. Common in meadows and open places, Vancouver Island to California: Europe.

Tribe 3. Dryadæ Vent. Tabl. iii, 349. Calyx campanulate or turbinate, or rather flat, valvate in the bud; stamens numerous: carpels numerous, rarely few and definite, dry; ovule erect: radicle inferior.

5 KUNZIA Spreng. Anleit. ed. 2, ii, 869.

PURSHIA DC. not Raf. nor Spreng,

Diffusely branched shrubs with mostly fascicled leaves, small triangular stipules and subsessile yellow flowers at the ends of short lateral leafy branchlets. Calyx persistent, funnel-form, 5-lobed, without bractlets. Petals 5, unguiculate. Stamens about 25, in one row, inserted with the petals into the throat of the calyx. Carpels 1 or 2, free, slightly stipitate attenuate into the subulate style, 1-ovuled; stigma lateral, extending nearly the whole length of the style. Seed obovate, with membranaceous testa, separated from the inner coat by a layer of purple resin-like intensely bitter granulated matter; albumen none. Cotyledons broadly oval, flat.

K. tridentata Spreng. l. c. *Purshia tridentata* DC. A shrub or small tree 2-10 feet high, with brown or grayish bark, the young branches and branchlets pubescent: stipules connate at base, setaceous; leaves cuneate-obovate, 3-12 lines long, 3-lobed at the apex, attenuate at base to a thick petiole, white-tomentose beneath, green above: flowers nearly sessile; calyx 2-4 lines long, densely canescent-tomentose, with or without some glandular hairs below, the oblong obtuse lobes shorter than the tube; petals spatulate-obovate, unguiculate, 3-5 lines long, exceeding the calyx-lobes: carpels oblong, densely pubescent, striate, attenuate at each end, 4-6 lines long, exserted. Common on rocky hillsides and gravelly or sandy plains, Brit. Columbia to California and the Rocky Mountains.

6 CERCOCARPUS H. B. K. Nov. Gen. vi, 223 t. 556.

Small trees or shrubs with alternate leaves, small wholly adnate stipules and axillary or terminal inflorescence. Tube of the calyx cylindrical, long and pedicel-like, more or less persistent, the limb short, campanulate, 5-lobed, without bractlets, deciduous. Petals none. Stamens 15-25, inserted in 2-3 rows on the limb of the calyx; filaments short; anthers oval or rounded deeply emarginate or cleft at each end. Ovary solitary, free, with a single erect ovule: style terminal, villous: stigma capitate. Carpel linear-oblong, caudate with the long persistent plumose style which is more or less enclosed in the slender persistent tube of the calyx. Seed with a membranous testa and no albumen. Cotyledons long and linear.

* Leaves persistent, small, entire, thick-coriaceous with revolute margins, 1-nerved.

C. ledifolius Nutt. T. & G. Fl. i, 427. A small tree or shrub 6-15 feet high with moderately straight rigid branches: leaves lanceolate or oblong, acute, glandular apiculate, dark green and usually glabrous above, tomentose beneath, attenuate below to a thick petiole, 6-18 lines long, mid-nerve prominent: flowers sessile, 3 lines in diameter, tomentose; limb of the calyx 2 lines long, the oblong-obtuse lobes longer than the throat, tube becoming 3-5 lines long: tails of the achenes at length 2-3 inches long. In mountainous districts, eastern Oregon to California and the Rocky Mountains.

C. intricatus Watson Proc. Am. Acad. x, 346. A rigidly and intricately much branched shrub, 1-6 feet high with ashy-gray bark: leaves lanceolate or apparently linear by the involution of the margins, silky-pubescent both sides or glabrate above, acute, apiculate, sessile, 5-10 lines long: flowers sessile; tomentose; limb of the calyx 2 lines in diameter, 1-2 lines long, the short triangular lobes not half as long as the throat, the persistent tube becoming 2 lines long: tails of the achenes 1-2 inches long. On dry hillsides along streams, John Day valley eastern Oregon to Nevada and California.

** Leaves deciduous, rather large, the margins not involute, pin-nately veined.

C. betulæfolius Hook. l. c. t. 322. *C. parvifolius* of recent authors not Nutt. A shrub or small tree 2-15 feet high with gray thin flaky bark and long slender spreading or recurved branches: leaves obovate or oblong, with cuneate base, obtuse, coarsely serrate above the middle, green but finely pubescent above, densely white tomentose beneath, 1-2 inches long on short petioles, conspicuously veined: flowers on rather slender pedicels, tomentose, limb of the calyx 3-4 lines in diameter, the triangular obtuse lobes about equalling the throat; the tube becoming 4-6 lines long, ob-

liquely open on one side. On dry hillsides, southwestern Oregon to California.

7 GEUM L. Gen. n. 636.

Perennial herbs with mostly radical lyrate or pinnate leaves, adnate stipules and solitary or corymbose flowers. Calyx obconic at base, deeply 5-cleft, usually with 5 bracteoles alternating with the lobes. Petals 5, obtuse or emarginate. Stamens numerous, inserted into the disk that lines the base of the calyx; filaments somewhat persistent. Carpels numerous, 1-ovuled, on a dry, conical or clavate receptacle, becoming achenes; styles terminal, at least the base persistent, straight, or geniculate near the middle: stigma simple. Seed erect; radicle inferior.

§ 1 EUGEUM T. & G. Fl. i, 420. Flowers erect: segments of the calyx reflexed: head of carpels sessile: styles articulated and geniculate above the middle, the lower portion glabrous, hooked at the apex, persistent after the deflexed and mostly hairy terminal portion falls away.

G. macrophyllum Willd. Enum. i, 557. Hirsute throughout with spreading yellowish hairs: stems mostly solitary, 1-3 feet high, usually simple: stipules foliaceous, ovate, lacerate serrate, adnate to the petiole below the middle, acuminate above; radical leaves lyrate and interruptedly pinnate, 6-12 inches long or more the terminal leaflet very large, round-cordate, irregularly lobed and toothed, the others very unequal, often very small; cauline leaves similar but with a short rachis or reduced to the terminal leaflet only: flowers yellow, 6-9 lines broad, in an open panicle; bractlets small, often wanting; lobes of the calyx ovate, long acuminate, puberulent or nearly smooth reflexed, about equalling the obovate or oblong petals: style three lines long, at length reflexed; achenes hispid, upon a nearly naked oblong receptacle. In moist meadows and along streams. Alaska to California and across the continent.

G. strictum Ait. Hort. Kew ii, 218. Stems and petioles hirsute or hispid, with spreading hairs: stems stout, 2-3 feet high, simple, dichotomous at the summit: radical leaves interrupted and somewhat lyrate pinnate; leaflets cuneiform-obovate, incisely lobed and serrate; cauline leaves 3-5-foliolate; the leaflets rhombic-ovate or oblong, acute, sharply toothed and incised; appressed-pubescent; stipules large, incised: flowers rather large, numerous; bractlets shorter than the calyx-lobes; petals yellow, roundish-oval, longer than the calyx: carpels hispid at the apex; style glabrous, the upper joint hairy: receptacle densely pubescent. In fields and moist places, Idaho to the New England States and Canada.

§ 2. SIEVERSIA Willd. Berl. Mag. v, 398 as genus. Flowers rather large, erect; segments of the calyx erect or spreading: head of carpels sessile: style wholly persistent.

G. triflorum Pursh Fl. 736. Villous and hirsute: stems clustered, from stout branching rootstocks, 6-15 inches high, simple, nearly naked: radical leaves pinnate, with numerous cuneate-oblong irregularly incised leaflets: the cauline reduced to a few small linear-lobed leaves or bracts: flowers few, usually 3, on long peduncles; calyx often purplish, the linear bractlets 4-9 lines long usually exceeding the calyx-lobes and equalling the oblong purplish erect petals: tails of the small achenes plumose, at length 2-3 inches long: receptacle small, hemispherical. On bleak hill-tops, from Arctic America to California and the Rocky Mountains.

8 FRAGARIA Tourn. L. Gen. n 633. (STRAWBERRY).

Acaulescent stoloniferous perennials with trifoliolate, coarsely toothed leaves and white flowers in few-flowered cymes upon erect scapes in early spring. Calyx concave, persistent, the limb 5-lobed with 5 alternate bractlets, valvate in the bud. Petals 5. Stamens many, in one row. Carpels numerous, smooth; style lateral, very short; ovule solitary, ascending. Receptacle large, fleshy, becoming conical and pulpy, bearing the small turgid crustaceous achenes upon its surface, at length separating from the conical central portion of the torus.

F. cuneifolia Nutt. T. & G. Fl. i, 448. Usually low; petioles and scapes villous with spreading hairs: leaves 1-6 inches high; leaflets cuneate-oblong, very obtuse and coarsely toothed at the summit, smooth above, appressed silky beneath: scapes shorter than the petioles, 1-few-flowered, decumbent or ascending; bractlets oblanceolate, entire, shorter than the lanceolate acuminate calyx-lobes: receptacle sparingly villous, in fruit semi-hemispherical to oblong 3-9 lines in diameter: achenes deeply imbedded in the receptacle. Very common in prairies and open places, Alaska to California.

F. Californica Cham & Schlecht. Linn. ii, 20. Comparatively tall, 2-12 inches high: pubescence of the petioles and scapes usually appressed, sometimes spreading and appressed on the same plant: leaflets obovate to oblong, more or less cuneate at base, coarsely toothed above the middle, appressed-silky beneath, sparingly villous above, 6-18 lines long: scapes equalling or surpassing the leaves, erect; bractlets linear-oblanceolate, entire or sparingly toothed, about equalling the triangular acuminate calyx-lobes: receptacle very sparingly if at all hairy; fruit oblong to obovoid, 3-6 lines in diameter: achenes slightly imbedded in the receptacle. Common throughout the Pacific States, always in wooded districts.

9 COMARUM L. Gen. n. 638.

Perennial herbs with pinnate leaves, mostly scarious wholly adnate stipules and purple flowers. Calyx flat, deeply 5-cleft, rarely 6-7 cleft, with as many smaller alternate deflexed bractlets. Petals 5, somewhat persistent. Stamens numerous, inserted into the thickened and hairy slightly lobed disk which lines the bottom of the calyx; filaments subulate, persistent. Achenes aggregated on the convex, at length very large and fleshy or spongy persistent receptacle: styles filiform, at length deciduous, inserted below the apex of the ovary; stigma simple. Seed inserted next the insertion of the style, pendulous. Radicle superior.

C. palustre L. Sp. 502. Stems stout, ascending from a decumbent rooting perennial base $\frac{1}{2}$ -2 feet long, glabrous below, minutely silky or glandular-pubescent above: lower stipules scarious, amplexicaul, long-adnate to the petiole; the upper broadly ovate, entire: leaves pinnate: leaflets 5-7, oblong 1-2 inches long, more or less pubescent beneath, dark green above, coarsely serrate: flowers dark purple, in an open few-flowered cyme; bractlets linear, acuminate, much shorter than the calyx; calyx-lobes purple within, ovate, acuminate, becoming 6-10 lines long; petals spatulate, acute, 2-3 lines long; stamens 20, with stout fleshy filaments, in one row: carpels very numerous, sessile upon the large fleshy receptacle. In marshes and bogs, Alaska to California and across the continent.

10 SIBBALDIA L. Gen. n. 393.

Procumbent or depressed suffruticose plants with trifoliolate leaves and rather small flowers on scape-like peduncles. Calyx rather flat, 5-cleft and 5-bracteolate. Stamens 5, alternate with the 5 petals, inserted into the margin of the villous disk which lines the base of the calyx; filaments short. Carpels 5-10, raised on short hairy stipes; styles lateral, attached near the base of the ovary; stigma capitate, depressed. Seed ascending, amphitropous. Radicle superior.

S. procumbens L. Sp. 284. Somewhat villous: stems creeping, leafy at the extremities: leaves trifoliolate; leaflets cuneiform, 3-12 lines long, 3-5 toothed at the apex: calyx-lobes 1-2 lines long; bractlets linear and shorter: petals much shorter, acute. Alpine and subalpine, from the Arctic regions to California and the Rocky Mountains: Greenland, Labrador and the White Mountains of N. H., Northern Europe.

11 POTENTILLA L. Gen. n. 634.

Herbaceous or suffruticose plants with pinnately or palmately compound leaves, adnate stipules and axillary or cymous inflorescence. Calyx concave at the bottom, deeply 4-5-cleft, with 4-5 alternate bractlets. Petals 4-5, obtuse or retuse or obcordate, deciduous. Stamens numerous, inserted into the margin of the disk which lines the base of the calyx: filaments filiform or subulate. Carpels numerous 1-ovuled, collected into a head on the flattish persistent dry villous receptacle: styles lateral or nearly terminal, deciduous: stigmas obtuse or somewhat capitate: ovule always inserted next the insertion of the style and accordingly either suspended or ascending. Radicle always superior.

§ 1 Styles thickened and glandular toward the base: carpels glabrous, numerous, sessile: inflorescence cymose.

* Style attached below the middle of the ovary: disk thickened and pentagonal; stamens 20-30, in one row on the margin of the disk; herbaceous perennials with pinnate leaves and glandular-villous pubescence.

P. glutinosa Nutt. T. & G. Fl. i, 446, under *P. fissa* var. Stems stout, erect, simple, striate, 1-4 feet high: radical leaves 7-11-foliolate 4-12 inches long, usually long-petioled; stipules ovate, entire or incised; leaflets rounded or subrhomboidal, incised or densely serrate, the terminal one 1-3 inches long: inflorescence loosely and regularly dichotomous, forming an almost flat-topped cyme 6-8 inches broad in fruit; calyx densely pubescent, the acute sepals 3-4 lines long; bractlets much smaller; petals rounded obtuse, 3-5 lines long, clear yellow: achenes very broadly oblique-ovoid, obtuse, distinctly carinate on the back above the middle, the sides marked with numerous rather coarse simple or forked veins. On stony hills, Vancouver Island to Oregon and Idaho.

P. ciliata. Loosely pilose throughout: stems cespitose, slender, 10-12 inches high, from short creeping rootstocks: radical leaves 4-6 inches long: stipules linear to obovate, 4-6 lines long, more or less lacerate; leaflets 5-9, with 2-6 small ones interspersed, mostly obovate with cuneate base, 4-12 lines long, coarsely lacerate toothed: flowers large, in a rather close corymbose cyme; sepals ovate, acuminate, 4-6 lines long,

conspicuously ciliate; bractlets linear-lanceolate, 3-4 lines long; petals broadly obovate or nearly orbicular, 6 lines long or more, bright yellow: achenes not known. In wet meadows on the Siskiyou Mountains near Ashland Butte, Oregon:

P. fissa Nutt. l. c. Viscidly pubescent: stems erect, branching, leafy, 8-10 inches high: leaves 9-11-foliolate on short petioles; leaflets unequal, roundish or oval, deeply incised or incisely toothed; cymes narrow, few-flowered; sepals ovate-lanceolate, long-acuminate; bractlets much smaller, often toothed; petals bright yellow, large, very concave, much exceeding the sepals. Idaho to the Rocky Mountains.

P. glandulosa Lindl. Bot. Reg. xix, t. 1583. Stems erect, slender, branched above, villous-pubescent, viscid toward the summit: radical leaves pinnately 5-9-foliolate: leaflets ovate or roundish, those of the nearly sessile cauline leaves obovate or oblong, all deeply and usually doubly serrate-toothed and often incised: branches of the cyme elongated and rather loosely-flowered; sepals ovate, acute, as long as the broadly oval yellow petals. Eastern Washington and Brit. Columbia to South Dakota and New Mexico.

P. Wrangelliana Fish. & All. Anim. Bot. Ind. Sem. Stems erect, 1-2 feet high, glandular-pubescent: leaves pinnately 5-9-foliolate; leaflets ovate or rhombic-ovate, coarsely and doubly serrate: cyme dichotomously branched, with a short-pedicelled flower in the forks, lax, leafy-bracted; sepals oval, abruptly contracted into a small almost mucronate point; petals pale yellow, obovoid, scarcely equalling the calyx; stamens 25, in one row on the margin of the thickened disk. Valleys of the coast range, Washington to California.

P. reflexa Greene Pitt. iii, 19. Stems erect or spreading, 1-2 feet high, rather slender; minutely villous-hirsute throughout and somewhat glandular: radical leaves 3-6 inches long, 5-9-foliolate; stipules entire; leaflets orbicular to oblong, coarsely and doubly serrate, an inch long or less: cymes open-paniculate; pedicels slender, often elongated; sepals narrowly triangular, acute, 3-4 lines long; the linear-lanceolate bractlets about half as long; petals obovate, 3-4 lines long, about equalling the sepals, yellow. Common on dry open hills and plains, Washington to California.

P. rhomboidea Rydberg Bull. Torr. Club xxiii, 248. *P. glandulosa* var. *Nevadensis* Watson. Sparingly villous to nearly glabrous; slightly if at all glandular: stems slender, 4-8 inches high, often solitary: radical leaves, 5-7-foliolate, short petioled: stipules ovate, subentire; leaflets rhombic-ovate, mostly acute, serrate with acute teeth, 4-8 lines long: cymes open, few-flowered pedicels stout and rather rigid; calyx sparingly hairy, the oblong acute lobes 2-4 lines long; bractlets linear-lanceolate, 1-2 lines long, petals yellow, 12 lines long obovate, tardily deciduous: stamens 15-25; styles nearly basal, filiform. On cliffs in the high mountains, Washington to California and Nevada.

** Style terminal: disk not thickened; flowers small yellow, leaves pinnate or ternate.

+ Annuals or biennials; leaflets incisely serrate, not white tomentose.

P. Mouspeliensis L. Sp. 499. *P. Norvegica* L. Hirsute: stems stout, erect, 1-3 feet high, leafy, at length dichotomously branched above: leaves trifoliolate, mostly short petioled; stipules large, ovate, coarsely incised or entire; leaflets obovate or oblong-lanceolate, 1-3 inches long: cyme leafy and rather loose; calyx large, becoming 3-5 lines long, the bractlets nearly equalling or exceeding the sepals; petals obovate, often emarginate, not longer than the sepals; stamens 15-20, in 2 rows; recep-

tacle large, oblong. In damp places, Puget Sound to Alaska, Labrador and the Atlantic States.

P. rivalis Nutt. l. c. 437. Soft-villous with spreading hairs: diffusely branched from the base, or erect and branched above, 4-18 inches high: radical leaves 5-foliolate, or 3-foliolate and the terminal leaflet 3-parted; the upper ones 3-foliolate; stipules lanceolate to ovate, entire or toothed; leaflets ovate to oblong-cuneate, 6-18 lines long, more or less incised-serrate: cymes loose, leafy; pedicels slender; bractlets and sepals nearly equal, acute, 2-3 lines long; petals small; stamens 10-20; achenes usually smooth. In moist places along streams, Oregon and Washington to the Missouri river.

P. millegrana Engelm. Lehm. Ind. Sem. Hort. Bot. Hamb. 1849. *P. rivalis* var *millegrana* Watson. Pubescent throughout with minute soft appressed hairs: stems 6-18 inches long, spreading, profusely branched with divergent branches: leaves all 3-foliolate; stipules large, often nearly free, lanceolate to obovate, acutely 3-lobed, the lower ones often coarsely serrate; leaflets cuneate-obovate to oblanceolate, coarsely serrate with blunt teeth, 1-2 inches long; cymes very leafy, repeatedly dichotomous with a slender pedicelled flower in the forks; lobes of the calyx triangular, acute 2 lines long; the lanceolate bractlets nearly as long; petals obovate about 1 line long; achenes smooth, nearly white. On sandy bars along streams, Brit. Columbia to California and Ill.

P. lateriflora Rydberg l. c. 261. Soft pubescent with spreading hairs: stems often several from the root 4-20 inches high, terete, finely and rather densely glandular-pubescent, often tinged with red or purple, simple or sparingly branched with erect branches: leaves all 3-foliolate, the lower on petioles 1-4 inches long; stipules small, ovate or oblong, entire or toothed; leaflets broadly obovate, coarsely crenate, 1-2 inches long by 6-18 lines broad; flowers small, about 3 lines in diameter, on pedicels 2-7 lines long, from the axils of upper leaves, making the branches resemble leafy racemes: calyx glandular-pubescent in fruit, about 3 lines in diameter; bractlets ovate-lanceolate or oblong, acute, a little shorter than the ovate; acute sepals: petals yellow, obovate-cuneate, sometimes slightly emarginate, shorter than the sepals; stamens about 10; carpels very numerous; style terminal, thickened and glandular at base: achenes smooth, whitish. In moist places and along streams, Brit. Columbia to California, Montana and Arizona.

§ 2. Styles filiform, not glandular at base: inflorescence cymose.

* Style terminal; carpels glabrous: disk not thickened: stamens 20-25: herbaceous perennials.

+ Leaves pinnate; carpels usually 10-30: bractlets shorter than the sepals.

P. Drummondii Lehm. Nov. Stirp. Pug. ii, 9. Stems cespitose, 1-2 feet high, finely appressed-pubescent, simple; leaves pinnate with 2-5 pairs of leaflets, the lower long-petioled; stipules lanceolate, entire; leaflets obovate to oblong, cuneate at base, 6-18 lines long, incisedly 8-10-lobed; flowers somewhat panicled at the summit of the stem, on long slender pedicels; bractlets narrowly lanceolate, 2 lines long, nearly equalling the acuminate-ovate, acute calyx-lobes; calyx hirsute; petals oblong-obovate with broad rounded, or almost truncate apex, 6 lines long: achenes smooth, brown. In mountain meadows at high elevations, Brit. Columbia to California and the Rocky Mountains.

P. Newberryi Gray Proc. Am. Acad. vi, 532. *Ivesia gracilis* T. & G. Pac. R. Rep. vi, 72. Canescently villous with spreading hairs: stems slender, from an apparently annual or biennial root, 6-8 inches long:

leaflets 5-10 pairs, scattered on the slender rachis, 3-5-parted with oblong segments, 2-4 lines long: flowers on slender pedicels in a very diffuse panicle; calyx nearly 2 lines long, broadly campanulate; bractlets lanceolate, nearly equalling the lanceolate acuminate calyx-lobes; petals white, very broadly obovate, 2 lines long, nearly as broad, exceeding the calyx; stamens 15-20; carpels numerous; achenes rugose. On sandy plains, Washington, at Wallula, to California.

+ + Leaves digitately 5-7-foliolate.

P. gracilis Dougl. Hook. Bot. Mag. t. 2984. Villous and more or less tomentose: stems erect, 2-3 feet high: stipules ovate or lanceolate, often long acuminate, entire or sub incised: leaflets mostly 5-7, rarely 3, cuneate-oblong, obtuse, incisely serrate or pinnatifid, white-tomentose beneath, green and subvillous or appressed-silky above, 1-3 inches long: flowers in a loose subfastigate cyme, the pedicels at length elongated and slender; bractlets narrow, lanceolate, shorter than the broad acute or lanceolate sepals; petals broadly obovate, 3-4 lines long, exceeding the calyx: achenes very numerous, oblong, dark brown. Common on dry prairies and plains, Brit. Columbia to California and the Rocky Mountains.

P. flabelliformis Lehm. l. c. 12. Appressed-silky and more or less white tomentose: stems rather stout, 2-4 feet high, erect, branched above; leaves 5-9-foliolate, the lower long-petiolate; the upper sessile or nearly so; stipules linear-lanceolate, long-acuminate, mostly 3-toothed, 1-2 inches long; leaflets linear-oblong in outline, 2-4 inches long, deeply pinnatifid with linear-lanceolate segments, white-tomentose beneath, green and more or less silky above: flowers in ample flat-topped cymes; bractlets lanceolate, 2-3 lines long, about half as long as the broad triangular-ovate acute sepals; petals bright yellow, orbicular or broadly obovate, but little exceeding the sepals. Plains of Eastern Oregon and Washington to the Saskatchewan.

+ + + Low, arctic or alpine species: densely villous or subglabrous: leaves ternate: flowers few, in a loose cyme, or solitary: the obovate petals exceeding the calyx: carpels 10-40.

P. villosa Pall. Pursh Fl. 353. Densely white-tomentose: stems 6-12 inches high: stipules large, oblong, acuminate; leaflets cuneate-obovate, 6-15 lines long, sessile, coarsely incised-serrate: flowers few or solitary, very large: bractlets ovate, obtuse, shorter than the ovate, acute sepals; petals obovate, 3-6 lines long, exceeding the sepals. On Mount Rainier Washington to Alaska.

P. flabellifolia Hook. T. & G. Fl. i, 442. *P. gelida* American authors not Meyer. Nearly glabrous or with scanty minute villous pubescence: stems slender, erect or spreading, 6-10 inches long, 1-3-flowered: stipules oval or oblong, mostly entire: leaflets flabelliform, 6-9 lines long, rounded at the apex and incisely 7-9-toothed, entire at base, the middle leaflet shortly petiolulate: bractlets oblong, obtuse, 3 lines long, equalling the triangular, acute, sepals; petals broadly obovate, 4-6 lines long, bright yellow carpels numerous. Wet banks and meadows of the highest mountains, Oregon to Alaska.

P. brevifolia Nutt. T. & G. Fl. i, 442. Minutely glandular-pubescent, the calyx very sparingly villous: stems decumbent or ascending, 2-3 inches long: stipules ovate, entire; leaflets suborbicular, 2-3 lines long, 2-3-lobed and crenately toothed, the middle one petiolulate: bractlets acute shorter than the acute sepals: petals obovate, scarcely exceeding the calyx; style attached below the apex of the ovary. Alpine peaks of Oregon.

* * Style attached below the middle of the ovary: carpels on short stipes: receptacle densely villous: disk not thickened: more or less woody perennials.

P. fruticosa L. Sp. 495. Shrubby, much branched, 1-4 feet high: leaves pinnately 5-7-foliolate; stipules scarious; leaflets crowded, oblong-lanceolate, 2-12 lines long, entire, usually whiter beneath and the margin: revolute: flowers on slender pedicels in loose cymes or solitary: bractlets equalling the acute sepals; petals yellow, orbicular, 2-6 lines long, exceeding the calyx; stamens 30; carpels 20. On high mountains, Washington to California and the Eastern States.

§ 3. Style filiform, attached to the middle of the ovary or below the apex: peduncles axillary, 1-flowered: carpels glabrous, short stipitate, the stipe and receptacle villous: herbaceous perennials with mostly creeping or decumbent stems and yellow flowers.

P. anserina L. Sp. 495. Creeping; ascending stem none; stolons slender, rooting and proliferous: leaves pinnate; stipules multifid; leaflets 9-19, with several minute pairs interposed, oblong sharply pinnatifid-serrate, nearly glabrous above, silvery-canescens beneath: pedicels scape-like, solitary, as long as the leaves. Borders of lakes and streams, Idaho to the Eastern States and far northward.

P. Pacifica. *P. anserina* *var. grandis* Lehm. Spreading by slender jointed runners: ascending stems none: leaves pinnate, 10-30 inches long; stipules scarious; leaflets 11-35, with small ones interposed, oblong, coarsely and sharply serrate, densely white-tomentose and silky beneath, smooth above, $\frac{1}{2}$ -2 inches long; peduncles scape-like, as long or longer than the leaves; bractlets lanceolate, acute, glabrate, about $\frac{3}{4}$ lines long, equalling the oblong acute silky sepals; petals broadly ovate, 6 lines long, nearly as broad; style attached in the middle of the ovary: achenes ovoid, 1 line long. In salt marshes along the coast, Alaska to California.

12 HORKELIA Cham. & Schlecht. Linnæa ii 26.

Perennial herbs with pinnate or pinnately parted leaves, adnate stipules and white or rose-color flowers in crowded or subcapitate cymes. Calyx-tube campanulate, with 5 erect lobes and 5 alternate bractlets. Petals 5, linear or spatulate, more or less unguiculate. Stamens 5 in one series or 10 in two series; filaments shorter than the calyx-lobes, triangular and petaloid or subulate, those alternate with the petals broadest and persistent. Carpels few to many, attached by their middle to the dry conical villous receptacle: style filiform or thickened at base, nearly terminal: stigma obtuse. Achenes reniform-ovate. Seed suspended, with a thick and firm brownish testa. Leaflets not crowded; 3 to many-lobed or -toothed.

* Style short, thickened at base.

H. fusca Lindl. Bot. Reg. xxiii, t. 1997. Viscous-pubescent; stem rather slender, 2-3 feet high: radical leaves 12-19-foliolate, leaflets cuneate-oblong, pinnatifid and incised; stipules deeply lacinate: flowers crowded on the branches of the compound many-flowered cyme: bracts palmatifid, much shorter than the golmerules: bractlets shorter and much smaller than the triangular-lanceolate calyx-lobes; petals cuneiform-obcordate, much longer than the calyx. In the mountains of eastern Oregon to California.

H. tenella Rydberg Rev. Pot. *H. fusca* *var. tenella* Watson Bot. Cal. i, 181. Glandular-pubescent: stems slender, simple, 6-18 inches high: radical leaves pinnately 11-19-foliolate; stipules linear, the free portion

setaceous; leaflets oblong-cuneiform, 6-8 lines long, deeply cut into 5-9 linear-oblong or filiform segments; cauline leaves similar, with nearly free pinnatifid stipules and more simple leaflets with linear segments: flowers crowded on the branches of the almost capitate or at length open-paniculate cyme; bractlets linear, shorter and much smaller than the triangular acuminate calyx-lobes; petals white or pinkish, cuneate-obovate, attenuate to a slender claw, 3 lines long, longer than the sepals; filaments broadly oblong; achenes oblique-ovoid. In high mountain valleys, Washington to California.

H. pseudocapitata Rydberg l. c. Sparingly pilose and more or less glandular: stems rather slender, 6-14 inches high: leaves 2-6 inches long, 9-15-foliolate; stipules linear or the upper ones broadly subulate; leaflets broadly obovate with cuneate base to narrowly cuneate, 3-8 lines long, more or less deeply incised and toothed with obtuse to acute teeth: flowers in small subcapitate cymes; bractlets linear, a line long, about half as long as the broadly subulate calyx-lobes; petals oblong, attenuate below to a short claw, retuse at the apex, about 3 lines long, but little exceeding the calyx, filaments triangular, obtuse. In moist meadows and along streams, southern base of the Blue Mountains in Oregon.

H. capitata Lindl. Bot. Reg. under t. 1997. Somewhat glabrous: stems viscous-pubescent toward the summit: radical leaves about 13-foliolate; stipules entire or 3-parted; leaflets lacinate-incised, the lower ones roundish-cuneiform, the upper oblong and attenuate at base: heads of flowers dense, shorter than the lacinate bracts; bractlets lanceolate-subulate, about as long as the calyx-lobes; petals broadly cuneiform, longer than the calyx. Cascade Mountains of Oregon.

H. Hendersoni Howell P. C. Pl. Col. 1887. Densely silky-pubescent; not glandular: stems densely tufted, 4-6 inches high: simple: stipules setaceous, or those of the cauline leaves lanceolate: leaves very numerous at the ends of the much branched caudex: leaflets 11-17, mostly crowded, broadly cuneate and palmately 3-5-lobed, or the lowest ones often obovate and entire, 1-3 lines long, flowers rather few, in compact terminal cymes, bractlets linear, nearly equalling the subulate calyx-lobes; petals narrowly lanceolate, about equalling the calyx; filaments broad-subulate, half as long as the sepals: achenes not seen. On top of Ashland Butte, Siskiyou Mountains, Oregon. First collected by L. F. Henderson, July 1886.

H. parviflora Nutt. T. & G. Fl. i, 435. Tomentose; upper part of the stem viscidly villous: radical leaves 9-13-foliolate; stipules ovate-lanceolate, small, entire or toothed; leaflets short, roundish, the upper ones cuneiform, incised: flowers small, much crowded on the branches of the fastigiate cyme; bractlets linear subulate, shorter than the narrowly triangular calyx-lobes; petals narrow, spatulate longer than the calyx. Plains of eastern Oregon and Washington.

* * Style filiform, about equalling the stamens: stipules much divided into linear lobes.

H. congesta Dougl. Hooker Bot. Mag. t. 2880. Hirsute with long spreading hairs below, nearly smooth above: stems slender, erect, 6-20 inches high or more: radical leaves 7-15-foliolate, the rachis hirsute below with long white spreading hairs: leaflets narrowly spatulate, or the earliest ones oblong, 6-10 lines long, 2-3-toothed at the apex, sparingly to densely silky both sides: flowers rather small, in open paniculate cymes; bractlets linear, more than half as long as the triangular-acuminate calyx-lobes: petals obovate, attenuate below to a narrow claw, rounded at the apex, 2-3 lines long, exceeding the calyx: filaments very short, triangular: achenes ovoid, a line long, whitish. On low hills and dry prairies, southwestern Oregon and adjacent California.

H. caruifolia Rydberg l. c. Hirsute with long white hairs and more or less glandular: stems ascending, 6-20 inches long: stipules cut into many filiform segments: radical leaves 4-6 inches long, 13-21-foliolate; leaflets broadly cuneiform, 3-6 lines long, deeply cut into 5-9 linear lobes: flowers rather large, in close paniculate cymes: bractlets linear-lanceolate, a little shorter than the acuminate-triangular calyx-lobes: petals suborbicular or broadly obovate attenuate below to a claw: filaments deltoid, a line broad at base: achenes very smooth ovoid, fully a line long. In clayey soil southwestern Oregon.

H. sericata Watson Proc. Am. Acad. xx, 364. White-silky throughout, not at all glandular: stems slender, flexuous, 6-12 inches high: leaves densely white-silky, the numerous leaflets crowded, 2-3 lines long, oblong or obovate, unequally bifid: cymes open and few-flowered; bractlets linear, nearly equalling the narrowly lanceolate acuminate calyx-lobes; petals narrowly obovate, white or tinged with pink: filaments short-subulate: carpels 5. On barren slopes of the Coast Mountains near the Oregon and California boundary.

H. Howellii Rydberg l. c. *Potentilla Howellii* Greene Pitt. i, 104. Pubescent with white spreading hairs: stems slender, ascending, 10-20 inches long: paniculately branched above: leaves narrow, on short almost filiform petioles; leaflets 21-31, 2-3 lines long, broadly cuneiform and deeply 2-3-lobed, or narrow and entire: flowers in crowded few-flowered cymes; bractlets lanceolate, nearly as long as the lanceolate-acuminate calyx-lobes; petals spatulate, obtuse, 2 lines long: filaments oblong, abruptly acuminate. On barren plains, southwestern Oregon.

H. tridentata Torr. Pac. R. Rep. iv, 84, t. 6. More or less villous with mostly appressed hairs: stems erect from a decumbent base, 10-20 inches high: radical leaves 5-9-foliolate; leaflets cuneate-obovate to narrowly oblong, usually 3-toothed at the apex, 3-6 lines long: flowers on slender pedicels, in an open paniculate cyme; bractlets linear, shorter than the lanceolate acuminate lobes of the more or less scarious calyx; petals linear to broadly spatulate, but little longer than the calyx: filaments subulate. On dry hillsides, Southwestern Oregon to California.

13 IVESIA T. & G. Bot. Wilkes 288.

Low herbs with pinnate leaves, numerous small palmately or pedately lobed, often crowded and closely imbricate leaflets and white purple or yellow flowers in cymes. Calyx campanulate or cyathiform at base, 5-lobed with 5 alternate bractlets. Stamens definite, 5, 10, 15, or 20; filaments slender, narrowly subulate or filiform. Carpels few or solitary, upon a small villous receptacle; style filiform, subterminal.

I. Baileyi Watson Bot. King 90. Viscidly glandular and villous: stems several, 3-6 inches long, from a thick perennial branching caudex, slender, branching above, exceeding the leaves; leaflets 7-21, broadly ovate or flabelliform, 2-3 lines long, 3-7-toothed: or parted; stipules ovate entire or 2-3 toothed: flowers on slender pedicels, in a loose open cyme; calyx concave or broadly turbinate, the ovate-triangular acute lobes but little longer than the oblong obtuse bractlets; petals yellow or white, spatulate-oblong, not longer than the calyx; stamens 5; carpels 1-5. On cliffs in the mountains of Southeastern Oregon to Nevada and California.

I. Pickeringii Torr. Bot. Wilkes 288 t. 4. Densely villous with white silky hairs: stems 8-10 inches high: leaflets very numerous, at first closely imbricated, 2-5-lobed or parted or often entire, 1-4 lines long; stems paniced above; cymes densely many-flowered; calyx 2 lines long or less; bractlets linear; petals yellowish, spatulate, equalling the calyx; stamens 20; carpels 4-6. On the Klamath river and southward.

I. alpicola Rydberg l. c. Viscid-pubescent: throughout: stems 3-8 inches high, several from a thick resinous caudex, exceeding the leaves; leaflets 21-41, 2-3-lines long, 3-5-parted into cuneate-oblong or linear-oblong, obtuse, entire lobes the single cauline leaf similar, with ovate-lanceolate, entire stipules: cyme capitate, many-flowered; calyx somewhat scarious, campanulate, 2 lines long; bractlets linear, obtuse, $\frac{2}{3}$ as long as the lanceolate acute calyx-lobes; petals oblong to spatulate, shorter than the calyx; stamens 5; carpels 1-3; receptacle densely long-wooly. On Mount Adams Washington at 5000-6000 feet elevation.

Tribe 4. Rubex B. & H. Gen. i, 616. Calyx flattish, 5-parted, mostly imbricate in the bud: stamens numerous; carpels numerous, or rarely few, drupaceous, crowded on the conical receptacle: ovules 2 colateral: style terminal or nearly so: seed suspended: radical superior.

14 RUBUS Tourn. L. Gen. n. 632.

Shrubs or somewhat woody, erect or trailing often prickly plants or herbs with simple or pinnately 3-7-foliolate leaves, adnate stipules and white or purple flowers in panicles or corymbs or solitary. Calyx 5-lobed, persistent, without bractlets, tube short and open. Petals 5, conspicuous, deciduous. Stamens numerous, inserted into the border of the disk which lines the bottom of the calyx-tube. Ovaries numerous, rarely few, with colateral suspended ovules, becoming globose 1-seeded drupelets: style nearly terminal, deciduous

§ 1. Carpels forming a somewhat hemispherical fruit, concave beneath and falling away from the dry receptacle together when ripe sometimes few in number and falling away separately.

* Leaves simple, palmately lobed: shrubs without prickles.

R. parviflorus Nutt. Gen. i, 308. *R. Nutkanus* Moc. Stems shrubby, erect, 3-8 feet high; bark green and smooth or more or less glandular-pubescent, becoming brown and shreddy: leaves round-cordate in outline, palmately 3-5-lobed, the lobes acuminate, unequally serrate, 4-12 inches long, tomentose on one or both sides, the veins beneath and the petioles and peduncles usually hispid with gland-tipped hairs; petioles stout, often with a small leaflet near the summit; stipules linear, acuminate, the upper half free, ciliate: peduncles terminal, few-flowered calyx-lobes oblong-ovate, 4-6 lines long with linear appendages nearly as long, more or less tomentose; petals broadly ovate to elliptical, 6-10 lines long: carpels very numerous, tomentose; fruit red, large, hemispherical, sweet and pleasant-flavored. Common in forests and wooded districts, Alaska to California and East to Lake Superior.

* * Leaves trifoliolate, sometimes simple on the flowering branches, rarely 5-foliolate: stems more or less prickly.

R. spectabilis Pursh. Fl. 348 t. 16. Stems perennial, shrubby and branching, 6-12 feet high, with yellowish shreddy bark, copiously armed when young with straight stout prickles: leaves usually trifoliolate; leaflets ovate, acute or acuminate, doubly incised-serrate, often 2-3-lobed, the veins beneath and the petioles sparingly villous-pubescent and prickly; flowers mostly solitary, large and showy; calyx-lobes pubescent, broadly ovate, acuminate, 4-5 lines long; petals red, ovate to elliptical, acute, 6-8 lines long: fruit large, ovoid, red or yellow, the drupelets smooth and tipped with the slender subsistent style: achenes deeply pitted. Common along streams and moist places, Alaska to California.

Var. Menziesii Watson Bot. Cal. i, 172. More or less densely tomentose and silky. Southern Oregon and southward.

R. leucodermis Dougl. T. & G. Fl. i, 454. Stems soft-woody, biennial, erect, 3-8 feet high, glaucous, armed with stout straight or recurved prickles: leaves trifoliolate, rarely 5-foliolate; leaflets ovate to lanceolate, acute or acuminate, doubly serrate, 1-2 inches long, white-tomentose beneath, smooth above, the petioles and veins beneath prickly; flowers in small terminal corymbose cymes; calyx-lobes lanceolate, long-acuminate, closely reflexed, 3-4 lines long, longer than the spatulate petals: carpels tomentose; fruit dark purple when ripe, rather large, with a white bloom and agreeable flavor: achenes minutely pitted. Common in rich moist woods, Alaska to California.

R. strigosus Michx. Fl. i, 297. Stems erect, suffruticose, biennial, armed as well as the petioles, peduncles and calyx, with straight spreading rigid bristles which are glandular when young, slightly glaucous: leaves pinnately 3-5-foliolate: leaflets oblong-ovate, acuminate, often narrow, but sometimes broadly ovate, occasionally confluent, incisely serrate, canescently tomentose beneath, the terminal one often cordate at base, the lateral ones sessile; stipules setaceous, deciduous: peduncles axillary and terminal; often aggregated at the summit of the branches so as to form a leafy panicle 4-6-flowered; petals white, erect, about as long as the spreading sepals: carpels pruinose; fruit light red, very juicy. Hillsides and rocky places, Eastern Oregon and Idaho to the Atlantic States and Canada.

* * * Stems herbaceous, more or less trailing, unarmed: leaves trifoliolate or 3-lobed: carpels few.

R. arcticus L. Sp. i, 494. Stems low, somewhat pubescent, mostly erect, 1-2-flowered: leaves trifoliolate; leaflets rhombic-ovate, or obovate, coarsely and often doubly serrate, petiolulate; stipules ovate: sepals lanceolate, acute, often shorter than the obovate entire or emarginate petals: fruit amber-color, very delicious. Marshes and river banks, Idaho to the Rocky Mountains and far north.

R. pedatus Smith Inc. Ined. t. 63. Stems trailing, filiform, 1-3 feet long or more, rooting at the nodes, pubescent: leaves trifoliolate; leaflets cuneate-obovate, 8-12 lines long, incised and serrate, the lateral ones often parted to the base, smooth or sparingly villous; stipules ovate-oblong: flowers usually solitary, on long slender pedicels, white, 6-9 lines broad; sepals ovate-lanceolate, nearly glabrous, entire or incised, exceeding the petals, at length reflexed: carpels glabrous; styles filiform, not thickened upward: fruit 1-6 large red juicy drupelets. Common in the Coast and Cascade Mountains, Alaska to California.

R. lasiococcus Gray Proc. Am. Acad. xvii, 201. Stems slender, creeping, 2-12 inches long, cinereous-pubescent: leaves 3-5-lobed, rarely 3-foliolate, the obtuse lobes irregularly and doubly serrate; stipules ovate to lanceolate, entire or lacerate: peduncles slender, equalling or exceeding the leaves, 1-3-flowered: flowers white, 6-10 lines broad; calyx-lobes ovate, acuminate, entire, exceeding the obovate petals; carpels densely tomentose; styles thickened upward: fruit 1-3 large red tomentose juicy drupelets. In shaded places, base of Mount Hood and other peaks of the Cascade Mountains.

§ 2. Fruit persistent upon the somewhat juicy receptacle which is at length deciduous from the calyx: stems biennial, trailing, prickly.

R. nivalis Dougl. Hook. Fl. i, 181. Stems slender, trailing, 1-4 feet long, armed with small recurved prickles: leaves round-cordate, obscurely to prominently 3-lobed, or rarely 3-foliolate, unequally serrate, usually

acute, smooth and shining above, sparingly pubescent beneath, 1-2 inches long or more, persistent, the veins beneath and the petioles armed with recurved prickles; stipules a pair of ovate acuminate lacerate-serrate leaflets, contracted at base, situated on the petiole a line or more from the base: peduncles short, one to few-flowered; flowers perfect; sepals nearly distinct, broadly lanceolate, acuminate, 3-4 lines long, ciliate and more or less pubescent: petals narrowly lanceolate, acuminate, longer than the sepals; carpels few, pubescent, those that mature becoming large red juicy drupelets; achenes flattish, a line long, conspicuously pitted. In forests, Washington to Northern California and Idaho.

R. ursinus Cham. & Schlecht. *Linnaea* ii, 11. Stems slender, trailing, 5-20 feet long, armed with straight rather slender prickles, somewhat glaucous: leaves deciduous, 3-foliolate, rarely 5-foliolate, often simple and 3-lobed on the flowering branches; leaflets ovate to oblong coarsely and doubly serrate, more or less pubescent or tomentose, veins, petioles, peduncles and calyx more or less armed with prickles; stipules oblanceolate to linear, often long and toothed: flowers dioecious, in small cymes terminating the numerous lateral branchlets or leafy peduncles; calyx-lobes ovate-lanceolate acuminate or often foliaceously tipped, densely tomentose inside, glandular outside; petals of the staminate flowers lanceolate to obovate, unguiculate, 6-8 lines long, much exceeding the calyx; of the pistillate smaller, but little if at all exceeding the calyx: carpels numerous, glabrous: fruit oblong to ovoid, black, pleasant flavored: achenes small, flattish, reticulated. Common in wooded districts, Alaska to California.

Tribe 5. Spirææ Juss. Calyx campanulate, imbricate, or sometimes valvate in the bud: carpels 1-8, mostly 5, verticillate, follicular or 2-valved in fruit: style terminal: seeds 1-8 or 10 in each carpel, pendulous or ascending.

15 HOLODISCUS Maxim. Act. Hort. Petrop. vi.

Shrubs with alternate simple leaves without, stipules and numerous flowers in loose panicles that terminate the short branchlets. Flowers perfect, disk wholly coherent. Calyx deeply 5-cleft, persistent. Stamens numerous, perigynous. Carpels 5, opposite the calyx-lobes, distinct, shortly stipitate, with two pendulous ovules, becoming woolly achenes. Stigma capitate, 2-lobed.

H. discolor Maxim Adn. Spir. 150. *Spiræa discolor Pursh.* A diffuse shrub 2-6 feet high with grayish-brown bark and short rigid pubescent branches: leaves ovate, obtuse or acutish, cuneately narrowed at base to a winged petiole, pinnately lobed or toothed above the middle, 6-18 lines long, more or less silky-pubescent beneath, nearly smooth above: panicle small, 1-4 inches long; more or less tomentose; calyx-lobes oblong, acute or acutish; petals obovate, obtuse, barely a line long, exceeding the calyx, white, changing to tawny-white in age: achenes densely tomentose with long white hairs. Common on bluffs and rocky banks, Brit. Columbia to California and the Rocky Mountains, east of the Cascade range.

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H. ariæfolia. *Spiræa ariæfolia Smith.* A rather large shrub 4-16 feet high, with slender spreading or recurved striate branches: leaves ovate, often abruptly contracted below to a short more or less margined petiole, 1-4 inches long, pinnately lobed, the mostly obtuse lobes often sharply toothed, finely tomentose beneath, smooth above: panicles large and diffuse, 4-8 inches long, tomentose, white, changing to tawny; petals oblong, a line long, exceeding the ovate acute calyx-lobes; carpels pubescent with long white hairs. Common in forests, Puget Sound to California, west of the Cascade Mountains.

16 FILIPENDULA Erndt. Virid. Warsaw, 43.

Perennial herbs with palmately lobed or pinnate, alternate leaves, foliaceous persistent stipules and numerous small flowers in terminal compound panicles or cymes. Flowers perfect, calyx 5-cleft, sometimes only 3- or 4-cleft, persistent. Disk obsolete. Petals 5, rarely fewer. Stamens in 2-3 rows on the calyx-tube. Carpels 6-10, distinct, often stipitate, with two pendulous ovules, becoming one-seeded achenes. Stigma capitate, usually large. Seed small with thin membranous testa.

F. occidentalis. *Spiræa occidentalis* Watson. Stems simple, 2-6 feet high, glabrous or nearly so: stipules broadly ovate, acute, laciniately toothed, 4-6 lines long or more; leaves ample, 5-7-lobed, the lobes acute or acuminate, doubly lacerate-toothed, appressed-silky on the veins beneath, 3-6 inches long; petioles stout, with 1-5 pairs of small ovate to linear-lanceolate toothed leaflets below the large terminal one: inflorescence a compound cymose panicle, pubescent with short somewhat appressed hairs, calyx-lobes subulate, twice as long as the tube, smooth or nearly so, soon reflexed: petals white, elliptical, sessile, 2-3 lines long, carpels about 9, erect, narrowly lanceolate, long-stipitate, beaked by the elongated style, villous on the margins from the summit of the style to the base. Rocky banks of the Trask river, Tillamook county, Oregon.

17 NEILLIA Don. Prodr. Fl. Nep. 228.

Shrubs with simple toothed or lobed alternate leaves, membranaceous deciduous stipules and rather large white flowers in simple terminal corymbs. Flowers perfect. Disk wholly coherent to the tube of the calyx. Calyx 5-cleft, persistent. Petals 5, rounded, sessile. Stamens numerous, perigynous. Carpels 1-5, distinct, often stipitate, becoming membranaceous, inflated pods. Ovules few to several, some ascending, some pendulous. Seeds with shining stony testa and distinct albumen.

N. capitata Greene Pitt. ii, 28. *N. opulifolia* var. *mollis* Brewer and Watson. A shrub 3-20 feet high with slender spreading or recurved branches and ash-colored shreedy bark: stipules linear, 5-6 lines long, remotely toothed, caducous; leaves roundish, often subcordate, 3-lobed, doubly serrate, 1-3 inches long on slender petioles, stellately soft-pubescent beneath, smooth or nearly so above: flowers on long slender pedicels in simple hemispherical tomentose corymbs; bracts all scarious; calyx-lobes triangular, apiculate, as long as the tube, shorter than the orbicular petals pubescent on both sides: carpels 2-5, at length 4-6 lines long, glabrous, 2-4-seeded; seeds slenderly and obliquely pyriform, a line long. Common along streams and moist places. Brit. Columbia to California and the Rocky Mountains.

N. Torreyi Watson Proc. Am. Acad. xi, 136. A small shrub, barely 2 feet high, erect, scarcely surculose, freely branching: leaves of rather deltoid-ovate outline, incisely 3-lobed to the middle, the lobes nearly equal, the whole with slight secondary lobes, these crenately or incisely toothed, about 1 inch long: flowers few, in usually compound corymbs; petals comparatively large, often rose-tinted; carpels mostly 2, coherent to above the middle, but little longer than the calyx, divergent at apex, only slightly inflated, minutely tomentose, 1-seeded: seeds obovoid. In dry soils on rocky slopes at 8000-9000 feet elevation, Idaho to Nevada and the Rocky Mountains.

N. malvacea Greene Pitt. ii, 30. "Shrubs 3-5 feet high, stout, the shoots erect: leaves digitately 5-veined, with or without 3 broad and

shallow lobes above the middle, the general outline orbicular or oval, with many slight-rounded and crenately toothed secondary lobes: corymbs mostly simple, short-stalked: calyx tomentose, very large, broadly campanulate, its lobes in maturity connivent over the fruit: carpels 2 (sometimes 3) not inflated, connate above the middle, compressed, erect and straight at apex, indehiscent, 1- or 2-seeded: seeds large, oblong-obovate. Dry rocky banks, above the northern shore of Lake Pend d'Oreille in Northern Idaho.

18 SPIRÆA Tourn. L. Gen. n. 630.

Shrubs with simple alternate leaves without stipules and white or rose-color perfect flowers in compound corymbs or elongated panicles or spikes. Calyx 5-cleft, persistent, the disk more or less free at the margin. Petals 5, rounded, nearly sessile, stamens numerous, perigynous, inserted with the petals into the disk. Carpels 5, alternate with the calyx-lobes, distinct, sessile, becoming dry cartilaginous several-seeded follicles, not inflated. Seeds small, pendulous, linear, with a thin membranaceous testa and no albumen.

S. lucida Dougl. (see Greene Pitt. ii, 221). *S. betulæfolia* of American authors in part, not Pall. Stems erect, mostly simple, 1-2 feet high, from horizontal running and woody not deep-seated rootstocks or roots: lowest leaves small, obovate to oblanceolate, the upper oval to oblong, 1-2 inches long, acutish, often obscurely lobed, sharply and doubly serrate above the middle, narrowed below to a short petiole, glabrous throughout, pale and glaucescent beneath: flowers white, in a terminal glabrous compound fastigiate corymb: calyx-lobes triangular, shorter than the tube, reflexed; petals elliptical, shortly unguiculate; stamens 15-20, filaments three times as long as the petals; carpels 5, glabrous a line or more long, tipped with a style half as long, 5-8-ovuled. Common on dry wooded hillsides, Brit Columbia to Oregon and Montana.

S. pyramidata Greene Pitt. ii, 221. *S. betulæfolia* of American authors in part, not Pall. Stems erect, sometimes cespitose, often branched, 1-3 feet high: leaves elliptical to oblong, mostly obtuse, narrowed at base to a short petiole, coarsely serrate above the middle, 1-2 inches long: flowers white to rose-color, in a dense pyramidal compound panicle; calyx more or less pubescent, its broadly ovate lobes about equalling the short campanulate tube; petals orbicular, less than a line long; filaments very slender, not twice the length of the petals; follicles glabrous, scarcely a line long, tipped with a style of equal length. On rocky ridges, Oregon and Washington.

S. arbuscula Greene Erythea iii, 63. *S. betulæfolia* var. *rosea* Gray. Stems erect, 2-4 feet high or more, red, shedding annually a thin bark: leaves ovate to elliptical, serrulate at the apex, entire below, narrowed at base to a very short petiole or the lowest sessile, dark green both sides, 6-8 lines long: flowers deep rose-color, in small roundish leafy-bracted corymbs, terminating the numerous branches; calyx-lobes deltoid-ovate, not reflexed, about as long as the broad tube; petals oblong, narrowed at base to a very short claw; filaments twice as long as the petals: free edge of the disk obsolete or reduced to a mere ring: carpels glabrous; styles shorter than the petals. Along brooks at subalpine elevations in the Cascade and Sierra Nevada Mountains.

S. Douglasii Hook. Fl. i, 172. Stems erect, 3-8 feet high, with reddish-brown bark, cespitose and forming dense patches several yards in extent, branching, young branches and inflorescence more or less densely tomentose; leaves elongated-oblong, 1-4 inches long by 6-12 lines broad,

unequally serrate toward the rounded or acutish apex, often cuneate at base, very shortly petioled, densely white-tomentose beneath, smooth above: flowers deep rose-color, densely crowded in a narrow usually elongated sessile leafy panicle; calyx campanulate, the ovate acute lobes as long as the tube, reflexed; petals obovate, narrowed at base to a short claw; stamens twice as long as the petals; free edge of the disk obsolete or reduced to a mere ring: carpels glabrous, 9-11-ovuled. Common in low grounds and swales, Brit. Columbia to California.

S. Menziesii Hook l. c. 173. Stems erect, 3-4 feet high, with light brown bark: leaves obovate to elliptical. 1-3 inches long by 8-16 lines broad, coarsely and unequally serrate above the middle, glabrous and of nearly the same color both sides or paler beneath, narrowed below to a very short petiole: flowers rose-color, in a rather small somewhat pyramidal obtuse panicle; calyx pubescent, the broadly ovate acute lobes as long as the broad shallow tube; petals ovate, a line long, exceeding the sepals; stamens more than twice as long as the petals; carpels glabrous. In cold marshes, Alaska to Oregon.

S. cespitosa Nutt. T. & G. Fl. i, 418. Cespitose, with simple or branching scape-like stems: leaves rosulate on the short tufted branches of the prostrate and root-like stems, oblanceolate or linear-spatulate, acute silky on both sides, 2-12 lines long, those of the scape scattered and narrower: scapes 2-6 inches high; flowers white, in small oblong spiks 6-20 lines long; calyx-lobes silky, exceeding the tube and nearly equalling the spatulate petals, not reflexed; filaments twice as long as the petals; disk of the calyx-tube conspicuous, entire; carpels 3-5, villous or glabrate, 2-3-ovuled. On high shelving rocks, in the Cascade Mountains of southern Oregon to Arizona and the Rocky Mountains.

19 LUETKEA Bong. Veg. Sit. 230, t. 2.

ERIOGYNIA Hook. Fl. i, 255, t. 88.

Low, nearly herbaceous perennial plants with palmately cleft or entire leaves without stipules and scape-like stems terminated by a short spike or panicle of small white flowers. Flowers perfect. Disk wholly coherent with the tube of the 5-cleft persistent calyx. Petals 5, rounded. Stamens numerous, perigynous. Carpels 4-6, membranaceous, becoming 2-valved. 4-seeded pods. Seeds small, attenuate at each end, with thin membranaceous testa and no albumen.

L. sibbaldioides Bong. l. c. *Eriogynia pectinata* Hook. Glabrous stems cespitose, creeping, very leafy, 1-2 inches long; flowering stems erect, 2-6 inches high; leaves trifoliolate persistent; leaflets deeply 2-4-lobed, usually 3-lobed, the lateral ones decurrent and forming a broad flat petiole: flowers rather large, white, in short terminal racemes; inflorescence more or less pubescent; pedicels stout, 1-2 lines long; calyx-lobes ovate, acute, equalling the tube; petals obovate, 1-2 lines long, exceeding the calyx; filaments united at base, shorter than the petals; carpels 3-5, villous along the inner suture. On the highest mountains near perpetual snow, Alaska to California and the Rocky Mountains.

L. Hendersonii Canby, Greene Pitt. ii, 119. Stems cespitose, 1-2 inches long, very leafy: leaves spatulate, entire, the margin slightly involute, acutish, attenuate below to a broad petiole, 6-8 lines long, silky, pubescent, both sides coriaceous, persistent: flowers white, in oblong racemes that terminate the slender scapes; calyx almost rotate, the oblong obtuse lobes longer than the tube; petals oblong, $1\frac{1}{2}$ lines long, rounded at the apex; filaments distinct; carpels 3-5, villous along the sutures. "In rock crevices 7000 feet altitude Mount Steele, Olympic Mountains Washington." Piper.

20 ARUNCUS L.

Herbaceous perennials with repeatedly ternately divided leaves without stipules and loose panicles of small white flowers terminating the branches. Flowers diœcious. Calyx 5-cleft, marcescent in fruit; disk entire, coherent to the tube. Petals 5. Stamens numerous, hypogynous. Carpels 3-5, distinct, sessile, becoming cartilaginous several-seeded follicles. Seeds with a loose membranaceous testa and no albumen.

A. vulgaris Raf. Sylv. Tell. 152. *Spirœa Aruncus* L. Glabrous: stems stout, 2-6 feet high or more, branching: leaves large, ternately decomposed; leaflets thin, sparingly villous beneath, ovate to lanceolate, acuminate, 2-5 inches long sharply and laciniately doubly toothed, the terminal ones broadest: panicles large, compound, pubescent; flowers a line broad, nearly sessile; petals spatulate; filaments twice as long as the petals; styles short; carpels 3-5, several seeded, globose, the pedicels reflexed in fruit. Along streams in mountainous districts, Alaska to California and across the Continent.

ORDER XXX SAXIFRAGACEÆ Dumort. Anal. Fam. 36.

Herbs with bland watery often astringent juice, alternate or opposite leaves without true stipules and mostly perfect flowers. Sepals 4-5, united or nearly distinct, imbricate in the bud. Petals as many as sepals and alternate with them, rarely wanting. Stamens as many or twice as many as petals, rarely fewer, inserted into the throat of the calyx; anthers introrse. Ovary either free from the calyx or coherent with its tube, 1-3-celled with parietal placentæ: ovules mostly numerous: styles distinct or more or less united. Fruit capsular, usually beaked with the distinct summits of the carpels, opening along the inner suture of each, septical. Seeds anatropous, usually small and numerous. Embryo straight, in the axis of fleshy albumen: radical cylindrical: cotyledons short.

*Ovary with 2 or rarely more cells and placentæ in the axis, or of as many distinct carpels: fruit capsular or follicular.

1. **Leptarrhena.** Petals 5; stamens 5: carpels 2, distinct, free and exerted from the small calyx.
2. **Peltiphyllum.** Petals deciduous: stamens 10, inserted at the union of the ovary and calyx-tube: carpels distinct, adnate to the tube of the calyx: leaves peltate, radiately veined.
3. **Saxifraga.** Petals deciduous: stamens 10, rarely more, inserted under the ovary: carpels 2, rarely 3, more or less united at base, free from or adnate to the base of the calyx.
4. **Saxifragopsis.** Petals persistent, soon deflexed: stamens 10, inserted at the base of the calyx: carpels united at base, adnate to the lower part of the calyx-tube: leaves palmately veined, the blade obscurely articulated to the petiole.
5. **Sullivantia.** Petals persistent: stamens 5, inserted on the throat of the calyx: carpels united at base, adnate to the tube of the calyx.
6. **Boykinia.** Petals deciduous. stamens 5 or 10, inserted on the calyx-tube at its union with the ovary: carpels united at base and adnate to the calyx-tube.

7. **Bolandra.** Petals 5, linear, persistent: stamens 5, inserted in the throat of the calyx: carpels 2, united at base free from but included in the inflated calyx.
8. **Hemieva.** Petals persistent: stamens 5, inserted on the throat of the calyx: carpels united and wholly adnate to the tube of the calyx: leaves not peltate
- * * Ovary 1-celled, with 2-3 parietal or basal placentæ alternate with the styles or stigmas; filaments all antheriferous.
9. **Leptaxis.** Petals 4, filiform, entire, persistent: stamens 2-3, inserted in the throat of the calyx: capsule 2-valved, attenuate below to a stipe, free from the calyx.
10. **Tellima.** Petals 5, deciduous, pectinately lobed or parted: stamens 9 or 10, short, inserted in the throat of the calyx: capsule 2-valved, sessile, adnate to the base of the inflated calyx.
11. **Lithophragma.** Petals 5, deciduous, unguiculate, palmately lobed or entire: stamens 5 or 10, inserted in the throat of the calyx: capsule mostly 3-valved, free or adnate to the base of the calyx.
12. **Mitella.** Petals 5, deciduous, pinnately lobed or parted: stamens 5 or 10, very short, inserted in the throat of the calyx: capsule 2-valved, depressed, adnate to the base of the calyx: inflorescence racemose.
13. **Mitellastra.** Stamens 5, included connivent: petals 5, deciduous, styles 2, recurved: inflorescence cymose.
14. **Tiarella.** Petals 5, entire: stamens 10, inserted at the base of the calyx: capsule very unequally 2-valved, free from the calyx.
15. **Heuchera.** Petals 5, entire, deciduous: stamens 5, inserted in the throat of the calyx: capsule equally 2-valved, the lower half adnate to the calyx.
16. **Chrysosplenium.** Petals always wanting: stamens 8-10, short, inserted in the throat of the calyx: capsule short, equally 2-valved, the lower half adnate to the calyx.
- * * * Ovary 1-celled, with 3-4 parietal placentæ directly under as many obtuse sessile stigmas: stamens 5, alternating with as many clusters of united sterile filaments.
17. **Parnassia.** Petals 5, large: calyx 5-parted, free from the ovary: flowers solitary.

1 LEPTARRHENA R. Brown, Parry's 1st voy. Suppl. 273.

Herbs with coriaceous persistent leaves crowded at the base of the nearly naked stems and rather numerous flowers in bracted paniculate racemes. Calyx campanulate, 5-parted, the base adherent to the ovary. Petals 5, entire. Stamens 10, inserted into the tube of the calyx: filaments subulate: anthers 1-celled, 2-valved. Ovary of two nearly distinct carpels, tapering into very short styles. Seeds numerous, ascending, scobiform; the testa loose, elongated and subulate at both ends, including the oval nucleus.

L. pyrolifolia Ser. DC. Prodr. iv, 48. Scape-like stems 8-16 inches high, rigid, a little pubescent or glandular toward the summit, and 1-2 small leaves with sheathing petioles near the base; radical leaves obovate to oblong or spatulate, 1-6 inches long, coriaceous, glabrous both sides, coarsely serrate above the middle, attenuate below to a short winged

petiole which is dilated and sheathing at base; cauline similar: petals linear, 1-2 lines long, scarcely longer than the calyx, white: carpels becoming 4-6 lines long, purplish, but slightly divergent. In high mountain marshes, Alaska to Washington and the Rocky Mountains.

2 PELTIPHYLLUM Engler Nat. Pfl. iii, Abt. 2, 61.

Coarse perennial herbs with peltate leaves and rather large flowers in paniculate cymes on scapes that appear before the leaves. Calyx flat, deeply 5-cleft, the very short tube adherent to the base of the ovary. Petals 5, entire, deciduous. Stamens 10, persistent, inserted at the base of the calyx; anthers 2-celled. Carpels 2, distinct, becoming many-seeded follicles with placenta on the margin. Stigma capitate. Seeds angular, obconic with a loose testa.

P. peltatum Engler l. c. *Saxifraga peltata* Torr. Rootstock large and creeping, 1-3 inches in diameter, branching; scapes and leaves from the ends of scaly branchlets: leaves centrally peltate, at length 6-18 inches in diameter, orbicular, 9-14-lobed and sharply serrate, on stout petioles, 2-4 feet high: scapes rather stout, at length equalling the leaves, striate, more or less hispid with brownish hairs; flowers numerous, in rather large paniculate cymes; calyx-lobes oblong, obtuse, 2 lines long, much longer than the shallow tube; petals round-oval to obovate, 3-4 lines long, white or pinkish, tardily deciduous; filaments subulate with a broad flat base: mature follicles turgid, 3-4 lines long, dehiscent to the base. In mountain streams, central Oregon to California.

3 SAXIFRAGA L. Gen. n. 559.

Herbs with alternate simple leaves, their petioles commonly sheathing at base, and usually rather small flowers in one to many-flowered cymose thyrsoid or paniced clusters. Sepals 5, united at base or nearly distinct, valvate in the bud. Petals 5, inserted on the tube of the calyx, entire. Stamens 10, inserted with or below the petals on the base of the calyx, or between it and a fleshy disk: anthers 2-celled, opening longitudinally. Carpels 2-beaked, rarely 3-6-beaked, as many-celled below, many-seeded, opening by a roundish hole between the diverging beaks. Seeds numerous, smooth or rugose, not winged, the testa mostly thin and conformed to the nucleus.

§ 1 **HIRCULUS** Tausch Hort. Canal. i. Caudex perennial, leafy: leaves flat, mostly persistent, often bristly ciliate, the margins not punctate nor cartilaginous: flowering stems annual, leafy: sepals united at the base, slightly coherent with the base of the ovary: cilia of the leaves not articulated.

S. bronchialis L. Sp. 572 Stems ascending, slender, producing short branchlets: leaves somewhat coriaceous, narrowly lanceolate, acuminate-cuspidate, sessile with a broad base, finely ciliate, 2-3 lines long, crowded on the short branches: flowering stems 1-4 inches high: flowers solitary or few in an open corymb, on slender pedicels; sepals lanceolate, sub-mucronate, spreading; petals obovate-oblong, white marked with orange spots; capsule opening only half way down, there diverging at right angles. Alaska to Mt. Adams, Washington, and the Rocky Mountains.

S. cherlerioides D. Don Monogr. Saxifr. 382. *S. bronchialis* var. *cherlerioides* Engler. Cespitose, with many creeping branches and short branchlets forming dense masses 6-18 inches in diameter: leaves spatulate, rounded or obtuse and cuspidate at the apex, finely ciliate, 1-3 lines long, crowded on the short branchlets: flowering stems 2-4 inches long; flowers white, in a loose open cyme on slender pedicels; sepals nearly distinct, ovate, obtuse, glabrous, a line long; petals oblong-obovate, 3-nerved, thrice longer than the sepals; styles connivent in flower. On rocky slopes along the Columbia river near the Cascade falls.

S. tricuspidata Ritz. Prodr. Fl. Scand. ed. 2, 104. Stems erect, thick, 2-3 inches high: leaves densely imbricated below, thick-coriaceous, 3-cuspidate, with cartilaginous points, the margins very slightly ciliate: flowers somewhat corymbose, on short stout pedicels; sepals ovate, somewhat coriaceous; petals obovate-oblong, longer than the sepals: capsule ovoid, apiculate with the conical divergent styles. Arctic America: said to have been found on Mount Hood.

§ 2 DACTYLOIDES Tausch l. c. Caudex perennial, leafy: leaves persistent, the margins not punctate nor cartilaginous: flowering stems annual, somewhat leafy: sepals united at base and coherent with the base of the ovary: ciliæ of the leaves articulated.

S. cæspitosa L. Sp. 404 (?). Cespitose, the slender running stems and short branchlets forming dense tufts 6-16 inches in diameter: leaves pale or yellowish, thin, pubescent, spatulate, 2-5-cleft or entire, the segments usually obtuse, closely imbricate on the short branchlets, persistent, flowering stems slender, 2-6 inches high, glandular, 1-5-flowered: calyx cleft to the middle, with oblong acute lobes; petals white, 3-5 lines long, oblong, 3-nerved, rounded above, twice as long as the calyx: capsule open only at the top the slender beaks but slightly diverging. On cliffs and rocky slopes, along the Columbia river near the Cascade falls.

S. Tolmæi T. & G. Fl. i, 567. Cespitose with leafy running diffusely branching stems, forming dense tufts 4-20 inches in diameter: leaves succulent, nearly terete when young, glabrous, sometimes sparingly ciliate near the base, 4-6 lines long, clavate, obtuse, closely imbricated on the slender branches, persistent: flowering stems scape-like, 2-4 inches high, 1-4-flowered; sepals ovate, 3-nerved, about 2 lines long; petals white, narrowly lanceolate, unguiculate, 3-nerved, longer than the sepals; capsule large, 4-5 lines long, ovoid, united only at the base, the acute beaks diverging, sometimes abnormally 3-4-celled. In sand along rivulets on the highest mountains near perpetual snow. Brit. Columbia to California.

§ 3 HYDATICA Tausch. l. c. Caudex perennial, commonly subterranean; stems or scapes annual; calyx nearly free from the ovary; sepals almost distinct, reflexed; filaments more or less dilated upward.

* Leaves all clustered at the crown of a ligneous more or less creeping caudex.

S. Lyalli Engler Index Crit. Saxifr. 3). Glabrous: caudex creeping and sparingly branched: leaves obovate, attenuate below to a margined petiole, coarsely toothed at the summit. 6-12 lines long: stems erect, slender, 6-12 inches high, 6-10-flowered; calyx parted nearly or quite to the base, the ovate acute segments soon reflexed, 2 lines long; petals round-obovate, subunguiculate, 1-nerved, but little if any longer than the sepals; filaments flat, broadest in the middle: capsule united only at the base, rarely 3-4-celled, the beaks erect. Along streams, northern Idaho to Brit. Columbia and the Arctic Coast.

Var. laxa Engler l. c. Leaves ovate, the whole margin dentate: panicle 10-12-flowered; pedicels long and slender. With the type.

S. æstivalis Fisch. Ind. Sem. Petr ii, 37. *S. punctata* of American authors not *L.* Glabrous or somewhat pubescent: caudex short, slightly creeping: leaves reniform to round-cordate, on long slender petioles, coarsely and almost equally many-toothed or somewhat incised, 1-2 inches in diameter: stems erect, 6-18 inches high, bearing many flowers in a loose open panicle; pedicels long and slender; calyx cleft to near the base; sepals narrowly oblong, acute, soon reflexed: petals oblong, obtuse, rather abruptly narrowed below to a short claw; filaments dilated toward the top: capsule oblong, cleft to near the middle, the short beaks abruptly diverging. Along high mountain streams, Alaska to California and the Rocky Mountains.

* * Leaves and stems from the summit of a fleshy or bulb-like caudex.

S. Mertensiana Bong. Veg. Sitch. 141. *S. heterantha* Hook. Sparingly pubescent: caudex bulb-like propagating by bulblets in the axils of the leaves; leaves round-cordate, 10-12-lobed, the lobes 2-5-toothed, 1-3 inches in diameter, on petioles several times longer than the blade: stems erect, 6-12 inches high, often bearing bulblets in the axils of the much branched, many-flowered, open panicle; flowers white, on slender pedicels; petals ovate, attenuate below to a short claw, spreading, white with two yellow spots near the base, 2 lines long, longer than the lanceolate reflexed calyxlobes: filaments dilated upward; ovary free from the calyx: capsule inflated-ovate, united only at base, the beaks widely divergent in fruit. On wet rocks and cliffs, Alaska to California, west of the Cascade Mountains.

S. Marshallii Greene Pitt. i, 159. Scuffy-pubescent: caudex fleshy, propagating by oblong tubers at the ends of long filiform runners: leaves oval or oblong to ovate, abruptly contracted at base to a broad petiole, obtuse, rather coarsely dentate, 6-20 lines long: stems 6-12 inches high: panicle loose, many-flowered, not bulblet-bearing; flowers on slender pedicels; calyx free from the ovary, cleft to the base, the lanceolate obtusish segments soon reflexed: petals oblong-oval, white with two yellow spots near the base; filaments dilated about the middle, becoming lanceolate on long claws; capsule short, united only at base, the beaks diverging at right angles in fruit. On wet banks, southern Oregon, on the Rogue river, to Humboldt Co., California.

S. Californica Greene l. c. 286. White-pubescent or glandular-tomentose: caudex fleshy, propagating by small oblong tubers at the ends of filiform underground runners: leaves ovate to oblong or elliptical, 1-2 inches long, narrowed below to a broad petiole, the margin from coarsely crenate to repandly denticulate or almost entire, more or less ciliate: stems 6-18 inches high, few-many-flowered; flowers white, on slender pedicels; calyx nearly free from the ovary, divided almost to the base, with oblong rather acute soon reflexed segments; petals white not spotted, elliptical to spatulate, obtuse; filaments flattened but not dilated upward; carpels united only at the base, strongly diverging in fruit. On open hillsides, southern Oregon to California.

S. fragosa Suksdorf, Small Bull. Torr. Club xxiii, 363. Perennial by an ascending or horizontal rootstock that increases by branching at the crown, glandular-pilose with rigid hairs: stems erect or assurgent, 12-18 inches high: leaves ovate or oblong-ovate, entire or repand, 1-2 inches long, abruptly narrowed or truncate at base, decurrent on the winged petiole which is slightly dilated at base, somewhat coriaceous, glabrate: stems 12-18 inches high, erect or assurgent, paniculately branched at the top: flowers white, on slender pedicels, in many-flowered cymes, calyx

broadly campanulate, the tube adnate to the ovary, the lobes triangular or triangular-ovate, obtuse, 3-nerved, about a line long, at length reflexed; petals obovate, obtuse or notched at the apex, nearly 2 lines long, strongly 3-nerved, the lateral nerves arising below the middle and converging toward the apex; filaments subulate, shorter than the petals; carpels flat, surrounded by a disk, becoming globose-ovoid, nearly distinct follicles 2-3 lines long, the short beaks strongly diverging: seeds obovoid, more or less pointed at both ends. On wet cliffs along the Columbia and Willamette rivers.

S. claytoniæfolia Canby, Small l. c. 365. Perennial by a short horizontal rootstock, slender, glandular-pilose above, glabrate below: leaves fleshy, orbicular-elliptic, more or less oblique, 3-4 inches long, glabrate, obtuse, entire, undulate, palmately 6-8-nerved, narrowed into a winged ribbed petiole which is as long as the blade or longer: stems erect or assergent 8-12 inches high, glabrate near the base; inflorescence thyrsoïd-corymbose, its branches subtended by small linear or linear-oblong bracts: calyx flattish, 1 line high, its lobes spreading and recurved, thin, oblong, acute, 3-nerved, longer than the tube; petals white, spatulate or obovate-spatulate, about 1 line long, slightly emarginate or minutely apiculate, gradually narrowed into a claw, marked with a stout mid-nerve which gives off two lateral nerves about the middle; filaments subulate, shorter than the petals, incurved at the summit; carpels each ovoid, 1½ lines long, the short stout beaks strongly diverging; seeds irregularly oblong, reddish, smooth or very faintly striate. Damp crevices of rocks, The Dalles, Oregon.

S. nidiflca Greene Eryth. i, 222. "Near *S. integrifolia*, but crown and roots imbedded in a dense subglobose mass of small bulblets: leaves ovate or obovate, entire or merely denticulate, an inch long, on dilated petioles rather shorter: scapes 8-12 inches high, stoutish, glandular-hirsute: cymes several-flowered and pedicillate, forming a thyrsoïd panicle toward the summit: calyx-segments ascending, oblong-ovoid, acutish and mucronulate: petals round-obovate, not unguiculate, white: filaments very short; anthers dull red: ovary very broad at summit, depressed and even slightly concave: carpels not known." In wet springy places, eastern Washington to the Sierra Nevada Mountains in California.

S. plantaginea Small l. c. "Perennial by a thick rootstock, stout, scapose, glandular-pilose: leaves elliptic or elliptic-spatulate, 2-4 inches long, obtuse, undulate or distinctly and shallowly toothed, leathery, ciliate, 5-7-ribbed, narrowed into a winged petiole, which is usually much shorter than the blade; scape erect, 8-10 inches tall, sparingly branched near the top, the branches subtended by elliptic bracts; flowers greenish; in dense cymules; calyx flat, its segments ovate, 2 lines long, obtuse, 3-nerved, longer than the tube; petals suborbicular-oblong or some inclined to be broadly spatulate, 1-2 lines long, greenish, shorter than the calyx-segments, obtuse, marked with a midnerve and several branches narrowed into a broad claw; filaments converging, subulate, shorter than petals; ovaries immersed in a lobed disk, fruit not seen." Spokane, Washington.

S. integrifolia Hook Fl. i, 249, t. 86. Glandular-pubescent throughout; leaves and stems from a somewhat woody caudex: leaves ovate to oblong or lanceolate, usually obtuse, entire or slightly sinuate-crenate, somewhat membranaceous; stems 6-20 inches high, rather stout: flowers many, in an elongated panicle, on short pedicels, clustered at the ends of the branchlets of the narrow panicle; petals white, obovate, twice the length of the glabrous spreading sepals; filaments short, subulate; ovary free: styles divergent: carpels united only at the base. In moist prairies and wet places, Washington to California.

S. parvifolia Greene Pitt. iii, 116. Stems stoutish, 6-16 inches high, from a small somewhat woody caudex, pubescent with coarse glandular hairs: leaves ovate, obtuse, entire or slightly toothed, 6-10 lines long, on winged petioles as long or longer, somewhat fleshy, glabrous; branches of the panicle each cymosely 3-5-flowered; calyx cleft to the middle into deltoid erect segments; petals white, spatulate-oblong, obtuse; nearly 2 lines long, more than twice as long as the calyx; filaments filiform; anthers orbicular; mature carpels red, united to near the middle, adnate to the tube of the calyx, only the beaks divergent. On damp open hillsides about Grants Pass, Oregon.

S. Oregana Howell Eryth. iii, 34. Canescently pubescent: leaves and stem from a thickened fleshy caudex: leaves spatulate to lanceolate, 1-8 inches long, obtuse, obscurely repand-dentate, sessile or attenuate below to a broad petiole: stem stout, 1-4 feet high, leafless, branched near the top, the branches subtended by linear-lanceolate mostly cuminated bracts; flowers in dense cymes, sessile or nearly so; calyx adnate to the base of the ovary, cleft to the middle, with short triangular obtuse or acute at length reflexed segments; petals yellowish-white, 2 lines long, oblong, attenuate below to a short claw; filaments subulate, half as long as the petals: carpels distinct or nearly so, diverging, the short beak at length bent at a right angle; seeds oblong. In marshes and about springs, Washington and Oregon.

§ 5. **ARABIDIA** Tausch. l. c. Caudex above the ground scarcely any: stems annual, mostly leafless: calyx free from the ovary; the sepals nearly distinct: petals with slender claws, often unequal: filaments filiform: seeds longitudinally striate.

S. Nutkama Moc. Engler Monog. Sax. 135. Pubescent: stems and leaves from the crown of a small fleshy caudex: leaves cuneate-spatulate, sessile or some of the outer ones attenuate below to a broad petiole, 10-18 lines long, unequally ciliate, rather coarsely dentate above the middle: stems 3-12 inches high, paniculately branched above, bearing numerous propagula in the axils of the floral bracts; flowers numerous, in a loose usually secund panicle; calyx free from the ovary, cleft to the base; sepals broadly lanceolate, acute, very early reflexed, barely a line long; petals white, with a yellow or red spot at the base of the blade, somewhat unequal, lanceolate, long-clawed; filaments clavate, as long as the petals; carpels lance-ovate, united to above the middle, the short slender beaks erect. In moist places on the highest mountains, Alaska to Oregon.

S. reflexa Hook. Fl. i, 249, t. 85. Canescently pubescent: leaves ovate, rather coriaceous, opaque, incisely serrate, attenuate into a petiole: stem naked; panicle glabrous, compact, corymbose; petals obovate, marked with two orange spots, scarcely twice the length of the obtuse reflexed calyx-segments; filaments dilated upward or petaloid, often abortive; ovary free from the calyx. Northeastern Washington and Idaho to the Arctic Sea shore.

S. occidentalis Watson Proc. Am. Acad. xxiii. 264. Leaves somewhat fleshy, 6-18 lines long, roundish to oblong or ovate, coarsely dentate, contracted below to a short petiole, tomentose beneath with red or reddish hairs, smooth above: stems 2-10 inches high, more or less pubescent and glandular; flowers numerous, in a somewhat corymbose cyme: calyx free from the ovary, cleft nearly or quite to the base, the oblong or ovate obtuse segment not reflexed; petals white, oblong-obovate, obtuse, twice as long as the sepals; filaments slender-subulate about equalling the sepals; carpels lanceolate, united below, the stout beaks divergent: seeds oblong, apiculate at one or both ends, with a loose smooth testa. Common on wet rocks, Brit. Columbia to California.

S. Howellii Greene Pitt. ii, 163. Leaves thin, less than an inch long, oblong to obovate, tapering to a rather long slender petiole, coarsely dentate, smooth both sides: stems 3-6 inches high: flowers rather few, in a loose corymbose cyme: calyx free from the ovary, cleft nearly to the base, the narrow oblong segments obtuse or acutish, spreading in flower; petals oblong, obtuse, but little longer than the sepals, the claw very short or obsolete; filaments filiform, as long as the petals: seeds obscurely tuberculate, the testa loose at the ends. On wet banks along the Coquell river, Oregon.

§ 6. **NEPHROPHYLLUM** Gaud. Fl. Helvet. iii, 103. Caudex above the ground none: stems annual, leafy; bracts at the base of the pedicels often geminate: calyx free or adnate to the base of the ovary; the sepals erect or spreading: filaments subulate.

S. Nuttallii Small Bull. Torr. Club xxiii, 368. *S. elegans* Nutt. not Sternb. Annual, smooth or nearly so: stems slender, leafy, simple or branched, 2-12 inches high: leaves rotund to ovate or lanceolate, contracted below to a short petiole, 2-6 lines long, entire or with one or two coarse teeth toward the apex; flowers white in open few-flowered racemes on long slender pedicels; calyx campanulate, with short erect triangular acute lobes, the tube coherent to the lower half of the ovary in fruit; petals oblong, obtuse, 2-3 lines long, more than twice the length of the calyx; carpels united to the middle, the slender beaks diverging: seeds striate with scabrous ridges. On wet banks and cliffs at Oregon City and other places in western Oregon.

4 **SAXIFRAGOPSIS** Small Bull. Torr. Club xxiii, 19.

"Low caulescent cæspitose, sparingly glandular-pilose plants perennial by woody rootstocks. Stems straw-like, rather slender, not fleshy, sparingly leafy. Leaves alternate, membranaceous, the blade articulated to the petiole and not decurrent: petiole wiry, dilated into a scarioso-ribbed base. Inflorescence consisting of a terminal thyrsoid-panicle, its cymules peduncled, subtended by small bracts: pedicels usually bearing several opposite or nearly opposite bractlets below the flower. Calyx hemispheric, its tube ribbed, united to the ovary, its segments 5, unequal in size and shape, reflexed. Petals 5, inserted just below the sinuses of the calyx-tube, long-clawed, at length deflexed. Stamens 10, converging; filaments inserted at the base of the calyx-segments, dilated below into two thin wings; anthers sagittate, 4-angled. Ovary very short when young, soon elongating, immersed in a glandular disk; placentæ central. Follicles slender, the bodies united, the tips erect. Seeds minute, smooth, somewhat curved."

S. fragarioides Small l. c. 20. *Saxifraga fragarioides* Greene. Cæspitose, the short, much branched woody caudex leafy at the ends: leaves thin, broadly cuneate to oblong, coarsely dentate above the middle, sparingly pubescent both sides, 8-14 lines long, on slender petioles as long or longer than the blade: flowering stems 3-10 inches high, slender, glandular-pubescent, leafy; flowers numerous, in an elongated panicle; calyx hemispheric; its segments longer than the tube or at length shorter, ovate, ciliate, obtuse, reflexed, a line long; petals oblong-spatulate or spatulate, persistent, white, $\frac{1}{2}$ longer than the calyx-lobes, at length reflexed: capsule cleft to the middle, the slender beaks slightly diverging. On dry cliffs in the Siskiyou Mountains, Oregon and adjacent California.

5 SULLIVANTIA T. & G.

Slender herbs with running roots, palmately veined leaves and small flowers in paniculate cymules. Calyx campanulate, coherent with the base of the ovary, 5-cleft. Petals 5, broad, entire, alternate with the calyx-lobes, withering-persistent. Stamens 5, shorter than the petals. Ovary 2-celled, with the placentæ in the axis, many-ovuled: carpels united to the middle, the beaks flat and early open down the inner side. Seeds numerous, wing-margined.

S. Oregana Watson Proc Am. Acad. xiv. 292. Smooth below, pubescent and glandular above: stems slender, 3-10 inches high, sparingly leafy, from slender running rootstalks: propagating by long filiform runners: leaves round-cordate, 1-2 inches in diameter, laciniately cut and toothed, on long petioles with dilated scarious base: flowers numerous, in an elongated panicle; calyx campanulate; with acute triangular lobes; petals white, oblong-ovate, obtuse, a half longer than the calyx-lobes, somewhat cuneate at base: carpels membranaceous, the beaks exerted and slightly diverging in fruit: seeds oblong, dark brown and shining, narrowly winged. On wet cliffs along the Columbia river near the Cascades, and at Elk Rock on the Willamette.

6 BOYKINIA Nutt. Jour. Acad. Philad. vii, 113.

Perennial herbs with creeping caudex, alternate leaves with dilated stipule-like base and corymbose cymes of white flowers. Calyx campanulate, adnate to the lower part of the ovary, the tube at length urceolate, the limb spreading, valvate in the bud. Petals 5, entire, deciduous. Stamens 5, inserted in the throat of the calyx, shorter than its segments: anthers 2-celled. Styles 2-3, short: stigmas simple. Capsule 2-3-celled, with a central many-seeded placentæ, 2-3 beaked, dehiscent between the beaks. Seeds small, ovoid, with a close somewhat crustaceous testa, very minutely and evenly papillose.

B. major Gray Bot. Cal. i, 196. Sparingly pubescent; glandular above: stems stout, 1-3 feet high, from a creeping lignious caudex: leaves round-reniform, deeply 5-7-lobed, the lobes irregularly toothed and cut, 2-8 inches in diameter, the lower on long slender petioles with merely enlarged base, the upper similar but smaller, on shorter petioles with foliaceous stipular base: flowers many, in a corymbose at length elongated cyme; calyx campanulate, the lower half of the tube coherent with the ovary, enlarging and becoming urceolate in fruit; petals white, rounded above, a little longer than the triangular acute erect calyx-lobes: carpels united to above the middle, erect, the tips of the beaks divergent in fruit. In mountain streams, Oregon and California.

B. occidentalis T. & G Fl i, 577. Sparingly pubescent with fuscous hairs: stems rather slender, erect or declined, 1-2 feet high, from a creeping somewhat woody caudex: leaves round-cordate, incisely 3-9-lobed, the lobes 3-5-toothed, 1-2 inches in diameter, all on slender petioles with dilated ciliate base: flowers numerous, in elongated paniculate cymes; calyx campanulate, adherent to the lower half of the ovary, enlarging and becoming urceolate in fruit; petals white, early deciduous, spatulate, narrowed below to a long claw, 2-3 lines long, much longer than the acuminate calyx-lobes: carpels united to the middle, the long slender beaks slightly diverging. Common along mountain streams, western Washington to California.

7 BOLANDRA Gray Proc. Am. Acad. vii, 341.

Perennial herbs with palmately veined, thin leaves and loose panicles of purple flowers. Calyx broadly campanulate, 5-lobed, valvate in the bud, the tube free from the ovary. Petals 5, linear, entire, inserted in the throat of the calyx and alternate with its lobes, persistent. Stamens 5, alternate with the petals; filaments filiform: anthers cordate, 2-celled. Ovary included in but wholly free from the inflated calyx, many-ovuled with the placentæ in the axis: stigma truncate. Capsule membranaceous, ovate, with a broad 2-celled base. Seeds numerous, with a rather loose testa.

B. Californica Gray l. c. Stems 6-18 inches high, weak and ascending apparently from a filiform rootstock, granulate-bulblet-bearing at the base of the stem, glabrous or nearly so: leaves alternate, membranaceous; the lower round-reniform, 1-2 inches in diameter, about 5-lobed, on long-filiform petioles; the upper sessile or clasping, merely incised or few-toothed, gradually reduced upward to small ovate or lanceolate bracts, borne on or subtending the slender 1-flowered somewhat paniculate peduncles: petals dull purple, attenuated, 2 lines long. On wet rocks near the Yosemite falls, California, said by Mr. Wheelock to have been found in Oregon.

B. Oregona Watson Proc. Am. Acad. xiv, 292. Minutely-pubescent and glandular, at least above, stems slender, 6-20 inches high, from a small bulbiferous caudex: lower leaves round-reniform, incisedly lobed and toothed, 1-3 inches in diameter, on long slender petioles with dilated stipule-like base; the upper similar but smaller, gradually passing into sessile bracts: flowers rather numerous, in loose panicles, on slender pedicels; calyx inflated, campanulate, becoming urceolate, the tube 3-4 lines long, the subulate acuminate lobes, as long as the tube; petals dark purple, filiform, 6 lines long or more; filaments a line or more long: capsule ovate, the long acuminate beaks but slightly diverging, included in the calyx; carpels united to the middle. On wet cliffs along the Columbia river near the Cascades.

8 HEMIEVA Raf. Fl. Tell. ii, 70.

SUKSDORFIA Gray Proc. Am. Acad. xv, 42.

Low herbs with small bulb-like caudex, round lobed leaves and few flowers in loose paniculate cymes. Calyx campanulate, the tube coherent with the ovary, the 5 erect lobes imbricate in the bud. Petals 5, alternate with the calyx-lobes, persistent. Stamens 5, alternate with the petals. Ovary 2-celled, many-ovuled, with the placentæ in the axis. Stigma truncate.

H. ranunculifolia Raf. l. c. *Saxifraga ranunculifolia* Hook. Pubescent and glandular: stems erect, 6-12 inches high, from a small bulb-like caudex, propagating by bulblets in the axils of the lowest leaves: lower leaves round-cordate, 6-12 lines in diameter, 3-lobed, the lobes 3-9-toothed, on long petioles with dilated base, upper ones similar, on short petioles, or reduced to oblong or lanceolate bracts: flowers white, in a loose open or short capitate cymose panicle; calyx campanulate, cleft to about the middle, with oblong acute erect lobes; petals oblong, acute, attenuate below to a short claw, 3-4 lines long; stamens 5, filaments less than a line long; carpels united only near the base, the beaks diverging. On wet cliffs on the highest mountains, Brit. Columbia to Oregon.

H. violacea Wheelock Bull. Torr. Club xxiii, 71. *Suksdorfia violacea* Gray. Viscid-pubescent throughout: stems slender, 6-10 inches high, from a small bulb-like caudex which is covered with bulblets that are borne in the axils of the radical leaves: lower leaves round-cordate, crenately lobed and toothed, on slender petioles with scarious dilated base, upper ones obovate, 3-5-lobed, on short petioles with foliaceous stipular base: petals violet, entire or sometimes 2-3-lobed, spatulate, attenuate below to a long claw, 5-6 lines long, much longer than the acuminate at length connivent lobes of the calyx: capsule oblong; carpels united to near the top, the short beaks diverging: seeds oblong, with a close light-colored testa. On moss-covered rocks, along the Columbia river near Viento Oregon and on the opposite side of the river near the mouth of the White Salmon river.

9 LEPTAXIS Raf. Fl. Tel. ii, 75.

TOLMIEA T. & G. Fl. i, 582; not Hook.

Perennial herbs with cordate leaves on long petioles bearing a bud at the base of the blade, and simple stems with long ebracteate racemes of purple flowers on short pedicels. Calyx cylindrical, free from the ovary, unequally 4-cleft, the tube split down the lower side and gibbous at base, imbricate in the bud. Petals 4, filiform, entire, inserted between the lobes of the calyx, persistent. Stamens 3, scarcely exerted, inserted into the throat of the calyx opposite the three larger lobes: filaments subulate, unequal: anthers reniform, 2-celled, the cells confluent at the apex. Ovary stipitate at base, 1-celled, with two parietal placentæ; stigma obtuse. Capsule 1-celled, many-seeded, 2-valved at the apex, the valves equal. Seeds small, globose, muricate-hispid.

L. Menziesii Raf. l. c. 76. *Tolmiea Menziesii* T. & G. Hispid-pubescent throughout: stems clustered, 1-3 feet high, from a creeping branched caudex: leaves cordate, acute, obscurely lobed and repandly cuspidate-toothed, ciliate, 1-4 inches long, the lower on long petioles, the upper ones with petioles successively shorter until they become sessile bracts: racemes many-flowered, elongated; calyx cylindraceous, purple-veined, the upper lobes oblong, obtuse, the lower one narrow, acuminate, shorter; petals brown, filiform, somewhat dilated in the middle, recurved; filaments subulate, the upper one inserted lower down on the tube of the calyx than the other 2: capsule oblong, 2-valved, the valves beaked with the indurated styles, the valves spreading in age. Common along mountain streams from Brit. Columbia to California.

10 TELLIMA R. Pr. App. Frankl. Journ. 765.

Perennial herbs with roundish-cordate leaves on petioles with dilated and somewhat stipuliform base and rather large flowers in elongated simple somewhat spicate racemes. Calyx campanulate, obconic and coherent with the ovary at base, free and inflated above, 5-toothed, valvate in the bud. Petals 5, inserted in the throat of the calyx, laciniate-pinnatifid, deciduous. Stamens 5 or 10, inserted on the tube of the calyx; anthers 2-celled, ovate. Styles 2, short and distinct: stigmas capitate, obscurely 3-lobed. Capsule 1-celled with 2 parietal many-seeded placentæ, 2-beaked, opening between the beaks. Seeds horizontal.

* Stamens 10.

T. Grandiflora R. Br. l c. 759. Hispid-pubescent throughout, glandular above: stems clustered, 1-2 feet high, from stout short tufted rootstocks: leaves round-cordate, 2-4 inches in diameter, 3-9-lobed, the lobes coarsely toothed, prominently reticulate-veined, on long petioles with scarcely dilated base, the few cauline ones smaller and nearly sessile: flowers not fragrant, on short reflexed pedicels: calyx 4 lines long, thick-cylindrical, with turbinate tube and short triangular erect lobes, inflated, coherent with the ovary only at the base; petals lanceolate in outline, laciniately cut into long filiform segments, abruptly narrowed below to a short claw, soon bent at the lower third, the upper part closely reflexed, bright red; styles short, persistent, with broad flat stigmas, approximate: capsule ovate, open at the top, the indurated styles divergent in fruit: seeds oblong, tuberculate. Common in moist woods, Brit. Columbia to California.

T. odorata. Coarsely pilose below, glandular-pubescent above: stems rather slender, clustered, 1-2 feet high, from a multicapital caudex: leaves broadly cordate, acute, obscurely lobed and crenately toothed, 1-3 inches long, on long petioles with dilated scarious base, the few cauline ones smaller and nearly sessile: flowers fragrant, numerous, on short pedicels in a long terminal raceme; calyx campanulate, the inflated tube 3-4 lines long, coherent with the lower half of the ovary, the oblong erect lobes about half as long as the tube: petals red, lanceolate in outline, laciniately cut into long filiform segments, narrowed below to a long claw, bent at the middle, the upper half spreading or at length loosely reflexed; styles short, with broad capitate stigmas: capsule elliptical, the very short styles divergent in fruit: seeds oblong, rough tuberculate. In wet places and springs, along the Columbia river near the Cascades to Southern Oregon.

* Stamens 5.

T. racemosa Greene Eryth. iii, 55. *Heuchera racemosa* Watson. "Glandular-hispid, leaves reniform-cordate, crenately lobed and toothed, 1 or 2 inches broad: flowering stems 4-10 inches high, bearing 2 or 3 petiolate leaves and a loose few (6-15) flowered raceme; pedicels short (a line long or less): calyx very broadly campanulate, 2 (becoming 3) lines long, acutely lobed; petals glandular, linear, entire and acuminate or more or less laciniately toothed toward the top, a little exceeding the calyx-lobes: stamens 5, very short, opposite to the calyx-lobes: styles very short; capsule sub-globose, very shortly beaked: seeds very numerous, brownish, with wrinkled testa, not muricate." On cliffs of Mount Adams Washington at 7-8000 feet altitude. *Suksdorf.*

11 LITHOPHRAGMA Nutt. Journ Acad. Phila vii, 26.

Small and slender herbs with fibrous at length grumous roots, 3-5-parted or lobed leaves on petioles with stipuliform base and rather large flowers in simple few-flowered racemes. Calyx cyathiform or campanulate, coherent with or free from the lower part of the ovary: the limb short, 5-cleft, valvate in the bud. Petals 5, inserted in the sinuses of the calyx just below the margin, cuneiform, unguiculate, much exerted, 3-cleft, or rarely entire, deciduous. Stamens 10, inserted in the throat of the calyx: anthers cordate, 2-celled. Styles 2-3, short; stigmas obtuse or somewhat dilated. Capsule 1-celled with 2-3 parietal many-seeded placentae, 2-3 valved at the apex. Seeds horizontal, ovate, with a distinct raphe; the testa smooth and membranaceous.

L. campanulata. Minutely pubescent below, glandular above: stem slender, 12-20 inches high: radical leaves round-cordate, 3-lobed, the lobes coarsely 3-5-toothed, 8-12 lines in diameter, on long, slender petioles with a bulblet in the axil of each; cauline usually only one, similar or more deeply lobed: flowers few, very remote, on short pedicels; calyx campanulate, 3-4 lines long, with rounded base and short, triangular, acute teeth; petals incisely 3-5-lobed, white to pink, broadly ovate, 6 lines long, narrowed below to a filiform claw: capsule conical, divided nearly to the middle. On high open ridges of the Siskiyou mountains near the Oregon boundary.

L. parviflora Nutt. T. & G. Fl. i, 584. *Tellima parviflora* Hook. Roughish hirsute or scabrous-pubescent: stems slender, 8-20 inches high: radical leaves round-cordate, deeply 3-5-lobed, the lobes coarsely toothed, 6-10 lines in diameter, on slender petioles 1-4 inches long; cauline leaves usually 2, trifoliolate, leaflets deeply 3-lobed, the lobes 2-3-toothed; flowers few, in a subcapitate at length elongated raceme; calyx obconical, with triangular acute lobes; petals white or pinkish, deeply 3-cleft into linear or oblong lobes, attenuate below to a slender claw, 4-6 lines long, capsule oblong, often 3-va ved, open only at the top. Common in moist or shady places, Brit. Columbia to California and Colorado.

L. tenella Nutt. T. & G. Fl. i, 534 *Tellima tenella* Walp. Roughish with a minute glandular pubescence: stems slender, branching from the base, 4-12 inches high: leaves trifoliolate; leaflets 2-3-parted, with cuneiform 2-3-lobed segments: flowers few, in a capitate at length elongated often bulblet bearing usually simple raceme; calyx campanulate, 2 lines long, with very short triangular teeth; petals pink, 6 lines long, irregularly 3-7-parted into mostly linear-lanceolate, acute divisions: capsule almost free from the calyx, elliptical, usually 3-valved opening $\frac{1}{4}$ its length from the top: seeds short-oblong, rough-tuberculate. Common on prairies, Brit. Columbia to California and Colorado.

L. rupicola Greene Eryth. iii, 102. "Stems often 2 or 3 from the small grumous root, not very slender, a foot high or more, rather strongly hispidulous-scabrous throughout: lowest leaves from round-reniform to round-ovate in outline, deeply 3-5-lobed, the lobes again 3-lobed; petioles long, each with a large bulblet in its axil; cauline leaves of more angular outline, doubly cleft into narrow segments: racemes elongated, 12-20-flowered; fruiting pedicels nearly twice the length of the calyx: hemispherical base of the calyx adherent to the ovary, the body in maturity obviously 10-striate, the lobes short and obtuse: petals white, all deeply palmatifid, the 2 upper much smaller than the others: capsule 3-valved at the apex and the valves well exserted: seeds striate lengthwise but neither muriate nor obviously granular. Lava beds of Modoc Co., California, growing in the shade of Junipers." Perhaps in adjacent Oregon.

12 MITELLA L. Gen. n. 561.

Perennial herbs with mostly radical leaves, slender stems and small flowers in simple spicate racemes. Calyx 5-cleft, short-campanulate, more or less coherent with the ovary. Petals 5, lobed or pinnatifid, inserted into the throat of the calyx, deciduous. Stamens 5 or 10, not exserted; anthers cordate or reniform, 2-celled. Styles 2, short and distinct. Capsule 1-celled, with 2 parietal or somewhat basal many-seeded placentæ, 2-valved at the summit. Seeds obovoid, horizontal or ascending, smooth and shining.

*. Stamens 5, alternate with the petals.

MITELLA-ASTRA.

M. Breweri Gray Proc. Am. Acad. vi, 533. Sparingly pubescent with long crisp brownish hairs: scapes slender, 4-8 inches high: leaves round-cordate to reniform, obscurely 3-5-lobed, irregularly crenately toothed, with callous-apiculate teeth, 1-3 inches in diameter, on petioles 3-4 inches long that are subtended by scarious ciliate brownish bracts: racemes 4-20-flowered: flowers on short spreading pedicels subtended by minute scarious bracts; calyx short-campanulate, with short and rounded somewhat scarious lobes, petals greenish-yellow, pectinately pinnate with 3-5 filiform pinnæ; stigma distinctly 2-lobed. On the highest mountains, Brit Columbia to California.

M. ovalis Greene Pitt. i, 32. Pubescent with long whitish hairs: scapes 6-18 inches high: leaves oblong-cordate, obscurely 5-7-lobed, repandy toothed, 6-18 lines long, on rather stout petioles 1-4 inches long: flowers numerous, on short erect pedicels that are subtended by minute scarious bracts, often two or three together on a short peduncle and thus somewhat paniculate; calyx saucer-shaped, its short rounded lobes greenish-yellow; petals pectinately pinnate, with 3-5 rather short and distant pinnæ; filaments subulate, inflexed; stigma slightly 2-lobed. Along mountain streams in wet places, Brit. Columbia to California.

M. trifida Graham Edinb. New Phil. Journ. 185. Sparingly pubescent with coarse whitish hairs: scapes slender, 6-18 inches high, from a stout rootstock: leaves broadly cordate to reniform, 12-18 lines long, crenately toothed, ciliate: flowers several, in a short secund somewhat circinate raceme, on very short pedicels subtended by scarious white bracts: calyx campanulate, its oblong or triangular acute lobes white and petal-like, glabrous; petals ovate, on long slender claws, 3-toothed or 3-parted at the apex; stigma 2-lobed. On the high mountains of Washington and Oregon to the Rocky mountains.

* * Stamens 5, opposite the petals.

M. pentandra Hook. Bot. Mag. t. 293. Sparingly pubescent with short white hairs: scapes slender, 6-12 inches high: leaves cordate to round-reniform, obscurely 3-5-lobed, unequally serrate, an inch or more in diameter: flowers numerous, in a subpaniculate raceme, calyx short-campanulate, its very short obtuse lobes green; petals pinnate with 7-9 approximate filiform pinnæ; filaments very short, inflexed. In wet places, on the highest mountains. Alaska to Oregon and the Rocky mountains.

13 MITELLA-ASTRA.

MITELLA & MITELLA-ASTRA T. & G. Fl. i, 586.

Low herbs with alternate leaves without stipules and small flowers in spicate cymes. Calyx short-campanulate, 5-cleft, coherent with the base of the ovary. Petals 5, pinnatifid, inserted into the throat of the calyx. Deciduous. Stamens 5, not exerted, alternate with the petals. Styles 2, short and distinct. Stigmas simple. Capsule 1-celled with 2 parietal many-seeded placentæ, 2-valved. Seeds black and shining.

M. caulescens. *Mitella caulescens* Nutt. Retrorsely hispid and minutely scabrous, especially on the petioles and stems: stems simple, solitary, slender, bearing 1-3 leaves with 1-2 scarious bracts below them, 6-12 inches high, from a scaly slender caudex, propagating by long filiform runners: leaves broadly cordate, 3-5-lobed, the lobes crenately apiculate-toothed, 1-2 inches in diameter: flowers numerous, in a long slender simple cyme, on long slender pedicels, reflexed in bud, soon spreading or erect; calyx saucer-shape, its lobes ovate, colored and petal-like; petals pectinately pinnatifid with 7-9 filiform pinnæ; filaments subulate, nearly

a line long, connivent over the recurved styles: capsule globose nearly free from the calyx. Common along mountain streams at low elevations. Brit. Columbia to Oregon.

14 TIARELLA L. Gen. n. 560.

Perennial herbs with simple or trifoliolate leaves and small white flowers in simple or paniculate racemes. Calyx campanulate, nearly free from the ovary, 5-parted, white and petal-like, valvate in the bud. Petals 5, entire, small, with short claws, in ours persistent. Stamens 10, inserted with the petals into the base of the calyx: filaments filiform, exserted, the 5 opposite the sepals longest: anthers ovate, 2-celled: styles 2; stigmas simple. Capsule 1-celled, with 2 parietal placentæ, 2-valved, the valves very unequal. Seeds rather large, subglobose, smooth and shining.

T. trifoliata L. Sp 406. Softly hirsute: stems slender, ascending, 6-12 inches high, from slender creeping rootstocks: leaves trifoliolate, the middle leaflet ovate with cuneate base, slightly 3-lobed; the lateral ones oblique, 2-lobed, all coarsely and repandly apiculate-dentate, on slender petioles: flowers numerous, in an elongated narrow panicle: calyx cleft nearly to the base, the lanceolate lobes about a line long, acute; petals filiform, nearly twice as long as the calyx; filaments filiform, as long as the petals; valves of the capsule membranaceous, tipped with the slender persistent styles, the larger one 6 lines long, more than twice as long as the other. Common in forests, Alaska to California.

T. laciniata Hook. Fl. i, 239, t. 77. Scabrous-hirsute: stems about 3-leaved: leaves trifoliolate, the terminal leaflet deeply 3-cleft, the lateral ones 2-cleft, the segments broadly lanceolate, lacinate-pinnatifid: panicle loose: petals filiform and resembling the filaments. Vancouver Island to Washington.

T. unifoliata Hook. l. c. 238 t. 81. Sparingly pubescent or nearly glabrous: stems slender, erect or ascending, 6-16 inches high from slender running rootstocks: leaves simple, cordate, acute, obscurely 5-7-lobed, coarsely apiculate-dentate, 1-3 inches in diameter, on long slender petioles: flowers numerous, in a narrow panicle; calyx cleft to near the base; petals filiform, twice the length of the rather obtuse oblong-ovate calyx-lobes: valves of the capsule merely convex, the largest one oblong, acute, 5 lines long, twice as long as the other. Common in the forests of the high mountains, Alaska to California.

15 HEUCHERA L. Gen. n. 320.

Perennial herbs with mostly radical palmately veined leaves with partly free stipules and rather small flowers in terminal panicals or spikes. Calyx campanulate, coherent with the ovary below, 5-cleft, the segments imbricate in the bud. Petals 5, sometimes wanting, small, entire. Stamens 5, inserted alternately with the petals into the throat of the calyx; anthers 2-celled; styles 2; capsule 1-celled with 2 parietal placentæ, many-seeded, 2-beaked, dehiscent between the beaks; seeds horizontal, oval, minutely muriate or hispidulous.

* Filaments and styles filiform, much exserted: calyx short obconic or campanulate, the lobes spreading, equal: petals mostly persistent, at length often revolute or twisted: panicle effuse.

H. glabra Willd. Roem. & Schult. Syst. vi, 216. Glabrous: stems 1-3-leaved, 12-20 inches high, clustered at the ends of a much branched caudex: leaves roundish-cordate, accurately and irregularly lobed and doubly serrate, sparingly ciliate, 2-4 inches broad; on slender petioles 6-10 inches long; flowers numerous in an open cymulose panicle; calyx glandular-pubescent, 2 lines long, cleft to the middle, the oblong obtuse lobes about as long as the tube; petals white, little more than a line long, about equalling the stamens with ovate-lanceolate blade and long slender claw, recurved; styles at length much exserted: seeds oblong or oval, minutely hispid in lines. On cliffs and rocks along streams, Alaska to the highest peaks of the Cascade and Rocky mountains.

H. micrantha Dougl. Lindl. Bot. Reg. xv, t. 1302. Pilose with long crinkly hairs below: stems nearly naked, 1-2 feet high, from the ends of slender creeping rootstocks: leaves round-cordate to reniform, 1-3 inches broad, slightly and obtusely lobed, mucronulately crenate, ciliate, on slender pedicels 2-8 inches long; panicle diffuse, many-flowered; flowers small, on slender pedicels, in small dichotomous cymules; calyx turbinate, the rounded lobes about equalling the tube; limb of the petals linear-lanceolate, as long as the claw, soon curled or twisted: styles slender, long exserted: capsule ovate-lanceolate, at length exserted, the slender beaks erect. Common on rocky banks and cliffs, Brit. Columbia to California.

* * Filaments and styles subulate, short: calyx campanulate, the lobes equal: flowers small, in narrow panicles.

H. cuneata. Smooth or the leaves and inflorescence minutely pubescent: stems slender, 6-18 inches long, leafless but with a few ovate ciliate sessile bracts below: leaves elliptical to ovate or oblong, more or less cuneate at base, 6-12 lines long, obscurely 3-5-lobed, coarsely serrate and ciliate: flowers rather numerous, on short pedicels; calyx purplish, pubescent, 2 lines long, cleft to the middle, with oblong acutish lobes; petals minute, scarcely equalling the calyx-lobes; stamens and styles not exceeding the calyx: capsule ovoid scarcely exserted. On dry cliffs, Harney Valley eastern Oregon.

H. pilosissima F. & M. Ind. Sem. Hort. Petrop. v, 56. Villous or hirsute with spreading viscid hairs: stems 6-18 inches high, rather stout, leafless or with a few small leaves: leaves round-cordate, obtusely lobed and crenate, 1-3 inches in diameter: flowers in a close and clustered or sometimes loose panicle, usually as long as their pedicels: calyx somewhat globular; rounded or obtuse at base and the broad short lobes more or less incurving, densely hairy; stamens about equalling the calyx; short styles and narrow spatulate petals but little exserted. On dry cliffs in the Coast Mountains, from the border of Oregon southward.

H. parvifolia Nutt. T. & G. Fl. i, 581. Scabrous-pubescent: stems leafless, 10-20 inches high: leaves forming a small radical cluster, round-cordate, crenately 5-7-lobed with short and rounded lobes, rather coarsely dentate, ciliate: panicle racemose; flowers very small; calyx campanulate, the limb spreading, dilated; petals minute; stems shorter than the lobes of the calyx; styles very short, conical: capsule ovate, the beaks exserted: seeds minutely hispid. From the Blue Mountains of Oregon to the Rocky Mountains.

* * * Filaments and styles very short; subulate; calyx campanulate, the lobes erect and somewhat unequal: petals minute or wanting: flowers often large, glomerate or spicate.

H. cylindrica Dougl. Hook. Fl. i, 236. Stems 1-3 feet high, leafless the lower portion with the petioles and veins beneath very villous or hirsute with spreading fulvous hairs: leaves ovate-cordate, glabrous above,

5-7-lobed, the lobes obtuse, crenate with mucronate teeth: panicle spike-like, cylindrical, 2-4 inches long, the subsessile branches subtended by lanceolate ciliate bracts 6 lines long; calyx campanulate, 4 lines long, the somewhat unequal narrowly oblong lobes longer than the tube; petals filiform rudiments or none; stamens shorter than the calyx-lobes; filaments a line long; styles very short: capsule ovate, the acuminate beaks slightly exerted at maturity: seeds hispid. On gravelly plains at low elevations, Brit. Columbia to California.

H. glabella T. & G. Fl. i, 581. (?) Glabrous or the upper part of the stem and inflorescence pulverulent-pubescent: stems wholly naked, rather slender, 1-2 feet high: leaves round-cordate, 1-3 inches in diameter primarily 5-lobed, the lobes often again 2-3-lobed, crenately toothed, the broad teeth bristly apiculate and ciliate, somewhat coriaceous, very glabrous both sides, persistent, on slender petioles 3-6 inches long; stipules conspicuous, the free portion broadly subulate, long acuminate, ciliate: flowers rather small, numerous, in a rather loose spike-like panicle, 3-4 inches long, the subsessile branches subtended by setaceous pectinately ciliate bristly acuminate bracts; calyx campanulate, 2-3 lines long, cleft to the middle, with somewhat unequal oblong obtuse lobes; petals white, shorter than the calyx-lobes, the lanceolate blade but little longer than the slender claw; anthers subsessile: styles short, stout: mature capsule not seen. On rocks along the Columbia river between the Cascades and The Dalles.

H. ovalifolia T. & G. l. c. Minutely and somewhat glandularly pubescent throughout: somewhat caespitose stems leafless, 4-12 inches high: leaves ovate, subcordate to somewhat cuneate at base, incisely 5-lobed, the lobes coarsely toothed with obtuse to acute bristly apiculate ciliate teeth, 6-12 lines long, on petioles 1-2 inches long, persistent; stipules narrow, acute, ciliate: flowers rather few, in an almost or quite simple spike; bracts lanceolate; long acuminate, lacinate and ciliate above the middle; calyx tubular, becoming urceolate, 3 lines long cleft to the middle, the lanceolate mostly acutish lobes white and petal-like; petals usually if not always wanting; filaments subulate, a line long: capsule obovoid, cleft nearly to the base, the acuminate beaks scarcely equalling the calyx: seeds somewhat reniform, hispid. On cliffs and dry rocky ridges, throughout eastern Oregon and Washington.

16 CHRYSOSPLENIUM Tourn. L. Gen. n. 320.

Small depressed herbs growing in swamps and brooks with fleshy simple leaves and small yellowish green flowers solitary in the forks of dichotomous branches or terminal. Calyx rotate, its short tube coherent with the ovary, the 4-5 obtuse lobes colored within. Petals none. Stamens twice as many as the calyx-lobes, inserted on the margin of the evident epigynous disk: anthers reniform, 2-celled. Styles 2, distinct: stigmas simple. Capsule obovoid, compressed, 1-celled with 2 parietal placentæ at the base, 2-valved at the summit, seeds numerous, with a crustaceous testa.

C. glechomæfolia Nutt T. & G. Fl. i, 589. Glabrous: stems ascending, 2-6 inches high: leaves opposite, roundish, abruptly cuneiform at base, crenate above, 2-6 lines broad: flowers usually solitary, in the forks of the upper branchlets: calyx 2 lines broad with rounded entire lobes; stamens about equalling the calyx: capsule at length exerted. About springs and in marshes, Brit. Columbia to California west of the Cascade mountains.

17 PARNASSIA Tourn. L. Gen. n. 384.

Smooth perennial herbs with entire petioled leaves in a clus-

ter on the short caudex, and simple scape-like stems not rarely bearing a small sessile leaf or two near the middle and a large terminal solitary flower. Calyx rotate, deeply 5-cleft, the base free from or adnate to the base of the ovary, the lobes herbaceous, somewhat imbricate in the bud. Petals 5, imbricate in the bud, with a cluster of more or less united gland-tipped filaments at the base of each. Stamens 5, alternate with the petals: anthers 2-celled. Ovary entire, 1-celled with 3-4 parietal placentæ: stigmas as many, closely sessile, very obtuse. Capsule 3-4-valved from the apex, the valves bearing the many-seeded placentæ on their middle. Seeds with a loose thickish somewhat winged testa.

P. Californica Greene Pitt. ii, 102. Leaves ovate to broadly oval, 6-18 lines long, narrowed below to a slender petiole: stems slender, flexuous, 1-2 feet high, with a small sessile bract borne above the middle; calyx-lobes lanceolate, obtuse, 4 lines long; petals white, broadly ovate to elliptical, 8-10 lines long by 6 lines broad, bristles of the appendages 20-24, almost capillary, united below into a broad cuneiform base; filaments subulate, about half as long as the petals. In marshes at the eastern base of the Coast Mountains southern Oregon and adjacent California.

P. fimbriata Banks Sims 7 Koen. Ann. Bot. i, 591. Leaves cordate to reniform, 6-12 lines long, on long slender petioles: stems slender, 6-18 inches high, with a comparatively large leaf-like bract above the middle: sepals oblong, acutish: petals spatulate, 4-6 lines long, conspicuously fimbriolate ciliate at base; bristles of the appendages 5-9, often short or reduced to mere teeth on the cuneiform base; filaments filiform, about half as long as the petals. In high mountain marshes, Alaska to California and the Rocky Mountains.

ORDER XXXI. HYDRANGEACÆ Dumort Anal. Fam. 36, 38.

Shrubs with opposite leaves without stipules, the flowers in terminal or axillary panicles or cymes. Calyx 4-5-cleft, valvate in the bud. Petals as many as the sepals and alternate with them, convolute in the bud. Stamens few or numerous inserted with the petals into the throat of the calyx: anthers in-torse. Ovary either free from or coherent with the tube of the calyx, of 3-5 or more carpels with as many cells as carpels and the placentæ in the axis. Fruit capsular, with septicidal or loculicidal dehiscence. Seeds anatropous, small and numerous or solitary. Embryo straight, in the axis of fleshy albumen.

1. **Philadelphus**. Calyx-tube coherent with the 4-5-celled ovary: stamens 20 or more: seeds numerous.
2. **Whipplea**. Calyx nearly free from the 3-5-celled ovary: stamens 8-12; ovules and seeds solitary in the cells.

1 PHILADELPHUS L. Gen. n. 614.

Rather large shrubs with opposite simple leaves without stipules, and large showy flowers in paniculate cymes or sometimes solitary in the axils. Calyx with turbinate tube coherent with

the ovary nearly or quite to the summit, the limb 4-5-parted, valvate in the bud, persistent. Petals 4-5, large, convolute in the bud. Stamens 20-40, shorter than the petals. Styles 3-5, usually 4, united sometimes nearly to the summit: stigmas oblong or linear. Capsule mostly 4-celled, free at the summit; 4-valved, loculicidal, the placentæ projecting into the cells, many-seeded. Seeds pendulous and densely imbricated downward on the thickened placentæ, with a loose coat, usually prolonged at both ends or fimbriate at the hilum.

P. Lewisii Pursh Fl. 329. Shrub 3-12 feet high: leaves broadly lanceolate, entire or serrate, acute, more or less pubescent both sides: flowers in small cymes at the ends of the branchlets; lobes of the calyx acute, twice the length of the tube: petals white, oblong-ovate, 6-10 lines long; filaments unequal the longer ones about half as long as the petals; styles about equalling the shorter stamens, deeply 2-4-cleft. Common in open woods and rocky hillsides, Brit. Columbia to California.

2 WHIPPLEA Torr. Pac. R. Rep. iv, 90, t. 7.

Small diffuse shrubs with opposite simple leaves and small white flowers in cymous clusters on terminal naked peduncles. Calyx 5-cleft, the tube coherent with the lower part of the ovary, the lobes thin and petal-like. Petals 5. Stamens 10, rarely more or less; anthers short, 2-celled. Ovary 3-5-celled with a single suspended ovule in each cell; styles distinct; stigmas introrse. Capsule septically dehiscent into 3-5 cartilaginous 1-seeded closed valves which open down the ventral suture only. Seeds oblong with a closed coat.

W. modesta Torr. l. c. Stems slender, spreading or trailing, rooting at the nodes, 1-2 feet long or more: leaves ovate or oval, obtusely few-toothed or entire, somewhat 3-ribbed, 8-12 lines long, tapering below to a short petiole, acute or acutish, pubescent both sides: flowers white, few, in a close cyme at the end of a rather long slender peduncle hardly 2 lines broad; calyx campanulate, the white oblong lobes longer than the tube; petals white, with a lanceolate blade and broad claw, longer than the calyx-lobes: capsule globose: styles at length deciduous: seeds oblong. In open woods, from near the Columbia river to California.

Order XXXII. RIBESACEÆ.

Spiny or smooth shrubs with alternate often fascicled palmately veined leaves without stipules, and few to numerous, mostly perfect, flowers in racemes, either produced from the bud with the leaves and terminating the very short axillary branchlets, or sometimes leafless buds. Calyx campanulate or tubular, colored, the tube adherent to the ovary, the limb 4-5-cleft, with mostly equal segments, marcescent, imbricate in the bud. Petals distinct, equal in number to the segments of the calyx and alternate with them, inserted in the throat of the calyx. Stamens as many as petals and inserted alternately with them: anthers introrse. Ovary 1-celled with two parietal placentæ: ovules numerous, or sometimes few; styles 2, rarely

3-4. Fruit a berry, crowned with the remains of the flower, 1-celled, usually many-seeded. Seeds anatropous, the raphe at length distinct from the gelatinous testa: the inner integument somewhat crustaceous, adhering firmly to the fleshy albumen. Embryo minute excentric.

1 RIBES Juss. Gen. 281. L. Gen. n. 281.

Shrubs with alternate palmately veined and lobed leaves, the flowers in few to many-flowered racemes. Calyx campanulate, 4-5-cleft with mostly equal marcescent lobes. Petals distinct as many as the lobes of the calyx and alternate with them. Stamens as many as petals, inserted alternately with them into the throat of the calyx. Ovary 1-celled, closely adnate to the tube of the calyx, with 2 parietal mostly many-ovuled placentæ. Fruit a berry.

§ 1 SIPHOCALYX Berlandier Mem. Soc. Gnev. iii, t. 2 as genus. Stems neither prickly nor thorny: leaves convolute in the bud: racemes many-flowered: bracts foliaceous: flowers yellow; calyx long and tubular: berries smooth.

R. aureum Pursh Fl. 164. A smooth shrub 4-8 feet high: leaves 3-lobed, often broader than long, the lobes usually divaricate, few-toothed at the apex, ciliate when young, otherwise very glabrous: racemes 10-30-flowered, leafy at base; bracts lanceolate, more or less acuminate, 2-6 lines long or more, about equalling the pedicels: calyx yellow, tubular, the narrow tube 6-8 lines long, about twice as long as the oblong merely spreading lobes; petals cuneiform, truncate and erose-dentate at the apex, little more than a line long: berries yellow or black, 2-3 lines in diameter. On rocky banks along streams, eastern Oregon and Washington to Missouri and Arkansas.

R. tenuiflorum Lindl. Hort. Trans. vii, 242. A slender shrub 6-12 feet high, glabrous or the young branches and leaves pubescent with spreading hairs: leaves round-cordate, 3-lobed, the lobes often again 2-3-lobed, crenate at the apex, 1-3 inches in diameter: racemes usually about 9-flowered, leafy at base: bracts foliaceous, broadly lanceolate, 6-9 lines long, usually longer than the pedicels; calyx-tube 7-8 lines long, by a line in diameter, the unequal lobes about 3 lines long by less than a line broad: petals about a line long, narrowly o long, narrowed below to a broad claw: berries 2-3 lines in diameter. Along streams, southern Oregon and adjacent California.

§ 2 RIBESIA Berlandier (CURRANT). Stems neither prickly nor spiny: leaves plicate in the bud: racemes several-flowered: calyx campanulate or cylindrical: ovules numerous, in 2 or more rows.

* Calyx produced into a campanulate or cylindrical tube: fruit and foliage more or less glandular: bracts conspicuous: stamens not produced beyond the petals.

+ Flowers dull white or light-colored; racemes corymb-like and few-flowered.

R. viscosissimum Pursh Fl. 163. A shrub 3-5 feet high with reddish shreedy bark and stiffish branches: young branches, leaves and inflorescence viscid-pubescent: leaves round-cordate, shallowly 3-lobed, incisely crenate, 1-2 inches in diameter: racemes short; bracts spatulate, 6-8 lines long, about equalling the glandular pedicels; calyx-tube cylindrical, 5-6

lines long, abruptly inflated above its union with the ovary, twice as long as the oblong lobes: petals oblong, rounded at the summit, about half as long as the lobes of the calyx; styles smooth. 2-cleft at the apex about equalling the short included stamens: fruit ovoid, black, viscid-pubescent. On mountains, Brit. Columbia to California and the Rocky Mountains.

R. cereum Dougl. Hort. Trans. vii, 312. A low shrub 2-3 feet high with rather stiff branches and whitish bark: leaves roundish-cordate, usually broader than long, incisely 3-5-lobed and doubly crenate-toothed 6-9 lines in diameter, more or less viscid-pubescent and dotted with white waxy glands on one or both sides: racemes nodding, 1-5-flowered; bracts ovate to lanceolate, often toothed, appressed to the ovary, 3-4 lines long, longer than the very short pedicels; calyx tubular, 6 lines long, viscid-glandular, the ovate spreading lobes less than a line long; petals minute, broadly cuneiform; stamens inserted on the tube of the calyx and included in it; style minutely pubescent above, 2-lobed: fruit bright red, minutely glandular. On dry rocky ridges, Brit. Columbia to California and the Rocky Mountains.

+ + Flowers bright red varying to white; racemes drooping, many-flowered.

R. sanguineum Pursh l. c. 164. A stout shrub 3-12 feet high with erect branches: young branches and petioles glandular-pubescent: leaves cordate, 3-5 lobed, deeply serrate, glabrous above, canescent-pubescent beneath, 1-3 inches in diameter: racemes 1-4 inches long, pubescent and glandular, rather loosely many-flowered; bracts spatulate to obovate, entire or erose dentate, 6 lines long, about equalling the slender pedicels; calyx-tube cylindrical, 4 lines long, about equalled by the ample obovate or broadly lanceolate red lobes; petals oblong, obtuse, narrowed below to a broad claw, 2 lines long; style smooth, minutely 2-cleft: fruit subglobose, sparingly glandular-hirsute, black with a dense white bloom. Very common in wooded districts, Brit. Columbia to California.

* * Calyx with very short or no tube and rotate or saucer-shaped limb.

R. ciliosum. Stems prostrate, 2-4 feet long: leaves broadly cordate, 1-2 inches in diameter, acutely 3-5-lobed acutely serrate and ciliate, minutely pubescent on the veins beneath smooth above, on petioles about as long as the blade with dilated ciliate base: racemes 6-10-flowered; bracts small, ovate, about half as long as the smooth pedicels; calyx dark red, saucer-shaped, with broad rounded lobes and very short tube; petals broadly obovate, $\frac{1}{2}$ line long; anthers broader than long, sessile or nearly so; style very short, entire: fruit red, about the size of the common red currant and much like it in flavor. In marshy ground about the base of Mount Hood on the south side.

R. laxiflorum Pursh Fl. 731. *R. acerifolium* Howell: *R. Howellii* Greene. Stems caespitose, erect to ascending, 3-9 feet long: leaves triangular, 2-3 inches in diameter, truncate or more or less cordate at base, deeply 5-lobed, the acute lobes laciniately doubly serrate, smooth above, often resinous-dotted beneath; petiole as long or longer than the blade, rather abruptly dilated and ciliate at base: racemes finely pubescent, 5-12-flowered; bracts usually linear-lanceolate, 1-2 lines long, about equalling the slender pedicels; calyx rotate, with broad spatulate lobes; petals red, narrowly spatulate, a line long; anthers broader than long, on flat pedicels a line or more long; style deeply 2-lobed: fruit purple or black, with a whitish bloom, 2-3 lines in diameter. About springs and wet places along the coast and in the highest mountains, Alaska to Oregon.

R. erythroarpum Covill & Leiberg Proc. Biol. Soc. of Wash. x, 132. Stems trailing, rooting and giving rise to ascending branches 4-8 inches high: leaves round-cordate, 6-18 lines in diameter deeply 3-lobed, the

lobes coarsely crenate and the crenature uneven; apiculate-dentate, glandular-ciliate, more or less glandular: racemes erect, usually 10-20-flowered: bracts herbaceous, lanceolate to obovate, 1-3 lines long, equalling or shorter than the slender pedicels; calyx saucer-shaped, the oblong lobes spreading, yellow dotted with red, $1\frac{1}{2}$ lines long; petals broadly spatulate, glabrous; $\frac{1}{3}$ - $\frac{1}{2}$ as long as the calyx-lobes; filaments glabrous, equalling the petals, style glabrous, 2-parted: fruit scarlet, 4-5 lines long, subpyriform to spherical, glandular. Common on Mount Mazama around Crater Lake, Oregon.

R. bracteosum Dougl. Hook. Fl i, 233. Stems ascending, 2-8 feet long: leaves long-petioled, cordate, 7-8 inches in diameter, deeply 5-7-lobed, the lobes acuminate, coarsely and doubly serrate or incised, resinous dotted beneath: pedicels 6-12 inches long, loosely many-flowered; bracts foliaceous, lanceolate to linear, the lower ones broad and petioled the upper reduced and sessile, all as long or longer than the pedicels; calyx rotate, the purplish oblong lobes nearly 2 lines long; petals broadly cuneiform, rounded at the apex, less than a line long; style shorter than the petals, deeply cleft; fruit black, resinous dotted. Common along mountain streams in deep shade, Alaska to California.

R. Hudsonianum Richard. Franklin Journ 2 ed. 6. Stems erect, 4-6 feet high; leaves round-cordate in outline, 2-4 inches in diameter, smooth above, resinous dotted beneath, 3-5-lobed, the lobes acute, coarsely and doubly serrate: racemes erect, with or without a few small leaves at base, 2-4 inches long, many-flowered; bracts setaceous, much shorter than the pedicels; calyx campanulate deeply 5-parted, the oblong obtuse lobes more than a line long; petals oblong, minute; style glabrous, deeply cleft: fruit globose, resinous dotted. Along mountain streams, Brit. Columbia to Eastern Washington.

§ 3. GROSSULARIA Tourn. as genus. (GOOSEBERRY). Stems usually armed with subaxillary spines and often prickly: leaves plicate in the bud: peduncles (except in the first) 1-4-flowered: calyx more or less campanulate: ovules very numerous, in several rows: berries often prickly.

* Calyx-tube saucer-shaped, spreading immediately above the ovary: peduncles racemously several-flowered: anthers very short, pointless berries small and currant-like, sparingly bristly-glandular.

R. lacustre Poir. Suppl ii, 856. Stems prostrate or ascending, 3-4 feet long, very prickly when young; subaxillary spines several, weak and scarcely differing from the prickles: leaves cordate, 3-5-parted, the lobes deeply incised and toothed, the teeth bristly apiculate, 6-18 lines long; petioles slender, 1-2 inches long ciliate with long brownish bristles: racemes 5-9-flowered; calyx rotate; stamens about the length of the petals; styles short glabrous, 2-cleft; ovary glandular-hispid; fruit small, black. In cold mountain marshes and along streams, Alaska to California and the Atlantic States and Canada.

R. molle *R. lacustre* var *molle* Gray Bot. Cal. i, 206. Stems 1-4 feet high, intricately much branched: young shoots often prickly: subaxillary spines triple or multiple, rigid: leaves round-cordate in outline, 6-12 lines in diameter, 3-5-parted, the divisions 3-lobed and incisely toothed, soft-pubescent and sparingly glandular both sides: racemes 1-9 flowered short-peduncled; bracts ovate, acute, as long as the pedicels: flowers greenish-white, the open calyx three lines in diameter, its short lobes rounded; petals small; stamens very short: berries light red, not larger than peas. On rocky ridges in the mountains of Southeastern Oregon to California.

- * * Calyx-tube campanulate to cylindrical: peduncles 1-4-flowered.
- + Anthers oval or didymous, very obtuse and pointless:
- + + Tube of the calyx above the ovary very short.

R. velutinum Greene Bull. Cal. Acad. i, 85. Stout and rigid, 2-6 feet high, with strongly recurved branches, these not prickly; subaxillary spines solitary: leaves orbicular, palmately 3-5-cleft, the lobes crenately 3-toothed, 6-8 lines in diameter, densely velvety-tomentose to nearly glabrous: racemes short, 2-3-flowered, the orbicular bracts not half as long as the pedicels; calyx cylindrical, its lanceolate lobes twice longer than the tube; petals oblong, shorter than the calyx-lobes: stamens shorter than the petals; styles glabrous, equalling the stamens; ovary and fruit velvety-pubescent. On dry hillsides at the southern base of the Siskiyou Mountains.

R. montanum. Stems slender, creeping, 3-4 feet long: subaxillary spines 3, unequal: leaves round to oblong, less than an inch in diameter, slightly cordate or truncate, deeply 3-lobed, the lobes doubly toothed, pubescent but not glandular: peduncles usually one-flowered, bracts conspicuous, longer than the pedicels: calyx pubescent, its linear-oblong lobes 2 lines long, longer than the cylindrical tube; petals narrowly oblong, a line long: stamens longer than the petals, anthers broadly oblong; style glabrous, entire or nearly so; ovary and fruit spinose. In the forests of the Siskiyou Mountains near the summit.

R. ambiguum Watson Proc. Am. Acad. xviii, 193. Stems erect or ascending, 4-6 feet high: leaves roundish, 1-2 inches in diameter, villous and glandular, 5-lobed, the lobes crenately toothed, peduncle 1-3-flowered, calyx 6 lines long, more or less villous, the ligulate lobes several times longer than the tube, ciliate equalling the linear petals; anthers small elliptical, ovary and fruit densely spinose. Mt. Adams, Washington, to Northern California at high altitudes.

- + + Calyx-tube longer than the limb.

R. cognatum Greene Pitt. iii, 115. Slender shrub 3-10 feet high: younger branches stiffly and densely setose-hispid, the 1-3 subaxillary spines short, not very stout: leaves and the long and slender petioles villous pubescent: flowers 3-5, at the ends of long and slender pendulous peduncles: calyx salver-form, the long cylindrical tube villous-pubescent, twice the length of the oblong segments, the whole white or pale flesh-color: petals spatulate-obovate, truncate or retuse, not equalling the calyx-lobes: ovaries glabrous, fruit not seen. Along the Umatilla river, near Pendleton, Oregon.

- + + + Flowers small, dull-colored, fruit smooth.

R. gracile Michx. Fl. i, 111. Branches slender: subaxillary spines 1-3, leaves roundish, obtusely 3-lobed, crenately incised, entire at base, glabrous: peduncles elongated. 1-3-flowered; lobes of the calyx ligulate, twice or thrice longer than the short tube; stamens long exerted hairy, longer than the hairy style: fruit black smooth. Brit Columbia to Oregon and the S. E. States.

R. oxyacanthoides L. Sp. 201. Stems sometimes clothed with bristly prickles; subaxillary spines 1-3, often united at the base: leaves roundish, subcordate 5-lobed, pubescent or nearly glabrous, the lobes deeply toothed or crenate: peduncles very short 2-3-flowered; calyx tube cylindrical, pubescent at the base within, the segments spreading, rather longer than the stamens, about twice the length of the obovate petals; style cleft to the middle, hairy at base a little exceeding the stamens. Along streams, eastern Oregon to California and N. E. States.

R. divaricatum Dougl. Trans. Hort. Soc. vii, 515. Stems 3-12 feet

high, variously branched: subaxillary spines 1-3, usually stout and deflexed, leaves roundish, more or less cordate, 3-5-lobed, the lobes crenately incised; peduncles slender, usually 3-flowered; bracts broad, scarious; lobes of the calyx ligulate about twice the length of the campanulate tube: stamens exserted; anthers small, oval; style about equalling the stamens and calyx, 2-parted, hairy below; fruit small black. Brit. Columbia to California.

++ ++ ++ ++ Flowers large and showy.

R. Lobbii Gray Am. Nat. x, 274. Stems 2-6 feet high, much branched, subaxillary spines 3, usually unequal: leaves roundish, truncate or slightly cordate at base, more or less pubescent and glandular: peduncle almost filiform, 1-3-flowered; bracts broad about equalling the short pedicels: calyx campanulate, pubescent, the dark red ligulate lobes about equalling the tube, twice as long as the white truncate cuneate petals, strongly reflexed; stamens long exserted, slightly unequal; anthers nearly orbicular: style about equalling the longest stamens: fruit 6-8 lines in diameter densely glandular hispid. Washington to California, west of the Cascade Range.

R. Marshallii Greene Pitt. i, 31 (?). Stems 2-4 feet high; subaxillary spines 3; roundish, 3-5-lobed, crenately toothed, an inch or less in diameter, smooth not glandular; peduncles short, usually 1-flowered: bracts broadly lanceolate: calyx dark red, campanulate, 8-12 lines long, the lanceolate acute lobes much longer than the tube: petals oblong, rounded at the summit, 2-3 lines long, yellow: stamens and style exserted but shorter than the calyx-lobes; anthers oblong, obtuse at both ends, fruit large an inch long or more, covered with fleshy spines but not glandular. In forests in the Siskiyou Mountains.

+ + Anthers sagittate, mucronate-tipped.

++ Bracts persistent.

R. Menziesii Pursh. Fl. 732. Stems 5-10 feet high, branches strongly hispid or varying to glabrous: leaves deeply 3-cleft, the lobes coarsely incised, usually soft-pubescent beneath: pedicels slender, 1-2-flowered; bracts broadly ovate, acute; calyx 6-10 lines long, the lanceolate obtuse lobes twice as long as the campanulate tube: petals broadly cuneate, rounded at the summit; stamens equalling the calyx, anthers lanceolate, a line long, style longer than the stamens; ovary densely glandular hispid. In the coast ranges, Southern Oregon to California.

++ ++ Bracts deciduous.

R. amictum Greene l. c. 69. Stems 2-4 feet high, intricately branched: subaxillary spines 1-3, slender: leaves orbicular to oblong, less than an inch long, 3-5-lobed, the lobes crenately toothed: peduncle short, usually one-flowered; bract broadly ovate, longer than the very short pedicel, clasping the ovary when young: calyx 6-10 lines long, the lanceolate acute lobes but little longer than the narrow tube: fruit densely spinose. On dry rocky ridges, southwestern Oregon and adjacent California.

ORDER XXXIII. CRASSULACEÆ D. C. Fl. Franç. iv, 382.

Succulent or fleshy herbs with simple leaves without stipules and usually cymose inflorescence. Sepals 4-5, rarely 3-20, imbricate in the bud, more or less united at base, persistent. Petals as many as sepals and alternate with them, not unguiculate, imbricate in the bud, inserted on the base of the calyx, sometimes united at base. Stamens as many as petals and

alternate with them or twice as many, inserted with the petals or adnate to their base: filaments subulate or linear filiform: anthers introrse. Ovaries always equal in number to the petals and opposite to them with numerous, or rarely few, ovules in two rows: carpels follicular in fruit, subulate with the persistent style, usually many-seeded, opening by the inner suture. Seeds anatropous, with a membranaceous often loose testa. Embryo straight in the axil of thin fleshy albumen.

1. **Tillæa**. Parts of the flowers 3-5. Small annuals with opposite leaves and minute axillary flowers.
2. **Sedum**. Parts of the flowers 4-7: stamens twice as many: petals distinct:
3. **Cotyledon**. Parts of the flower in five, stamens ten. Petals somewhat united.

1 TILLÆA Micheli Gen. t, 20.

Small and slender somewhat succulent glabrous annual with opposite entire leaves and minute axillary flowers. Sepals and petals 3-4, distinct or united at base. Stamens as many; carpels distinct: style short-subulate: ovules one to many. Seeds longitudinally striate.

* TILLÆA PROPER. Flowers clustered: petals acuminate, hypogynous; scale minute or none: carpels 1-2-seeded.

T. minima Miers Trav. Chil. ii, 530. Diffusely branched, 1-3 inches high, erect or ascending: leaves ovate to oblong, connate at base, acute, about a line long: flowers in short leafy axillary panicles, nearly sessile or on pedicels a line or two long: sepals 4 scarcely half a line long, oblong-ovate, acute, a little exceeding the linear-lanceolate acuminate petals: carpels not longer, acute: seed usually solitary. On wet rocks etc., Southern Oregon to California and Chile.

** BALTARDIA DC. Flowers solitary; petals oval or oblong, hypogynous: scale linear: carpels, several-seeded.

T. angustifolia Nutt. T. & G. Fl. i, 558. Branching from the base, 1-2 inches high, rooting; leaves linear, acute connate: flowers axillary, usually solitary, on very short pedicels; segments of the calyx 4, ovate about half the length of the ovate obtuse-petals, carpels broad obtuse many-seeded, styles none, seeds linear-oblong. On muddy flats, Washington to California.

2 SEDUM L. Gen. n. 579.

Herbs or rarely suffrutescent plants with alternate or scattered (rarely opposite or verticillate) leaves and flowers in cymes. Sepals usually 5, rarely 4 or 6-7, more or less united at base, usually turgid. Petals distinct, mostly spreading. Stamens twice the number of the petals. Carpels as many as the sepals, many-seeded, with an entire scale at the base of each.

* Flowers mostly diœcious in a regular compact compound cyme, deep purple or becoming so, leaves flat, serrate.

S. Rhodiola DC. Fl. Franc. ed. 3, iv, 386. Stems simple, nearly erect, from a thick perennial root 1-10 inches high, leafy: leaves alternate, oblong-

oblanceolate, acute rarely entire: 6-18 lines long: cyme sessile often an inch or two in diameter: flowers on short naked pedicels, usually 4-merous sepals short, oblong: petals 1-2 lines long linear-oblong: carpels becoming 3 lines long shortly beaked. In the high mountains Alaska to California.

* * Flowers perfect, decandrous; secund upon the branches of a forked cyme, mostly yellow: style filiform: leaves entire, very fleshy.

+ Leaves broad and obtuse, narrowed toward the base: perennials.

S. spathulifolium Hook Fl. i, 227. Glabrous and sometimes mealy; stems ascending from a branched rooting caudex, 4-8 inches high, simple: leaves obovate or spatulate, 6-10 lines long: branches of the cyme approximate: flowers on short pedicels or sessile, 3 lines long: petals yellow, lanceolate, acute, twice longer than the ovate acute sepals and scarcely exceeding the stamens and style. On rocks, etc., Brit Columbia to California. Flowering in May.

S. Oreganum Nutt. T. & G. Fl. i, 559. Glabrous, not glaucous, leaves all scattered, cuneate, rounded at the summit: stems erect simple; from a creeping branched caudex: cymes compound; the flowers on very short pedicels, petals yellow linear-lanceolate, acuminate 3-4 times the length of the ovate-lanceolate acuminate sepals and about twice the length of the stamens. On rocky banks along the Columbia river near the Cascades.

S. divergens Watson Proc. Am. Acad. xvii, 372. Stems rather stout, 2-4 inches high from a creeping-branched caudex: leaves broadly ovate or obovate, sessile, 3-4 lines long: inflorescence close with short branches, flowers yellow, the lanceolate petals thrice longer than the triangular-ovate sepals and equalling the stamens: carpels united at base, widely divergent above. Eastern slopes of the Cascade Mts.

S. debile Watson Bot. King v, 102. Stems weak, 2-4 inches high, from very slender running root stocks: leaves rounded or obovate, 1-3 lines long: flowers on rather long pedicels in small cymes, 3 lines long, yellow: petals lanceolate, acuminate, twice the length of the acute sepals and little exceeding the stamens and styles. Southeastern Oregon to Nevada and Utah

S. divaricatum Watson Proc. Am. Acad. xvii, 372 Cespitose with slender branching rootstock: the lower rosulate leaves oblanceolate or acutish, roughish on the margin, 6 lines long or less, flowering stems 2-8 inches high, branches of the cymes once forked: flowers nearly sessile, bright yellow, with short lanceolate sepals and narrowly lanceolate, acuminate petals: carpels united at base strongly divergent above. Eastern Oregon and Washington.

++ Leaves lanceolate to subulate, mostly acute.

++ Perennials.

S. Douglasii Hook. Fl. i, 228. Branching at base from a stout proliferous root-stock: the rather stout stems 6-10 inches high: leaves lanceolate or the lowest linear-subulate 6-12 lines long, smooth on the margins, flat above, carinate beneath: flowers yellow, sessile, in an open cyme: petals 2-3 lines long, acuminate-lanceolate, twice the length of the ovate acuminate sepals and exceeding the stamens: carpels united at base, strongly divergent. Brit Columbia to Oregon west of the Cascade Range.

S. uniflorum Stems rather slender, branching at the base, from a short proliferous caudex, 4-8 inches high, leaves lanceolate; acuminate, flat above, carinate beneath, 4-8 lines long: stems bearing numerous propagula and terminated by a single flower: petals lanceolate; sepals a little longer than the stamens. On rocks along the Willamette and Columbia rivers near Portland.

S. ciliosum. Stems branching from a short proliferous root-stock, 2-4 inches high: leaves lanceolate from a broad base, long acuminate, 6-10 lines long, ciliate on the margin or the cauline smooth: flowers yellow in small compact cymes, sessile: petals lanceolate, acuminate, a little longer than the stamens, twice as long as the ovate long-acuminate sepals: carpels divergent above. On rocks in the Coast mountains near Roseburg, Oregon.

S. stenopetalum Pursh. Fl. 324. Cespitose: stems erect from a decumbent base, 2-4 inches high: leaves lanceolate, closely sessile, 2-4 lines long, granular-puberulent: flowers yellow, crowded in close compound cymes, on short pedicels: petals lanceolate acute equalling or a little exceeding the stamens, twice as long as the ovate sepals: carpels erect, tipped by the long divergent styles. On the higher ridges of Eastern Washington and Oregon to the Rocky Mountains.

+ + Annuals.

S. pumilum Benth. Pl. Hartw. 310. Slender, branching or single, 1-3 inches high: leaves ovate-oblong, a line or two long: flowers sessile, in sparingly branched cymes, yellow: calyx-lobes very small, triangular, acute; petals linear, acute, 1-2 lines long, exceeding the stamens and style: follicles short, 1-seeded, the seed erect, filling the cavity. On gravelly soil Oregon *Nuttall* to California.

COTYLEDON L. Gen. n. 578.

Herbs or soft-wood plants with thick fleshy entire leaves and often showy, mostly scarlet and yellow flowers in scorpioid cymes or long racemes. Calyx 5-parted, petals united into a 5-lobed pitcher-shaped or cylindrical corolla. Stamens 10 inserted on the corolla-tube: carpels distinct or rarely united at base, many-seeded beaked by the subulate style.

C. Oregonensis Watson Proc Am. Acad. xvii, 373. Stems ascending from a stout branched rooting caudex 6-8 inches high, the rosulate basal leaves spatulate, obtuse, 8-15 lines long, the cauline oblong-spatulate, 6 lines long or less: peduncles axillary along the upper part of the stem 6-12 lines long, bearing short simple or compound few-flowered racemes, pedicels 1-2 lines long, with small bractlets; sepals deltoid, a line long: petals pale yellow, united below the middle, 4 lines long; stamens slightly shorter, carpels oblong, rounded at the top, apiculate with the slender style. Eastern base of the Cascade Mts. near Mt. Hood.

C. farinosa Baker Refug. Bot i, t. 71. Caulescent: more or less mealy-pulverulent: rosulate leaves rather flaccid, ascending, lanceolate, acuminate, the larger ones 2-4 inches long, very acute: flowering branches a span high or less with scattered broadly ovate to lanceolate clasping leaves: flowers in a rather close short compound cyme; bracts ovate-lanceolate, rather large; pedicels stout, 1-3 lines long: sepals broadly lanceolate, about 3 lines long; petals yellow, oblong-lanceolate, mostly acuminate, 4-6 lines long; carpels ovate-oblong about three lines long. At the mouth of the Chetco River, Oregon and Southward along the Coast.

ORDER XXXIV. DROSERACEÆ S. F. Gray Arr. Brit. Pl. ii, 664.

Herbs or rarely suffrutescent plants with alternate or crowded entire, usually viscid-glandular leaves without stipules and perfect flowers. Sepals 5, persistent, equal, sometimes united at base; imbricate in the bud. Petals 5, alternate with the sepals, marcescent, stamens distinct, usually as many as petals

and alternate with them, rarely 2 or 3 times as many, marcescent; anthers extrorse or innate, the cells distinct or somewhat connivent above, opening down the sides or rarely by a terminal pore. Ovary composed of 2-5 united carpels: placenta parietal or filling the base of the cell. Styles 2-5, distinct or united at base, each 2-parted, or multifid and pencil-shaped, sometimes all united into one. Capsule loculicidally 2-5-valved or indehiscent mostly many-seeded. Seeds anatropous; the testa sometimes arilliform. Embryo short, at the base of cartilaginous or fleshy albumen.

1 DROSERA L. Gen. n. 391 (SUNDEW).

Small herbs growing in sphagnous or sandy marshes, with the leaves all radical and furnished with numerous long glandular hairs, and small flowers on simple scapes. Stamens 5, styles 3-5, 2-parted with the divisions somewhat thickened toward the apex, or multifid. Capsule subglobose or ovoid, usually 3-valved at the top; the valves placentiferous to the top. Seeds numerous, in 2-5 rows on each placenta.

D. rotundifolia L. Sp. i, 281. Leaves spreading, orbicular, abruptly attenuate to a long hairy petiole: scapes 2-6 inches high, 5-10-flowered; petals oblong, 2 lines long, a little exceeding the oblong sepals: styles short, 2-parted: capsule included in the calyx: seeds linear with a loose coat. In cold marshes Alaska to California, the Atlantic States and Europe.

D. Anglica Hudson Fl. Angl. 135. Leaves ascending, oblong, attenuate into the slender naked petioles: scapes 3-10 inches high, sometimes forked at the top, few-flowered: petals linear-oblong 3-4 lines long nearly twice longer than the oblong sepals: capsule exceeding the calyx: seeds linear with a loose coat. In cold marshes Alaska to California, Siberia and northern Europe.

ORDER XXXV. CERATOPHYLLACEÆ. Gray, Ann. Lyc.
N. Y. iv, 41.

Perennial submerged aquatic herbs with cylindrical jointed stems and branches, verticillate, sessile, filliformly 2-3-lobed leaves without stipules, and sessile axillary-flowers. Flowers monœcious without perianth but surrounded by a persistent 8-12-cleft involucre; anthers numerous sessile, fleshy, 2-3-cuspidate at top, ovary solitary, 1-celled, with a pendulous orthotropous ovule; achene beaked by the slender persistent style, seeds with membranous transparent testa and no albumen; radicle inferior very short; the cotyledons thick and oval, the highly developed plumule consisting of several nodes and leaves.

1 CERATOPHYLLUM L. Gärtn. Fr. t. 44.

Characters as of the order.

C. demersum L. Sp. 1409. Stems very slender, a foot or two long,

smooth or nearly so; leaves in numerous whorls of 6-8, the filiform or linear segments acute, more or less aculeate-dentate. $\frac{1}{4}$ to one inch long: achene 2 lines long or more, elliptical, somewhat compressed, shortly stipitate, with a short spine or tubercle on each side near the base, not margined: style as long as the achenes. Washington to California, the Eastern States and Europe.

ORDER XXXVI. LYTHRACEÆ Lindl. Nat. Syst. ed. 2, 184.

Herbs, rarely shrubs or trees, with usually 4-sided branches opposite, rarely a ternate, entire leaves without stipules and flowers in the axils or in terminal racemes. Sepals combined into a 4-7-toothed or lobed calyx; the lobes valvate or distant in the bud; the sinuses sometimes produced into accessory lobes or processes. Petals alternate with the proper lobes of the calyx and inserted on its throat, deciduous, sometimes wanting. Stamens inserted into the tube of the calyx below the petals, equal to them in number, or 2-4 times as many, rarely fewer: anthers short, introrse. Ovary enclosed in but free from the calyx, 2-4-celled, with numerous ovules in each cell; the placentæ in the axis: style filiform, sometimes short or almost none: stigma usually capitate. Capsule membranaceous, surrounded by the calyx, often one-celled by the obliteration of the partitions, dehiscent either longitudinally or irregularly. Seeds numerous and small, rarely few and large, anatropous, without albumen. Cotyledons flat and foliaceous.

1. **Ammannia.** Calyx barely 4-angled, short: stamens 4 or 8: capsule globular.
2. **Lythrum.** Calyx striate, cylindrical: petals usually 6: stamens as many or twice as many: capsule oblong or cylindrical.

AMMANNIA Houst. L. Gen. n. 155.

Herbs with square stems, opposite entire leaves and axillary bracteolate flowers. Calyx more or less campanulate, 4-5-toothed or lobed, the sinuses usually expanding into spreading accessory teeth or horns. Petals as many as lobes of the calyx or wanting. Stamens as many or twice as many as lobes of the calyx: Ovary 2-4-celled: style short or rather long: stigma capitate, capsule globose or ovoid, included in the calyx, either bursting transversely or opening by valves. Seeds numerous, attached to thick central placentæ.

A. latifolia L. Sp. 115. Stems erect, branching, 6-24 inches high: leaves linear-lanceolate, acute, dilated and obtusely cordate-auriculate at base, closely sessile, 2-3 inches long: flowers 1-5 in each axil, somewhat pedunculate, at least when solitary: calyx 4-angled or pleated, with 4 short lobes and as many small spreading horn-like processes: petals 4, caducous; stamens 4; style more than half as long as the capsule: capsule 4-celled. Wet places along the Columbia River and the Eastern States.

A. humilis Michx. Fl. i, 99. Stems ascending, 2-10 inches high, branching from the base: leaves linear-oblong or lanceolate, obtuse, tapering below to a short petiole or sessile: flowers sessile or 2-3 in the lower axils; calyx 4-angled with 4 short lobes and as many small spreading pro-

cesses; petals 4, caducous; stamens 4; style very short or none; capsule 4-celled. On wet banks, along the Columbia River and the Eastern States.

2 LYTHRUM Juss. Gen. 132.

Herbs, rarely suffrutescent plants, with opposite or scattered entire leaves and purplish or white flowers. Calyx cylindrical, striate, with 4-6 short lobes and usually as many intermediate teeth or processes. Petals 4-6. Stamens as many or twice as many as petals, inserted on the tube of the calyx. Style filiform: stigma capitate. Capsule oblong, 2-celled, many-seeded, enclosed in the calyx-tube.

L. adsurgens Greene Pitt. ii, 12. Stems 1-3 feet long, from a stoloniferous perennial base, stoutish but tough and flexible, 5-angled, decumbent or nearly prostrate, herbage pallid and glabrous: leaves scattered, linear, sessile: calyx 2-3 lines long the small lobes subulate, the intermediate processes broad and mucronulate: petals pale purple, but little exceeding the calyx-lobes. In wet or springy places, Puget Sound to California.

ORDER XXXVII. HALORAGEÆ Endl. Gen. 1155.

Herbs or suffruticose plants growing in water or wet places with various leaves and small axillary sessile perfect, rarely monœcious or diœcious flowers. Limb of the calyx 3-4-lobed or entire, sometimes wanting. Petals 3-4 small or wanting. Stamens as many or twice as many as the lobes of the calyx, sometimes fewer, inserted with the petals into the summit of the calyx. Ovary coherent with the calyx, 1-4-celled, with a solitary pendulous ovule in each cell. Styles 1-4 or none: stigmas as many as cells of the ovary, distinct. Fruit dry and indehiscent. Seeds anatropous with a straight embryo and thin fleshy albumen.

* Stamens one.

1. **Hippuris.** Ovary 2-celled: leaves verticillate, linear or oblong, entire.
2. **Callitriche.** Ovary 4-celled: leaves opposite, linear or spatulate, entire.

** Stamens 5-8.

3. **Muriophyllum.** Ovary 4-celled: leaves verticillate subverticillate or scattered, the emersed entire toothed or pectinate, the submerged pinatifid.

1 HIPPURIS. L. Gen. n. 11.

Aquatic perennial herbs with simple stems, verticillate entire leaves and minute axillary flowers. Flowers perfect, or by abortion sometimes neutral or pistillate. Calyx-tube adherent to the ovary, the limb minute, entire. Petals none. Stamen one, inserted on the margin of the calyx. Style filiform, stigmatic its whole length and lying in a groove of the stamen. Fruit 1-celled, 4-seeded.

H. vulgaris L. Sp. i, 4. Stems erect, 10-20 inches high, rather stout: leaves in whorls of 6-12, linear, 8-12 lines long or more, one-nerved:

stamen with large thick filament and rather large 2-celled anther: fruit oval or somewhat 4-sided, 2-3 lines long; stigma persistent. In ponds and marshes, Alaska to California, the Eastern States and Europe.

Var. fluviatilis Hart. Larger; leaves 2-3 inches long, grass-like, in closely crowded whorls. Oregon to Canada and Sweden.

H. tetraphyllum L. f. Suppl. 81. Stems 10-12 inches high, leaves in whorls of 4 or 6, oval to obovate, often feather-veined; fruit less than 2 lines long. Alaska, perhaps northern Washington.

H. montana Ledeb. Reichenb. Incon. Bot. i, 71. Stems 2-4 inches high; leaves 1-nerved, linear mucronate, in whorls of 5-6, 4-6 lines long: flowers often monoëcious: fruit almost oval, a line or more long, minutely granulate. In wet turfy places, Alaska to Washington.

2 CALLITRICHE L. Gen. n. 13.

Small, mostly aquatic, herbs with opposite entire leaves without stipules and small axillary monoëcious flowers without petals. Calyx adherent to the ovary the limb very short or obsolete. Petals none. Stamen one with slender filament and cordate 4-celled anther. Ovary 4-celled, with 2 filiform styles. Fruit 4-celled, flattened and emarginate, 4-seeded, indehiscent, the cells separating at maturity into 1-seeded nutlets.

* Emerged leaves obovate-spatulate, 3-nerved, the submersed linear, (all uniform and narrow in terrestrial forms): carpels connate.

+ Fruit pedicellate, wing-margined; bracts none

C. marginata Torr Pacif R. Rep. iv, 135. Stems slender, branching, rooting in the mud growing in water: submersed leaves linear, 1-nerved, running gradually into the emerged oblanceolate or spatulate 3-nerved ones, or the terrestrial form with linear spatulate 3-nerved leaves 4-5 lines long: peduncles about two-thirds as long as the leaves, spreading or reflexed: styles as long or shorter than the fruit reflexed deciduous: fruit broader than long with conspicuous membranaceous wings and divergent lobes. From Arizona and California to The Dalles, Oregon.

C. sepulta Watson Proc. Am. Acad. xiv, 298. Terrestrial, prostrate and rooting in the mud: the numerous narrowly linear leaves 2-3 lines long: fruit broader than long emarginate at both ends, the thick carpels with acute divergent margins, on stout pedicels 1-3 lines long soon deflexed and buried in the soil: stigmas elongated, reflexed, soon deciduous. Oregon. (Hall 1871.)

C. verna L. Sp. i, 2. Perennial, with elongated stems and floating rosulate obovate often emarginate leaves which are more or less narrowly petioled the submerged ones from spatulate to linear: sometimes terrestrial and rooting with short linear leaves: bracts often longer than the fruit rarely wanting: stigmas erect or spreading, usually shorter than the fruit, deciduous: fruit oblong flat on the face mostly with a small apical notch and narrow apical wings the grooves between the lobes deep. Common from Alaska to California, the Eastern States and Europe, Asia and S. America.

C. heterophylla Pursh. Perennial with elongated stems and obovate floating leaves, the submerged ones linear-lanceolate, long acuminate, 4-8 lines long, sometimes terrestrial and rooting, with short linear leaves: stigmas longer than the fruit persistent: fruit obovate, broader than long, with a deep broad notch at the apex. thick, almost ventricose near the base, the lobes obtusely angled, with a small groove between them, wing-

less or with a narrow wing or raised border on the upper margin. Oregon to Colorado and the Eastern States.

C. Bolanderi Hegelm. Verhandl. Bot. Verein Brandenb. x, 116. Stems stout, elongated, floating: leaves rhombic-obovate, the submerged ones linear: stigmas twice as long as the fruit persistent or sub-persistent: fruit orbicular or slightly obovate, with obtuse closely approximate margins, the lobes scarcely winged. Brit. Columbia to California.

* * Submersed perennials with numerous uniform 1-nerved leaves: flowers without bracts: carpels separated nearly to the axis.

C. autumnalis L. l. c. Stems very slender, 2-10 inches long: leaves linear truncate or retuse at the apex: fruit sessile, round, deeply notched, nearly a line in diameter, the margins thin or at length winged: stigma long, reflexed, caducous. Eastern Oregon to California, the Eastern States, Europe and Asia.

3 MYRIOPHYLLUM L. Gen. n. 10, 66.

Aquatic usually submersed perennial plants, the upper part emersed while flowering, with verticillate, sometimes opposite or alternate leaves, the submersed ones pinnately parted with capillary or filiform segments, and sessile flowers in the axils of the upper leaves (which are frequently reduced to bracts) bibracteolate the uppermost usually staminate, the lower fertile the intermediate often perfect. Flowers monœcious or frequently perfect. Calyx 4-parted in the sterile flowers, 4-toothed in the pistillate and perfect ones. Petals 4, frequently inconspicuous or wanting. Stamens 4 or 8. Ovary 4-celled: stigmas oblong or linear, often compressed, penicillate, or papillose along the inner surface, recurved. Fruit of 4 indehiscent nut-like carpels cohering by their inner angles and enclosed in the adherent tube of the calyx, apiculate with the base of the stigma.

* Stamens 8, petals caducous carpels not ridged on the back: leaves verticillate

M. spicatum L. Sp. 992. Stems very long and slender, branching: leaves ternately verticillate, submerged all pinnately parted with capillary segments, emersed leaves bract-like, shorter than the flowers, ovate, entire, the lowermost larger and serrate: bracteoles triangular-ovate, about half the length of the bracts: lobes of the calyx somewhat obtuse: petals broadly ovate: anthers oblong: stigma short, pubescent along the inner side: carpels smooth and even. Deep ponds, Washington to California and the Eastern States.

M. verticillatum L. Sp. 992. Stem stout: leaves ternately verticillate, the lower ones pinnately parted with capillary or setaceous segments, floral leaves pectinate-pinnatifid, commonly much longer than the flowers: bracteoles minute: lobes of the calyx nearly lanceolate, acute, minutely serrulate: petals oblong-obovate: anthers oblong, stigmas linear-oblong, at length woolly: carpels smooth and even. Oregon, *Nuttall* (not since reported) and the Eastern States.

* * Stamens 3: petals somewhat persistent: carpels 1-2 ridged on the back.

M. hippuroides Nutt. T. & G. Fl. i, 530. Leaves quaternately verticillate, the lower ones pinnately parted, with capillary segments; floral leaves linear, remotely denticulate or serrate; petals obovate, carpels nearly 2-ridged on the back. In ponds, Washington to northern California.

M. pinnatum Walt. Leaves in whorls of 3's and 5's, sometimes scattered, the floral linear, pectinate toothed, or cut serrate, the teeth comparatively few, 5-12 lines long, gradually changing into the submerged which are in crowded verticels, the capillary pinnae sparse; spikes 3-6 inches long: petals purplish, somewhat persistent, stamens 4, very rarely 6: mature fruit about 1 line long: carpels strongly 2-keeled.

ORDER XXXVIII. ONAGRACEÆ. Dumort. Anal. Fam. xxxvi. 35.

Herbaceous or sometimes shrubby plants with entire or toothed leaves, with flowers in the axils or in terminal spikes or racemes. Sepals united into a tubular calyx, the limb 4-parted rarely more or less; valvate in the bud. Petals usually as many as the lobes of the calyx, and attenuate with them, inserted on the summit of the tube twisted in the bud, sometimes wanting. Stamens as many or twice as many as the lobes of the calyx, rarely half as many, inserted with the petals, filaments distinct; ovary coherent with the tube of the calyx. 2-4 (or by abortion) 1-2-celled placenta in the axis, style elongated or filiform; stigma capitate or 4-lobed, fruit capsular with mostly loculicidal dehiscence, or dry and indehiscent, rarely baccate. Seeds indefinite or solitary in each cell, anatropous without albumen; embryo straight.

TRIBE I. JUSSIÆ. Limb of the calyx divided quite down to the ovary and persistent on a many-seeded capsule. Seeds naked.

1. **Ludwigia.** Petals 4 or none. Stamens 4. Capsules short.

TRIBE II. ONAGRÆ. Limb of the free tube of the calyx, when there is any, deciduous from the ovary or capsule. Capsule loculicidal, few to many seeded. Parts of the flowers in fours.

* Seeds comose at the apex; stamens 8, lower leaves often opposite.

2. **Epilobium.** Calyx 4-parted nearly down to the ovary or with a short and campanulate tube beyond it.

* * Seeds not comose: leaves all alternate.

+ Anthers attached near the middle and versatile. Petals generally yellow or white.

3. **Gayophytum.** Calyx-tube not produced beyond the ovary; this and the membranous capsule only 2-celled.

++ Stamens all of equal length.

= Stigma deeply 4-cleft, its segments linear.

4. **Onagra.** Ovules and seeds horizontal, inserted in 2 or rarely in several rows, prismatic-angled.

5. **Oenothera.** Ovules and seeds ascending in one row; not angled: flower-buds erect: flowers yellow.

6. **Anogra.** Ovules and seeds ascending, not angled, in two rows: flower-buds drooping, flowers pink or white.

= = Stigma entire or rarely 4-toothed: ovaries and capsule sessile or nearly so.

7. **Taraxia.** Stigma capitate: calyx-tube longer than the ovary, usually adherent to the style.
8. **Sphærostigma.** Stigma capitate: calyx-tube campanulate, shorter than the ovary.
= = = Stigma capitate, ovules and capsule long-stalked.
9. **Chylismia.** Calyx-tube somewhat funnel-form, many times shorter than the ovary.
+ + Flowers irregular: the alternate stamens longer.
10. **Pachylophus.** Plants normally acaulescent: ovules and seeds few, sessile: seeds with a deep furrow along the raphe.
+ + Anthers attached at or near the base, remaining erect; those opposite the petals much shorter or sterile, rarely wanting; petals never yellow.
11. **Godetia.** Calyx-tube above the ovary obconical, its lobes reflexed. Petals sessile, entire, rarely 2-lobed. Capsule coriaceous. Seeds numerous angled or margined.
12. **Boisduvalia.** Calyx-tube above the ovary obconical, its lobes erect. Petals sessile, 2-lobed. Capsule membranaceous, the cells few-seeded, seeds smooth.
13. **Clarkia.** Calyx-tube above the ovary obconical; its lobes reflexed. Petals with claws either lobed or entire: the stamens opposite them often sterile. Capsule coriaceous.

TRIBE III. GAURINEÆ. Limb or produced tube of the calyx deciduous from the dry and indehiscent 1-4-seeded fruit. Parts of the flowers in 4's or rarely 3's. Leaves alternate.

14. **Gaura.** Stamens 8, all perfect. Anthers attached by the middle, versatile.
15. **Heterogaura.** Fertile stamens 4 with anthers attached at the base, sterile stamens 4 opposite the petals.

TRIBE IV. CIRCÆÆ. Limb of the calyx deciduous from the indehiscent burr-like 1-2-seeded fruit. Parts of the flowers in 2's throughout. Leaves opposite.

16. **Circæa.** Small perennial herbs with opposite petioled leaves.

LUDWIGIA L. Gen. n. 153.

Calyx-tube not produced beyond the short ovary, the 4 lobes usually persistent. Petals 4 often small or wanting. Stamens 4; filaments short. Capsule short or cylindrical, many-seeded, 4-valved, dehiscent septically or by openings at the summit. Seeds minute. Aquatic or marsh perennials; leaves entire (opposite in one species); flowers axillary, mostly solitary and sessile.

L. palustris Ell. i, 211. Stems creeping and rooting in the mud or floating, 4-12 inches long or more: leaves all opposite, ovate or oval, 6-12 lines long tapering to a short petiole acute: flowers solitary, sessile: petals none or short and reddish: capsule short-oblong 2 lines long or less some-

what angled. Western Washington and Oregon to California, in the Eastern States and Europe.

2 EPILOBIUM L. Gen. n. 471.

Perennial or annual herbs, with nearly sessile, denticulate or entire, often fascicled leaves, and rose-colored, purple or white, very rarely yellow, flowers in panicles or racemes. Tube of the calyx not conspicuously prolonged beyond the ovary; the limb deeply 4-cleft; campanulate or funnel-form or 4-parted to the base, the lobes spreading deciduous. Petals 4, spreading or somewhat erect. Stamens 8 the 4 alternate ones shorter; anthers elliptical or roundish, fixed near the middle. Stigma oblong, clavate or with four spreading or revolute lobes; capsule linear, 4-sided, 4-celled, 4-valved. Seeds numerous, ascending, the summit furnished with a coma or tuft of long hairs.

§ 1. CHAMÆNERION. Calyx cleft almost to the ovary. Corolla slightly irregular. Petals widely expanded. Stamens inserted in a single series; the filaments dilated below. Style at first recurved. Stigma with four ultimately divergent lobes. Capsule mostly linear-fusiform, many-seeded. Seeds fusiform, beakless, not papillate in one species. Cespitose perennials from a stout caudex, bearing sessile scaly winter buds with terete stems and ample leaves.

E. spicatum Lam. Fl. France 1077. Stems erect, 2-6 feet high, subsimple, glabrate below: leaves lanceolate, acute, nearly entire, 4-8 inches long, on very short petioles, thin pinnately veined, with the evident lateral veins confluent in submarginal loops: inflorescence elongated; racemes with small bracts; young flower buds soon reflexed, but again spreading or ascending before expansion: petals 5-7 lines long, style exceeding the stamens, hairy at base; capsule 2-3 inches long; seeds less than a line long, with very long dingy coma. Alaska to California, the Eastern States, Europe and Asia.

E. latifolium. L. sp. 347. A span to a foot or more high, frequently branched, mostly glabrate below; leaves 1-2 inches long; usually opposite and connected below on the branches and rarely on the main stem; lanceolate to ovate, acute at both ends, entire or sparingly and minutely denticulate, scarcely petioled, rather coriaceous, the mostly free lateral veins inconspicuous: inflorescence usually short and few-flowered, leafy throughout, the buds not reflexed; petals 8-15 lines long, rather narrow, styles shorter than the stamens, glabrous; seeds a line long or more. Damp places Arctic America to N. E. Oregon and N. E. states, Asia and the Himalayas.

§ 2. LYSIMACHION. Calyx with an evident though usually short tube mostly somewhat hairy within. Corolla regular, the petals deeply notched or obcordate; usually not expanding beyond funnellform. Stamens inserted in two more or less distinct whorls; those opposite the sepals longer and more deeply inserted. Style not declined mostly glabrous.

* Stigma 4-cleft: seeds beakless. Perennials with rather slender caudex and usually terete stems.

+ Capsule linear-fusiform; many seeded; seeds beakless. Rather tall plants with ample conspicuously-veined chiefly opposite leaves and large flowers with short and open calyx tube.

E. luteum Pursh 259. Stems slender a foot or two high, nearly simple; glabrate below except along the elevated lines decurrent from some of the nodes: leaves one to three inches long, ovate or elliptical to broadly lanceolate, acute or acuminate, sinuate-toothed, sessile or when large obliquely tapering to a winged petiole, slightly fleshy: inflorescence more or less glandular-pubescent; the flowers at first nodding, not very numerous, in the axils of the somewhat crowded and frequently reduced upper leaves; petals bright yellow 8-9 lines long, style frequently exerted, its obconical apex mostly deeply 4-parted: capsule long stalked more or less puberulent; seeds obovoid very acute at base, smooth or slightly areolated, less than a line long; coma at length reddish. Oregon to Alaska.

+ + Capsules rather short; subclavate-fusiform; few-seeded: rather low and slender stemmed, more or less cespitose plants, usually somewhat shreddy at base.

+ + Leaves rather broad; flowers large, rose-purple; style shorter than the petals.

E. rigidum Hausskn. Bot. Zeitschr. xxix, 51. Stems decumbent, 4-8 inches long, glabrous and rather glossy at base, glandular-pubescent above: leaves 8-16 lines long, the upper more or less attenuate, lanceolate to nearly obovate, acute, entire, cuneately narrowed into short winged petioles, glabrous and very glaucous, firm with mostly inconspicuous lateral veins: flowers rather few in the axils of the reduced upper leaves which are often adnate to the base of the peduncles; ovary more or less densely white pubescent; calyx cleft nearly to the base; petals 7-10 lines long; stigma very large, its surface pilose-papillate; seed smooth. Eastern base of the Coast range, Josephine Co., Oregon.

Var. areolatum Trel. Sp. Epilob. 83. Densely velvety-canescens throughout. With the type.

+ + Leaves relatively narrow, flowers rather small; cream-colored, style exerted; seeds nearly obconical, closely low-papillate.

E. suffruticosum Nutt. T. & G. Fl. i, 488. Stems woody and intricately much branched at base, a span high, minutely canescent throughout or at length glabrate below: leaves numerous, less than 10 lines long, mainly opposite, broadly lanceolate, acutish, entire, narrowed below but hardly petioled, thick, with inconspicuous veins: flowers rather few, in the axils of the scarcely reduced upper leaves; calyx-tube broadly funnel-form; petals 3-4 lines long; capsule an inch long, short-stalked: seeds a line or more long; coma long and very dingy. Oregon to northwest Montana and the Yellowstone Park.

* * Stigma more or less 4-cleft in the larger flowers, usually subentire in the smaller; capsule prominently ribbed, rather short and few-seeded; seeds beakless, very broad and blunt, usually abruptly contracted above the base, areolate or low-papillate; coma pale, falling easily: mostly slender annuals with terete stems, more or less glandular-pubescent above, and rather firm veinless leaves.

E. paniculatum Nutt. l. c. 490. Stems rather slender, 1-4 feet high, loosely dichotomously branched, mostly white glabrate below: leaves 1-2 inches long, chiefly alternate and fascicled in the axils, lanceolate or linear-lanceolate, often folded along the midrib, acute, rather sparingly denticulate, tapering to a slender winged petiole, gradually passing into the smaller bracts above: flowers rather remote towards the ends of the ascending branches, erect: the bracts often carried up on the peduncle;

calyx-tube very narrowly funnel-form, 1-2 lines long; petals about 4 lines long, violet; capsule fusiform, falcate, ascending about 10 lines long; seeds a line long, low-papillate. Brit. Columbia to California, and the Rocky Mts.

E. jucundum Gray Proc. Am. Acad. xii, 57. Stems erect, 2-4 feet high, diffusely paniculately branched: leaves linear-lanceolate, acute or acuminate, sparingly denticulate: 1-2 inches long, narrowed below to a distinct petiole: flowers somewhat fasciculate at the end of the branches; tube of the calyx linear, dilated at the top, 6 lines long; petals obcordate 6 lines long or more; capsule somewhat clavate. Dry prairies, eastern Washington to northern California.

E. Hammondi. Stems slender and flexuous, 1-3 feet high, paniculately branched above, glabrate and whitish below: leaves linear, 1-2 inches long: flowers larger, borne towards the ends of the branches, erect: calyx tube 6-8 lines long, almost filiform below; petals obcordate, 6 lines long or more, bright purple: capsule lanceolate to somewhat clavate about an inch long, ascending. On dry rocky slopes, Southwestern Oregon, blooming in August and September.

E. minutum Lindl. Hook. Fl. I. 207. Stems slender, a span or two high, simple or mostly with ascending branches throughout, crisp-pubescent below: leaves 6-10 lines long, usually alternate, narrowly to broadly lanceolate or the lowest spatulate, acutish, undulate, cuneately narrowed to a slender winged petiole; flowers rather numerous, erect; calyx tube broadly funnel-form, short; petals 1-2 lines long; capsules about one inch long, narrowed to the base, on short pedicels; seeds less than a line long, reticulated or low papillate. Brit. Columbia to California.

* * * Stigma clavate, entire or slightly notched: coma of seeds mostly persistent. Plants of various habit; perennial by rhizomes, stolons, turions, etc. (Exceptions are *E. exaltatum* and *E. Oregonum*, both of which have conspicuously 4-lobed stigmas.)

+ Spreading by filiform remotely scaly subterranean shoots which end in ovoid winter bulblets with fleshy scales: capsule many-seeded: seeds more or less papillate mostly fusiform with conspicuous translucent beak at insertion of coma.

E. palustre L Sp. 348. Quite canescent above, with incurved hairs; leaves 1-2 inches long, narrowly oblong or rarely lanceolate, obtuse or almost truncate, gradually narrowed to a sessile base: fruiting peduncle often long and slender; flowers few, mostly nodding at first; seed fusiform with prominent scarcely narrowed translucent point. Swamps and wet places, Alaska to Oregon and the N. E. states.

+ + Producing at base of stem in late summer and autumn rosettes of foliage; leaves not revolute, more or less toothed: seeds papillate.

+ Habit of *E. palustre*: stems terete or with occasional low decurrent lines: seeds fusiform, prominently beaked.

E. Davuricum Fischer. A span or two high, mostly simple, the very slender stems sparingly incurved-pubescent, otherwise glabrous; roots densely fascicled: leaves less than 8 lines long, somewhat crowded at base, alternate and remote above, linear or oblong, obtuse, remotely denticulate, sessile, 1-nerved: flowers pale, not very numerous, nodding: capsule erect, 20 lines long, on long slender peduncles; seeds less than a line long; coma white. Bogs Alaska to Washington and east to the Selkirk range.

+ + Coarser branched plants of the habit of *E. coloratum*: stems with rather prominent ridges decurrent from some of the leaves:

leaves usually ample, commonly toothed, with evident lateral veins; capsule 20-25 lines long; seeds mostly broadly obovoid, short-beaked, sharply papillate in rather distinct longitudinal lines.

= Large flowered for the group, with rather deep violet petals 3-5 lines long, hairs within calyx-tube well developed: leaves mainly opposite; 1-2 inches long.

E. Franciscanum Barbey. Bot. Cal. i, 220 A span to mostly a foot or two high, the larger forms much branched; subcanescent or more or less pilose above; leaves elliptical-lanceolate to ovate-lanceolate; obtuse, with rather numerous and prominent serrations; rounded to the very short and broad petioles: flowers at first crowded scarcely exceeding the somewhat reduced leaves, clustered at the end of branches; seeds broad, very hyaline-papillate. Oregon to California and Nevada.

= = Petals 2-3 lines long, pale to mostly rather deep rose-colored; leaves for the most part attenuate, rather broad often purple in autumn.

E. coloratum Muhl. Glabrate below, the rather numerous paniced branches canescent with incurved hairs, at least along the decurrent lines and more or less glandular towards the end: leaves 2-6 inches long, lanceolate to oblong-lanceolate, acute, deeply and irregularly serrulate, mostly gradually narrowed to conspicuous slender petioles, glabrous except the uppermost, rugose veiny: flowers very numerous more or less nodding; petals 1-2 lines long, rosy: fruiting peduncles slender mostly short: seeds beakless, strongly papillate; coma at length cinnamon-colored, at least at base. Oregon and Eastern States.

E. adenocaulon Hausskn. l.c. 119. Habit of the preceding; inflorescence and capsule very glandular-pubescent, with few if any incurved hairs; leaves 2 inches long or more; frequently erect, elliptical to mostly ovate-lanceolate, obtuse, only slightly serrulate or denticulate, abruptly rounded to short winged petioles, rather pale green and glossy, glabrous except the uppermost which are gradually reduced and seldom as rugose as in *E. coloratum*; flowers very numerous, more or less nodding, two lines long, rosy; seeds obovoid, abruptly short-beaked; coma white. Oregon to New Brunswick, Pennsylvania, Utah and California.

Var. occidentale Trel. l.c. 95. Remotely leafy, especially the mostly strict glandular branches; leaves more triangular-lanceolate; 2 inches long on the main stem, prominently denticulate. Brit. Columbia to Central California.

Var. (?) perplexans Trel. l.c. 96. Slender, subsimple or with few ascending remotely leafy branches; less glandular, the inflorescence sometimes canescent with incurved hairs: leaves scarcely 2 inches long, divergent, lanceolate, rather obtuse, the upper acutely tapering to slender sometimes elongated petioles. Yellowstone Park to Oregon and California.

+ + + Producing globose or ovoid sessile or sub-sessile subterranean winter bulblets with fleshy scales: seeds papillate and more or less beaked.

+ + Leaves mostly broad and ample or of medium size and with evident lateral veins; stems with more or less prominent lines decurrent from some of the nodes.

E. delicatum Trel. l. c. 98. Slender stemmed, glabrous except for the crisp-hairy lines above and slightly crisp-hairy or glandular inflorescence: leaves as much as 38 lines long, mostly very divergent, chiefly ovate-lanceolate and obtuse, undulately low-denticulate, rounded to the very short narrow base or cuneate and somewhat petioled, thin and pale: flowers

few, nodding; petals 2-4 lines long, violet; capsules 20-30 lines long, their slender peduncles about half as long: seeds finely papillate; coma dingy. Union county, Oregon (Cusick).

E. glandulosum Lehm. Hook. Fl. i, 206. Tall and rather thick stemmed, the largest specimens branched; commonly somewhat loosely crisp-pubescent above or with very flexuous glandular hair: leaves crowded near the summit, frequently exceeding the inflorescence; 3-5 inches long, broadly ovate or ovate-lanceolate, the upper acute or sub-acuminate, prominently serrulate, mostly abruptly rounded to the base, drying dark: flowers erect, near the end of the stem: petals 2-3 lines long, more or less purple; capsules about 30 lines long, short-stalked: seeds coarsely hyaline-papillate or with the papillæ often entirely collapsed, very blunt above; coma dingy. Alaska and Brit. Columbia, perhaps Washington.

E. brevistylum Barbey. Bot. Cal. i, 220. Slender pubescent, leaves scarcely 2 inches long, ovate or elliptical, loosely and uniformly distributed along the stem, the uppermost reduced and surpassed by the nearly glabrous capsule: seeds slightly tapering upwards, coarsely hyaline-papillate. Springs etc., Washington to California.

E. ursinum S. R. Parish. A span to a foot high, slender: both leaves and stems below pilose with rather remote and spreading long white hairs; the inflorescence minutely glandular-pubescent: leaves an inch long or less, rather uniformly and in larger plants remotely distributed, ovate, broadly lanceolate, the upper subacute and serrate, the lower blunter and finely denticulate or nearly entire, very abruptly rounded to the sessile base, flowers few, erect or somewhat nodding; petals white or lavender, 2-3 lines long: capsules ascending 15 lines long on very slender peduncles of more than half their length, soon glabrous; seeds often very rough, short beaked: coma rather scant, white. San Bernardino county, California to Washington.

Var. subfalcatum Trel. l. c. 101. Lower but often branched below, almost without decurrent lines, densely tomentose or pilose to the glandular shorter inflorescence; leaves narrower sometimes falcate, entire or remotely and inconspicuously denticulate, mostly obtuse, more cuneate at base, more tomentose with inconspicuous lateral veins; capsule at first very short stalked. California to Southern Oregon.

E. Halleianum Hausskn. Monog. Epilob. 231 Tall and slender, glandular-puberulent throughout or soon glabrous below. leaves remote, mostly ascending 10-15 lines long ovate to oblong-lanceolate, the lower obtuse, decidedly undulate-serrulate, abruptly sessile or some of them clasping, decurrent by the broad base; flowers and capsules ultimately rather remote in the upper axils; petals 2-3 lines long, pale to mostly rather deep violet; capsule almost 2 inches long on slender peduncles of nearly equal length, exceeding the subtending leaves: seeds sometimes smooth, usually very finely papillate, fusiform, blunt at base, with gradually narrowed pale apex and hyaline beak; coma scarcely dingy. Vancouver Island to Oregon.

‡ Leaves rather small with less conspicuous lateral veins evidently petioled; stems terete but sometimes pubescent in lines. Much-branched small plants, with the rather spreading leaves therefore mainly attenuate.

E. leptocarpum Hausskn. l. c. 258. A span or less high, glabrous except for some incurved pubescence on the stem: leaves less than 10 lines long broadly lanceolate, sparingly low-toothed, tapering from near the middle to the obtuse or subacute apex and winged petiole; flowers abundant

for the size of the plant; calyx-tube narrow; petals about 2 lines long, rosy capsules 10 lines long, on very slender peduncles of nearly equal length; seeds nearly ellipsoidal shortly hyaline-beaked; coma at length cinnamon-colored. Oregon (Hall No. 188.)

Var. (?) Macounii Trel. l. c. 105 Less branched, crisp-pubescent in lines, the same pubescence more or less abundant also on the flowers and capsules; leaves more ovate; seeds longer; coma paler. Washington to Athabasca.

+ + + + Producing subterranean scaly branches which ultimately turn upwards and usually develop at once into leafy shoots.

** Glabrous and glaucous; stems terete slender rather tall except in the variety usually somewhat caespitose, leaves mostly simple and opposite, subsessile with faint lateral veins; flowers erect or suberect; seeds obovoid; scarcely beaked, coarsely papillate.

E. glaberrimum Barbey. Bot. Cal. i, 220. About a foot high, simple or nearly so; leaves erect or ascending, often remote, an inch long, all but the lowest lanceolate, rather obtuse, entire to slightly repand, narrowed to the sometimes subpetioled base; petals purple to nearly white, 2-4 lines long; capsule 3 inches long, linear, falcate; seeds very rough with blunt papillæ, abruptly rounded to the short insertion of the barely dingy coma. In high mountains Washington to California.

Var. latifolium Barbey l. c. Rather firmer stemmed and more branched; sometimes dwarf; leaves more divergent scarcely an inch long; broadly ovate to ovate-lanceolate, mostly subcordately contracted to the very short base. Oregon to California and the mountains of Utah.

** ** Puberulent at least in lines; seeds more fusiform, usually somewhat beaked above.

= Seeds papillate.

E. Oregonum Greene Pitt. i, 225. Two to four feet high, stout simple or sparingly branched with ascending branches, glabrate and glaucous below, glandular-puberulent above; leaves ascending 2-3 inches long, lanceolate obtuse, closely denticulate, cuneately subsessile or abruptly rounded to short winged petioles; flowers rather numerous, erect in the axils of the reduced upper leaves; calyx-tube 1-2 lines long, narrowly funnel-form, petals violet 4-6 lines long, pubescent near the apex and on the outside of the four divergent stigmatic lobes; capsule nearly erect 20 lines long, usually subsessile; seeds oblong, fusiform, obliquely pointed at base and very shortly pellucid-beaked; coma white. In running water Spring Hill, Grant's Pass, Oregon.

E. Hornemanni Reichenb. Incon. Cirt. ii, 73. Mostly a span or two high; ascending, simple, somewhat crisp-hairy in the inflorescence and along the decurrent lines or slightly glandular at top, otherwise glabrate; leaves about an inch long, elliptical ovate, mostly very obtuse, nearly entire to remotely serrulate, the lower cuneately narrowed, the upper usually abruptly rounded to the short petioles; flowers rather few, nearly erect; petals 2-4 lines long, lilac to deep violet; capsule an inch long, slender, erect on slender peduncles, about equalling the gradually reduced subtending leaves; seeds rather abruptly short appendaged; coma somewhat dingy. Mountains, Brit. Columbia to California, Colorado, Utah and Europe

= = Seeds smooth or merely areolate.

E. Bongardi Hausskn. Oesterr. Bot. Zeitschr. xxix. 89. A foot or less high, erect, simple with crisp hairy lines, apex at first nodding; leaves 1-2 inches long, crowded above, very broadly lanceolate, the upper acute,

sharply but remotely denticulate, usually crisp-ciliate, gradually narrowed to the conspicuous cuneately winged base; inflorescence sparingly glandular; flowers rather few, somewhat nodding; petals about 4 lines long pale or rosy; capsule rather slender, 20 lines long, on slender peduncles much shorter than the leaves; seeds nearly beakless; coma dingy. Alaska and the adjacent islands, perhaps Washington.

+ + + + + Often more or less cespitose by leafy stolons, otherwise simple or nearly so, sometimes apparently annual.

** Seeds smooth or at most undulate-areolate except in forms referred to *Oregonense*.

= Leaves rather ample.

E. alpinum L. Sp. 348, in Part. Mostly a span or two high, simple, inflorescence and decurrent lines nearly glabrous; leaves thin and delicate, pale green, 20 lines long, sub-elliptical, rather obtuse, subentire to somewhat sharply serrulate, gradually narrowed to slender petioles: flowers few, suberect, in the upper axils; petals a line or more long, white or rosy-tipped; capsule very slender, erect or ascending, about 2 inches long, their peduncles rather slender and about equalling the subtending leaves or stouter and as long as the capsules: seeds smooth gradually attenuated at apex, with veiny beak. In the high mountain swamps, Brit Columbia to California and Eastern States.

= = Leaves narrow, subentire.

E. Oregonense Hausskn. Monogr. Epilob. 270. A span high with few sterile shoots at base, erect even as to the apex, glabrous except for very sparing glandular hairs in the inflorescence; leaves 6-10 lines long crowded below, remote and very small above, narrowly oblong-ovate or the uppermost linear very obtuse, remotely denticulate, somewhat cuneately narrowed at base but sessile: flowers few, strictly erect; petals deep violet, 4 lines long; capsules about 2 inches long slender strict, much surpassing the summit of the stem, their very slender peduncles of nearly equal length, far exceeding the subtending leaves; seeds smooth, blunt. Bogs, Oregon to Brit. Columbia.

Var. (?) gracillimum Trel. Sp. Epilob. 105. A span to nearly a foot high, cespitose, very slender; quickly erect and hardly bent at top, glabrous except the very minutely and sparingly glandular inflorescence: leaves shorter than the internodes, narrow, entire keeled, on the midrib; flowers few, nearly erect; petals white or pale, 3 lines long; seeds evidently papillate, the beak scarcely hyaline. Bogs, Washington to California.

E. anagallidifolium Lam. Dict ii, 376. About a span high, at length rather densely cespitose, otherwise unbranched, stems very slender, strongly nodding at apex, somewhat crisp-hairy at least in lines; leaves 5-10 lines long, all but the lowermost very narrowly ovate or oblong, rather obtuse, entire or remotely denticulate; flowers few, crowded at apex somewhat nodding; petals lilac to violet, 2 lines long; capsule one inch long, slender, surpassing the end of the stem, their rather slender peduncles shorter than the leaves or when only one or two are present equalling the capsules; seeds short-beaked; coma somewhat dingy. Arctic America to California, also in the Old World.

** ** Seeds often coarsely papillate, nearly one-half longer than in the preceding group

E. clavatum Trel. l. c. 111. A span high, mostly densely cespitose, the slender stems ascending, glabrate to sparingly glandular throughout; leaves 8-10 lines long, broadly ovate, very obtuse, mostly rounded to evident peti-

cles: flowers rather few, suberect, petals rose-colored, 2 lines long, capsules an inch long, subclavate, arcuately divergent the lowest often not reaching the apex of the stem, their slender peduncles equalling the subtending leaves: seeds fusiform, tapering into a pale beak. Oregon to Brit. Columbia, Wyoming and Utah.

3 GAYOPHYTUM. A. Juss. Ann. Sci. Nat. xxv, 18, Pl 4.

Calyx-tube not produced above the ovary: the 4-parted deciduous limb reflexed. Petals 4, white or rose-colored, very small, obovate or oval with a very short claw. Stamens 8; anthers broad or rounded, attached by the middle, those opposite to the petals on shorter filaments and usually sterile. Ovary 2-celled: style short: stigma capitate or clavate. Capsule membranaceous, clavate, 2-celled, 4-valved. Seeds few to many, in one row in each cell, small, smooth, oblong, naked, ascending. Very slender branching annuals, of Western North America and Chili, with linear entire leaves and axillary flowers. The following are the only North American species known:

G. lasiospermum Greene Pitt. ii, 164. Stems 10-12 inches high, loosely dichotomous with filiform branches: the upper leaves and inflorescence more or less canescent with appressed or spreading short hairs: leaves ascending; flowers small, the petals about a line long: shorter stamens with small anthers: stigma globose, about 2 lines in diameter: capsule erect, about equalling the subtending leaves, narrowly linear or slightly clavate, scarcely torulose, on slender pedicels about 2 lines long: seeds mostly numerous, erect, not papillate, finely appressed pubescent. In the high mountains, Washington to Southern California.

G. diffusum T. & G. Fl. i, 513. Minutely pubescent above especially when young, stems very slender, 6-18 inches high diffusely much branched above; leaves linear-spatulate to linear, the lower obtuse, the upper acute or acuminate; flowers 2 lines in diameter, petals ovate a line or less long; stamens all fertile; stigma small clavate; pod linear-subulate, minutely canescent, attenuate below to a slender pedicel: the cells 4-8-seeded. Brit Columbia to California and the Rocky Mountains.

G. eriospermum Coville Bot Death Valley Exp. 103. Stems 12-20 inches high, glabrous, widely branching: leaves narrowly linear, acute, attenuate at base, the largest 2 inches long and 3 lines broad: pedicels 4-8 lines long, erect: ovary appressed-pubescent: calyx-lobes 2 lines long, sparingly appressed-hairy: petals 3-4 lines long, obovate, rose-colored in age: capsule erect, about 5 lines long, torulose, commonly 8-10-seeded: seeds a line long, narrowly obovate, densely pubescent. In the mountains of Southeastern Oregon to middle California.

G. ramosissimum T. & G. Fl. i, 513. Glabrous or the inflorescence sometimes puberulent, diffusely much branched 6-18 inches high; leaves an inch long or less: flowers half a line long, mostly near the ends of the branches; capsule oblong, two or three lines long, on pedicels about the same length or shorter, often deflexed; 3-5-seeded. Eastern Oregon to Mariposa county, California.

G. racemosum T. & G. l. c. Glabrous or more or less canescent with short appressed hairs; 6-18 inches high, the elongated branches mostly simple; flowers half a line long, axillary the whole length of the branches; capsules linear, sessile or very shortly pedicelled, 8-10 lines long, usually many-seeded. Brit. Columbia to California.

G. pumilum Watson Proc. Am. Acad. Filiform stems 2-6 inches high, somewhat strict, sparingly branched above: flowers less than a line broad; capsule erect, very shortly pedicelled, 6 lines long by half a line broad or more; the numerous seeds oblique in the cells. Marshy places in the high mountains, from Washington to California.

4 ONAGRA Adns. Fam. Pl. ii, 85.

Caulесcent annual or biennial herbs with alternate leaves and yellow nocturnal flowers, that are erect before opening. Calyx-tube more or less prolonged above the ovary, deciduous, segments 4, reflexed. Petals 4, equal obovate to obovate sessile, yellow changing to pink in age. Stamens 8, equal in length. Stigma deeply 4-cleft, its segments linear. Ovules and seeds horizontal, inserted in two rows, rarely in several rows, prismatic-angled.

O. Hookeri. Small Bull. Torr. Club xxiii, 171. *Enothera Hookeri* T. & G. Fl. i, 493. *E. biennis* of authors as to plants of our range. Stems erect, usually stout and mostly simple, 1-5 feet high, canescently pubescent and more or less hirsute or strigose: root often persisting for three or more years; leaves lanceolate to ovate-lanceolate, 2-6 inches long, acute or acuminate, repandly denticulate, the lowest petioled: flowers sessile, in a leafy spike; calyx villous, the tube twice the length of the ovary, rather shorter than the slightly acuminate segments: petals obovate, 6-12 lines long, stigma linear; somewhat thickened: capsule 9-12 lines long, more or less pubescent or hirsute. Common along rivers, etc. Washington to California and the Rocky Mountains.

6 ANOGRA Spach. Ann. Sci. Nat. (II) iv, 164.

Annual or perennial caulescent herbs with alternate leaves and axillary white, becoming rose-color. diurnal flowers that are nodding in the bud. Calyx tube prolonged above the ovary, deciduous. Stamens 8, equal. Style filiform; stigma 4-lobed. Capsule coriaceous or somewhat woody, dehiscent loculicidally, 4-valved. Ovules and seeds in 2 rows in each cell ascending, not angled.

A. trichocalyx. Small l. c. *Enothera trichocalyx* Nutt. Stems mostly stout, 6-12 inches long, erect or decumbent at base, white and shining, from a perennial base: leaves linear to oblong-lanceolate or rhomboidal, 2-4 inches long, acute or acuminate, attenuate to a long petiole, repandly denticulate or sinuate-pinnatifid with irregular marginal segments or the lowest entire: calyx very villous, the bud obtuse: tube slender, 6-18 lines long, naked: petals about equalling the calyx-tube, very broad, entire or deeply sinuous: capsule linear, tapering upward, 1-2 inches long: seeds linear not punctate, subangled. Southeastern Oregon to California and the Rocky Mountains.

A. pallida Britton Mem. Torr. Club v. *Enothera albicaulis* of authors as to the plants in our range. Stems rather stout, 6-24 inches high, simple or branched, white and often shreddy, from a perennial running root-stock: leaves linear to oblong-lanceolate, 1-3 inches long, entire or repand-denticulate, or sinuate-pinnatifid towards the base: calyx with the tips of the segments free, the tube rather slender, 9-12 lines long, throat naked; petals equalling or somewhat shorter than the tube, suborbicular, entire or emarginate; capsule linear, tapering upward, 1-2 inches long; seeds lanceo-linear, smooth, subangled. On sandy plains, Brit. Columbia to Oregon and Minnesota.

7 **TARAXIA** Nutt. Raimann in Engl. & Prantl Nat. Pfl. Fam. 111, 216.

Acaulescent plant with pinnatifid or entire leaves and yellow or white axillary flowers. Calyx 4-parted, the tube filiform, longer than the ovary, marcescent or tardily deciduous, Petals 4, deciduous. Stamens 8, erect; anthers oval or oblong and fixed near the base or linear and fixed near the middle. Style usually adherent to the calyx-tube: stigma capitate, entire or rarely 4-toothed. Capsule sessile. Seeds somewhat ascending, in a double series with a crustaceous testa.

T. graciliflora Raimann. l. c. (*Enothera graciliflora* H. & A. Small villous annual: leaves linear. 18-30 lines long acuminate or obtuse attenuate or more frequently broad at base, entire or obscurely repand-dentate, ciliate calyx-tube 6-18 lines long; petals 3-5 lines long, yellow changing to greenish in age: capsule compressed-ovate 4-6 lines long coriaceous, tetragonal below and 4-winged above the middle, the wings obliquely truncate and hairy: seeds horizontal, smooth. On barren plains and gravelly bars, Southern Oregon and California.

T. heterantha Small l. c. (*Enothera heterantha* Nutt. Glabrous perennial: leaves oblong-lanceolate tapering into a slender petiole, acute or acuminate, entire or repand, 2-4 inches long: tube of the calyx much shorter than the leaves, the segments linear-lanceolate; about the length of the broadly obovate retuse petals, anthers oblong, fixed near the base, capsule 9 lines long, obovoid-oblong, tetragonal, attenuate above into the persistent calyx-tube, the sides nearly flat, ribbed, subreticulated: seeds numerous, minutely pitted. On dry plains, Eastern Oregon and Idaho to Utah and Nevada.

T. ovata Small l. c. (*E. ovata* Nutt. Subpubescent perennial leaves ovate to oblong-lanceolate, ciliate, acute, erosely or repandly denticulate, or serrulate, 2-8 inches long: calyx-tube 1-4 inches long: petals yellow, 3-10 lines long: capsule 6 lines long, strongly torulose: seeds few, in one or two rows, erect, oval a line long. In moist places, Southern Oregon to California.

T. longiflora Nutt. in Herb. (*Enothera Nuttallii* T. & G. Densely pubescent perennial: leaves lanceolate, 2-6 inches long, petioled, acuminate, deeply sinuate-pinnatifid, the numerous very unequal segments often roundish or obtuse: tube of the calyx 12-18 lines long; petals 5-7 lines long usually white: capsule 6-10 lines long, terete, attenuate above into the persistent calyx-tube: seeds numerous, conspicuously pitted. Along streams, eastern Washington to California and Nevada.

8 **SPHÆROSTIGMA** F. & M. Ind. Sem. Hort. Petrop. ii, 49.

Annual or perennial caulescent herbs with entire or pinnatifid leaves and yellow white or rose-color flowers in bracted or leafy spikes. Tube of the calyx obconic or shortly funnel form, much shorter than the ovary; the limb 4-parted. Petals 4, entire or emarginate. Stamens 8, somewhat unequal, the oblong anthers attached near the middle. Stigma capitate, entire. Capsule linear, sessile, terete or tetragonal, attenuate at the apex, more or less contorted, completely 4-celled. Seeds ascending, in a single row in each cell, ovate to linear-oblong, smooth or nearly so.

* Flowers white or rose color, in a nodding spike: tube of the calyx funnel form: capsule narrowly linear, terete, much contorted: seeds linear acute at each end.

S. alyssoides Walp. Rep. ii, 78. *Enothera alyssoides* H. & A. Canescently pubescent annual: stems 1-12 inches high, branching from the base: leaves oblanceolate or oblong-lanceolate, 1-3 inches long, attenuate into a slender petiole, entire or repand-denticulate; the bracts much smaller but similar: spikes many-flowered, elongating in age; tube of the calyx 2-3 lines long, equalling the orbicular entire white petals: capsule puberulent, 8-12 lines long, very slender: seeds nearly white very minutely pitted. On sandy plains Southeastern Oregon to Nevada, Idaho and Utah.

S. Boothii Walp l. c., 77. Very viscidly pubescent annual; branching from the base, 2-4 inches high; leaves ovate, 6-12 lines long, acute or acuminate; denticulate, shortly petioled; tube of the calyx 1-3 lines long; petals rose-color, 2-3 lines long; capsule linear-fusiform, 6-9 lines long, viscid-glandular, much contorted; seeds brownish, angled, very minutely tuberculate. On dry hillsides, Eastern Oregon and Washington to California and Nevada.

* * Flowers yellow becoming greenish or bluish in age: calyx-tube obconic: capsule linear, tetragonal, more or less contorted: stems leafy throughout.

S. spirale Walp. Rep. ii, 77. *Enothera cheiranthifolia* Hornem. Stems decumbent, spreading, often 2 feet long or more, canescently pubescent: leaves thick, 6-10 lines long, broadly ovate to oblong or lanceolate, the radical and lower cauline often spatulate or oblanceolate and slender petioled, mostly entire: calyx canescent, its tube 1-2 lines long; petals 3-4 lines long, yellow becoming bluish: capsule 4-8 lines long, sub-hairy, contorted: seed ovate oblong, acute at base, smooth. Along the coast, Southern Oregon and California.

* * * Flowers small, yellow usually turning red, calyx-tube very short; capsule elongated, very narrowly linear slightly curved.

S. contorta Walp. l. c. 78. *Enothera strigulosa* T. & G. Nearly glabrous; the ovary and calyx usually somewhat appressed-pubescent: stems slender, ascending or erect, usually divaricately branched, 2-12 inches high: leaves linear or lanceolate, 3-9 lines long, attenuate at base, entire or sparingly denticulate, flowers very small: petals 1-2 lines long, usually turning red in age: capsule 8-13 lines long, sessile or attenuate into a very short pedicel, scarcely attenuate above, more or less curved or contorted: seeds smooth. On dry sandy plains Eastern Washington to California, Nevada and Arizona.

Var. pubens Small l. c. 189. Pubescence hirsute and spreading especially below, often subglandular above, sometimes very smooth. Vancouver Island to Nevada; Arizona and Southern California.

Var. Greenei Small l. c. Strictly erect with ascending somewhat virgate branches: pubescence neither white nor appressed, but spreading and hirsute: pods longer and slender. Oregon to California.

* * * * Low, flowers minute: capsule fusiform, short.

S. Hilgardi Small l. c. 188. *Enothera Hilgardi* Greene. Canescently pubescent; stems 3-6 inches high, divaricately much branched: leaves linear-spatulate, entire including the petiole 1-2 inches long: branches corymbose in flower, densely spicate in fruit, the spikes leafy; petals 1-2 lines long, obovate, entire: capsule 6 lines long, straight, sharply angled, attenuate upward; seeds obovate pale, smooth and shining. In moist places Eastern Washington and Oregon.

PACHYLOPHUS.

S. andinum Walp l. c. 79. *Enothera andina* Nutt. Canescently pubescent throughout: stems slender, 1-3 inches high, becoming diffusely branched: leaves linear-spatulate 6-12 lines long, attenuate into a slender petiole: spikes mostly dense, many-flowered: flowers yellow, barely a line long: capsule 3-6 lines long, attenuate upward from near the base: seeds linear-oblong, nearly smooth. On alkaline plains, eastern Washington to Nevada, Montana and Utah.

9 CHYLISMA Nutt. Raimann, Engl. & Prantl, Nat. Pfl. Fam. iii, 217.

Caulescent annuals with pinnate or simple leaves and yellow flowers in terminal racemes. Calyx-tube funnel-form or obconic, the limb 4-parted. Petals 4, entire. Stamens 8, unequal; anthers oblong, attached near the middle. Stigma capitate, entire. Capsule linear, subcylindrical or subclavate, obtuse, membranaceous, not sessile, seeds ascending, in a single row in each cell.

C. scapoidea Small l. c. 193. *Enothera scapoidea* Nutt. Puberulent or subglabrous: stems erect, 4-18 inches high, usually branching from near the base: leaves mostly subradical, long-petioled, lyrate-pinnatifid, or sometimes undivided, the terminal segment much the longest, ovate to oblong-lanceolate, cuneate to cordate at base, irregularly serrate, the prominent veins often dark colored, the lateral leaflets few to many or none, very irregular in size and shape: racemes at first nodding, the bracts very small or wanting; calyx-tube funnel form with a narrow base, 1-2 lines long, the bud closed and abruptly acute; petals yellow, 1-2 lines long: capsule glabrous, 4-12 lines long, attenuate into a pedicel 2-8 lines long, ascending or divaricate. Idaho and Wyoming to Utah and Southern California.

C. cruciformis. *Enothera cruciformis* K. ll. *E. scapoidea* Var. *purpurascens* Watson. Stems erect, 6-18 inches high, stoutish usually branching from near the base: leaves mostly subradical, long-petioled, lyrate-pinnate, the terminal leaflets much the largest; lateral few to several or none, very irregular in size and shape, racemes at first nodding, the bracts very small or wanting, calyx-tube funnel-form with a narrow base, 2-3 lines long; the bud abruptly acuminate, petals white or pinkish, rarely yellowish, 3-4 lines long: capsule glabrous, 4-12 lines long, somewhat clavate, on pedicels 2-10 lines long. On alkaline plains, southeastern Oregon to Nevada and Southern California.

10 PACHYLOPHUS, Spach. Hist. Veg. iv, 365.

Acaulescent or very short caulescent perennials with entire or pinnatifid leaves and large white or rose-color flowers that open only at night or in cloudy weather. Calyx-tube elongated, somewhat dilated at the throat, the limb 4-parted, erect in the bud. Petals 4, sessile white, changing to red in age. Stamens 8, unequal: anthers oblong attached near the base. Capsule ovate or ovate-oblong, large and rigid, obtusely tetragonal or sharply angled, mostly sessile. Ovules horizontal, sessile few, in one or two rows. Seeds large, with a deep furrow along the raphe.

P. Nuttallia Spach. Hist. Veg. iv, 365. *Enothera cæspitosa* Nutt. Glabrous or more or less villous with spreading subscabrous hairs: leaves oblong to narrowly lanceolate 2-12 inches long attenuate to a long petiole acute or acuminate, sometimes spatulate, irregularly sinuate-toothed or pinnatifid or repand-denticulate: tube of the calyx 2-7 inches long, 3-6 lines wide at the throat, segments not free in the bud: petals broadly ob.

cordate, 9-20 lines long: capsule oblong 1-2½ inches long by 3-6 lines in diameter, subattenuate at each end, sessile or short-pedicel, strongly ribbed at the sides and often with a double crest along the sutures: seeds in two rows in each cell, oval oblong, not angled, very minutely and densely tubercled upon the back, with a thin flattened process and a longitudinal furrow on the ventral side. Oregon and Idaho to California, Dakota and New Mexico.

11 GODETIA Spach. l. c.

Simple or branched erect annuals with alternate leaves and showy flowers in racemes or spikes. Calyx-tube above the ovary obconic or shortly funnelform, deciduous. Petals 4, broad and sessile, entire or marginate or very rarely 2-lobed, lilac-purple or rose-color. Stamens 8, unequal, the filaments opposite the petals shorter: anthers all perfect, oblong attached at the base and erect or arcuate. Ovary 4-celled, many-ovuled. Style filiform: stigma-lobes short, linear or roundish. Capsule ovate to linear, 4-sided, somewhat coriaceous, loculicidally dehiscent. Seeds ascending or horizontal, in one or two rows in each cell, obliquely angled, the upper surface with a thin tuberculate margin.

* Capsule ovate to oblong, sessile, stems erect, leafy, usually stout and strict; the flowers in a strict compact spike erect in the bud.

G. purpurea Watson Bot. Cal. i, 229. Mostly very leafy, 1-2 feet high, canescently-puberulent, the ovary hirsutely villous; leaves oblong to oblong-lanceolate, 1-3 inches long, obtuse or acute, entire, sessile with an obtuse or attenuate base; flowers mostly in a leafy terminal cluster; calyx-tube 2-3 lines long, the tips not free; petals 4-6 lines long, deep purple; style shorter than the stamens, the stigma-lobes very short, purple; capsule ovate to linear-oblong, 6-9 lines long, acute, not attenuate at base, hairy, the sides nearly flat, ribbed. From the valley of the Columbia to California.

G. lepida Lindl. Bot. Reg. xxii, t. 1849. Erect, 6-24 inches high, canescently-puberulent, the stem usually white and shining; leaves oblong to oblong-lanceolate, 1-2 inches long, usually obtuse, sessile and scarcely attenuate at base, sparingly denticulate; flowers in a short simple spike; calyx-tube 2-3 lines long, the tips very slightly free; petals 9-12 lines long, rose-color with a darker spot near the apex; stigmas very short, purple; capsule 5-8 lines long, 2 lines broad and attenuate to the apex, hairy, the sides tricostate, at least alternately. Willamette valley to California.

G. decumbens Spach. Monog. Onogr. 68. Stems slender, erect or ascending, 3 inches to 3 feet high; leaves linear to oblong, 6-12 lines long; calyx-tube 2 lines long; petals 3-8 lines long, purple to rose-color; capsule shortly pubescent, 4-6 lines long. Columbia River to California.

G. Arnottii Walp. Rep. ii, 83. *G. lepida* var. *Arnottii* Watson. Nearly glabrous or subcanescently puberulent; leaves linear to lanceolate, 12-18 lines long, acute, entire or sparingly denticulate; petals 4-8 lines long; capsules glabrous or nearly so. Southern Oregon to California.

G. albescens Lindl. Bot. Reg. 27. Simple or branching from the base, erect, 1-2 feet high, canescently puberulent, leaves linear to oblong-lanceolate an inch long, acutish, sparingly denticulate; flowers small in numerous short lateral spikelets, mostly crowded into a compact spike; calyx-tube 2 lines long; petals 3-5 lines long, purplish-blue; stigmas

greenish to purple; capsule oblong 3-6 lines long, shortly hirsute or pubescent, at least the alternate sides tricostate. Oregon to California.

* * Capsule linear; flowers loosely scattered in a slender spike or raceme, nodding in the bud.

+ Capsules sessile.

G. quadrivulnera Spach. l. c. Usually very slender, erect, or ascending 1-2 ft. high, puberulent; leaves linear to linear-lanceolate, 1-2 inches long, sessile or attenuate to a short petiole; calyx-tube obconic, 2-3 lines long, the tips slightly free; petals 3-6 lines long, deep purple or purplish stigma lobes very short, yellow; ovary and capsule hairy, capsule linear 5-10 lines long, mostly short, attenuate at the apex, the sides nearly flat or channelled by the prominence of the sutures. On dry plains, Brit. Columbia to California. Cornell
June 10. 19

G. tenella Watson l. c. Erect, 6-18 in. high, puberulent: leaves linear, 6-24 lines long, acute or obtuse, more or less attenuate, mostly entire; calyx-tube shortly obconic, 1-3 lines long, the tips closed or slightly free; petals 3-5 lines long, deep purple; stigma lobes purple or purplish, the style shorter than the stamens; capsules puberulent, 8-12 lines long, attenuate above but not at base, the sides nearly flat. Washington to California.

G. viminea Spach. Monog. Onogr. 60. Usually stout, 1-3 ft. high, branched; leaves linear to linear lanceolate, 1-2 in. long, narrowed at the base, entire; calyx-tube 2-4 lines long, the tips slightly free; petals 9-12 lines long, deep purple or purplish; capsule 9 lines long, 8-costate, smoothish. Washington to California.

+ + Capsule pedicelled not costate; stigmas mostly yellow; calyx tips not free in the bud.

G. amœna Lilja in Lindblom Bot. Notes 1839, 53. Usually slender, erect, 1-2 feet high, minutely puberulent; leaves linear to narrowly oblanceolate, or sometimes lanceolate, 1-3 in. long, petioled, entire or nearly so; calyx-tube obconic, 2-4 lines long; petals 8-15 lines long, frequently rather villous, as also the purple anthers, varying from nearly white to rose-color, with more or less of purple; filaments rather stout; stigma-lobes linear, 1-2 lines long, yellow; capsules 12-18 lines long attenuate to a slender beak above and into the pedicel below which is 2-6 lines long. Brit. Columbia to California.

G. epilobioides Watson Bot. Cal. i. 231. Erect, 1-3 ft. high tomentously puberulent; leaves linear to linear-lanceolate, 1-2 inches long, petioled, entire or sparingly denticulate; calyx-tube 1-2 lines long; petals 3-6 lines long, light purple or rose-color; stigma lobes short; capsule 6-14 lines long, acuminate, attenuate to a short pedicel, or rarely nearly sessile. Brit. Columbia to California and Nevada.

G. hispidula Watson l. c. 633. Erect, 6-12 in. high, mostly simple and often but 1-flowered, hispidly puberulent, especially above; leaves very narrowly linear, 1-2 in. long; calyx-tube 2-3 lines long; petals 6-12 lines long, purple; filaments rather slender; style elongated and stigma-lobes linear; capsule 4-9 lines long, attenuate at the apex, abruptly contracted into a pedicel 2-4 lines long. Brit. Columbia to California.

12 BOISDUVALIA Spach. Hist Veg. iv, 383.

Erect leafy annuals with alternate simple sessile leaves and small flowers in leafy simple or compound spikes. Calyx-tube funnelliform above the ovary, deciduous, the lobes erect. Petals 4, sessile, 2-lobed, purple to white. Stamens 8, those opposite the

petals shorter; filaments very slender, naked at base; anthers all perfect, oblong, attached near the base. Ovary 4-celled several ovuled: style filiform: stigma-lobes short somewhat cuneate. Capsule membranaceous, ovate-oblong to linear, nearly terete, acute sessile dehiscent to the base. Seeds ascending few in one row in each cell, ovate-oblong, somewhat angled, smooth.

B. Torreyi Watson Bot Cal. i, 233. Villous throughout with short stiffish spreading hairs; stems rather slender, 4-18 inches high; leaves linear to lanceolate, usually narrowed at base, entire or somewhat denticulate, 4-9 lines long; the floral leaves similar and scarcely smaller; flowers in a loose simple spike, 1-2 lines long, purplish: capsule linear acuminate, 4-6 lines long, cells 6-8 seeded, the partitions adherent to the valves; seeds ovate half a line long or less. Washington to California.

B. Douglasii Spach. Hist. Veg. 223. *B. densiflora* Watson. Canescently pubescent and more or less villous, often stout, 1-3 feet high; leaves lanceolate to linear lanceolate, acuminate, mostly denticulate, 1-3 inches long the floral leaves usually much shorter and broader; flowers usually in a close terminal spike or numerous lateral spikelets; calyx 1-3 lines long, about half the length of the petals; capsule ovate-oblong, smooth or slightly villous, 2-4 lines long, cell 3-6 seeded, the partitions wholly separating from the valves and adherent to the placenta; seeds nearly or quite a line long. In wet places, Brit Columbia to California.

B. glabella Walp. l. c. Glabrous or slightly pubescent: slender, 8-16 inches high; leaves ovate to oblong-lanceolate, acute, serrate, 6-12 lines long, the floral bracts scarcely smaller: flowers in a simple spike, shorter than the leaves, petals deep purple, less than a line long; capsule ovate-oblong, 2-4 lines long, the partitions adherent to the valves, seeds 4-6 in each cell, linear-lanceolate, a line long. In ditches and wet places, Brit. Columbia to Oregon and Nevada.

13 CLARKIA Pursh. Fl i, 260, t, 11.

Annuals with erect brittle stems, alternate leaves and showy flowers in terminal racemes. Calyx-tube obconical above the ovary, deciduous: the 4-cleft limb reflexed. Petals 4, with claws lobed or entire, purple or violet. Stamens 8, those opposite to the petals often sterile or rudimentary; anthers oblong or linear, attached by the base. Ovary 4-celled: style elongated; stigma with 4 broad lobes, sometimes unequal, at length spreading. Capsule linear, attenuate above, coriaceous, erect, somewhat 4-angled, 4-celled and 4-valved to the middle. Seeds numerous, angled or margined.

C. pulchella Pursh. l. c. Stem (6-20) inches high, simple or branched, inflorescence puberulent: leaves linear-lanceolate to linear, 1-3 inches long, nearly glabrous, entire petals 6-9 lines long, 3-lobed, attenuate to a long claw, which has a spreading tooth on each side; perfect stamens with a linear scale on each side at base, the alternate stamens rudimentary and filiform: stigma-lobes equal, dilated: capsule 8-12 lines long, 8-angled, on a spreading pedicel, 2-3 lines long; seeds obliquely cubical, minutely tuberculate. Brit. Columbia to California and the Rocky Mountains.

C. rhomboidea Dougl. Hook. Fl. i, 214. Stem slender, 1-2 feet high, simple or sparingly branched above, puberulent or nearly glabrous: leaves oblong-lanceolate to ovate, the upper narrower, all on slender petioles, entire; petals entire, rhomboidal, with a short broad claw which is

HETEROGAURA.

often broadly toothed; anthers all perfect; filaments with hairy scales at the base: stigma-lobes short: capsule 8-12 lines long, 4-angled, nearly glabrous, on pedicels about a line long; seeds obliquely cubical, sparingly hispid. Washington to California.

14 GAURA L. Gen. n. 470.

Herbs with mostly sessile alternate leaves and numerous white or rose-color flowers in spikes or racemes. Calyx-tube prolonged beyond the obconic or clavate ovary; the 4-parted limb deciduous. Petals 4 with claws. Stamens 8, nearly equal; filaments furnished with a scale-like appendage on the inside next the base; anthers oval, versatile. Ovary 4 celled: ovules 1-2 in each cell, pendulous: style filiform, hairy below: stigma 4-lobed, surrounded by an obscure ring or indusium. Fruit nut-like, indehiscent or splitting at the apex, obtusely 4-angled and ridged upon the sides.

G. parviflora Dougl. Hook Fl. i, 208. Stems erect, 2-5 ft. high, sparingly branched softly white-pubescent and minutely glandular; leaves ovate-lanceolate, acute or acuminate, repand-denticulate, velvety pubescent on both sides, 1-3 inches long, the uppermost smaller; spikes virgate strict, very many flowered, much elongated in fruit, bracts lanceolate, subulate; petals spatulate, oblong, shorter than the calyx, segments, rose-color; fruit sessile, oblong-clavate, 4-nerved, 4-angled at the apex, about 2-seeded. Washington to California and east to Arkansas.

15 HETEROGAURA Rothrock Proc. Am. Acad. vi, 354.

Annual herbs with alternate leaves and small flowers in terminal racemes. Calyx-tube with a short obconic prolongation above the small ovary; limb 4-cleft, spreading, deciduous. Petals 4, entire, with claws. Stamens 8; filaments naked; anthers ovate-cordate, attached by the base and not versatile; those opposite to the petals on shorter filaments, lanceolate, acute, sterile. Ovary 4-celled, with a solitary pedulous ovule in each cell: style long: stigma discoid, entire. Fruit nut-like, indehiscent, obovoid, 2-4-celled, 1-2-seeded.

H. Californica Rothr. l c. Smooth or sparingly puberulent, 12-18 inches high, leaves lanceolate, entire, 1-2 inches long, tapering to a slender petiole: petals purple, narrowly spatulate, 2 lines long: anthers very small: fruit 2 lines long, obovate, 4-angled, $1\frac{1}{2}$ lines long, smooth, on a short spreading pedicel. Southern region (Evans & Reek, Jos. Howell to California).

16 CIRCÆA L. Gen. n. 24.

Low perennial herbs with thin opposite petioled leaves and small white flowers in terminal and lateral racemes, the fruit on slender spreading or deflexed pedicels. Tube of the calyx slightly produced beyond the ovary; the free portion nearly filled with a cup-shaped disk, deciduous; the limb 2-parted. Petals 2, obcordate. Stamens 2, alternate with the petals: filaments filiform: anthers short. Style filiform: stigma somewhat capitate marginate. Capsule obovate, 1-2-celled, at length 2-

valved, with a single erect seed in each cell, hispid with hooked hairs.

C. Pacifica Asch. & Mag. Mostly glabrous, stems usually simple, 6-12 inches high, from a small tuber; leaves ovate, rounded or cordate at base, acute or acuminate, repandly-denticulate, 1-3 inches long; the slender petiole about as long; racemes without bracts; flowers half a line long; calyx white with a very short tube; fruit a line long, rather loosely covered with soft hairs curved above, 1-celled, 1-seeded. In damp woods, Brit. Columbia to California.

C. alpina L. Sp. 9. Glabrous, stems weak, 3-8 inches high, often branching above; leaves cordate, shining, rather coarsely toothed, 1-6 inches long, on slender petioles nearly as long as the blade; pedicels subtended by minute setaceous bracts; flowers reddish, especially before opening; fruit pubescent but scarcely hispid. In damp woods, Alaska to Washington and the Northeastern States and Canada.

ORDER XXXIX. CUCURBITACEÆ B. Juss. Hort. Trian. (1759.)

Tendrils-bearing herbs with alternate palmately veined leaves and axillary monœcious or diœcious, rarely perfect flowers. Calyx 5-6-toothed, the limb sometimes obsolete. Petals 5-6, distinct or more or less united with each other and coherent with the calyx. Stamens 5, sometimes distinct, commonly united in three parcels (two, and two and one separate) so as to appear like three stamens only, rarely 3 and diadelphous, filaments of each set sometimes connate; anthers usually long and sinuous, or variously contorted or folded, 2-celled, adnate, extrorse, commonly more or less connate. Ovary coherent with the tube of the calyx, usually of 3, rarely of 2 or 4, united carpels, sometimes 1-celled by the obliteration of the partitions, more often with each carpel spuriously 2-celled. Fruit fleshy or juicy, rarely membranous. Seeds anatropous, compressed, often enveloped by a juicy or dry and membranous arillus; the testa coriaceous, albumen none.

MARAH Kell. Proc. Cal. Acad. i, 38.

MEGARRHIZA (Torr.) Watson.

Flowers monœcious: the sterile in racemes or panicles; the fertile solitary, from the same axils. Calyx-tube broadly campanulate: teeth obsolete or very small. Corolla rotate, deeply 5-7-lobed, with oblong papillose segments. Sterile flowers with the stamens at the base: filaments short and connate: anthers free or somewhat adherent; the cells somewhat horizontal, flexuous. Pistillate flowers pedicelled: with or without abortive stamens: ovary oblong to globose, usually more or less echinate, 2-celled or more: cells 1-several-ovuled: ovules ascending, horizontal, or pendulous, the attachment mostly parietal: style short: stigma 2-3 lobed or parted. Fruit mostly echinate, more or less fibrous within, becoming dry, at length bursting regu-

larly. (?) Seed large, tinged, ovoid or subglobose, smooth, not margined; hilum linear, acute: cotyledons thick, remaining under ground in germination. Stems elongated and climbing, from large fusiform perennial roots; leaves cordate, palmately 5-7-lobed or angled; tendrils 2-5-cleft; flowers small, white.

M. Oregona *Megarhiza Oregona Torr. Watson*. Stems 10-30 feet long; scabrous or nearly smooth; leaves cordate or reniform 3-6 inches broad, deeply 5-7 lobed, lobes broad-triangular, abruptly acute, mucronate, sterile flowers 10-20 in slender racemes 4-6 in. long, on slender pedicels; corolla 3-4 lines broad; fertile flowers without abortive stamens; ovary globose, densely echinate, 2-4-celled, the cells 1-2 ovuled, fruit globose to oblong, 1-2 in. in diameter covered with stout fleshy spines, 1-several-seeded, seeds orbicular 6-10 lines in diameter. In alluvial soil, Oregon and Washington to Idaho and Montana.

ORDER XL. LOASACEÆ. Reichb. Consp. 161.

Herbs with alternate or opposite leaves without stipules and usually showy flowers, the herbage often clothed with bristly hairs. Sepals united into an equally 5-lobed calyx, persistent. Petals 5 sometimes 10 (the inner series mostly dissimilar) inserted in the throat of the calyx. Stamens numerous, rarely few or definite, inserted with the petals, some of the outer filaments often dilated or petaloid and mostly sterile, the others commonly disposed in fascicles opposite the petals and slightly united. Ovary coherent with the tube of the calyx, 1-celled with mostly 3 parietal placentæ; ovules numerous or sometimes few rarely solitary, styles usually united into one. Fruit mostly capsular or succulent, crowned with the limb of the calyx. Seeds anatropous, usually with more or less fleshy albumen.

1 MENTZELIA L. Gen. n. 670.

Annual or biennial herbs with alternate mostly coarsely toothed or pinnatifid leaves and mostly showy flowers. Calyx-tube cylindrical to ovoid or turbinate; the limb 5-lobed, persistent. Petals 5 or 10. Stamens numerous, inserted below the petals on the throat of the calyx and not adnate to them: filaments free or in clusters opposite the petals, filiform, or the outer more or less dilated or sometimes petaloid and barren. Ovary truncate at the summit, 1-celled: style 3-cleft, the lobes often twisted: ovules pendulous or horizontal, few to many in one or two rows on the three linear parietal placentæ. Capsule short-oblong to cylindrical, few to many-seeded, opening by valves or usually irregularly at the truncate apex. Seeds flat or angled.

§ 1. TRACHYPHYTUM T. & G. Fl. i. 533. Seeds pendulous, few to rather many, small, in 1-3 rows, irregularly angled or somewhat cubical, not winged, opaque, minutely tuberculate: flowers in terminal cymes, mostly small: calyx-limb 5-parted:

petals 5: filaments all filiform or the 5 outer more or less dilated: capsule linear: leaves sessile, flat, sinuately toothed or pinnatifid: annuals.

M. albicaulis Dougl. Don Mill. iii, 61. Slender, 3-12 inches high or more: leaves linear-lanceolate, pinnatifid with numerous narrow lobes, the upper leaves broader and often lobed or toothed at base only: flowers mostly approximate near the ends of the branches: calyx-lobes $1\frac{1}{2}$ -2 lines long, a little shorter than the spatulate or obovate petals: filaments not dilated: capsule linear-clavate, 6-9 lines long: seeds numerous, rather strongly tuberculate, irregularly angled with obtuse margins less than half a line long. On sandy plains, Brit. Columbia to California.

M. dispersa Wat. Proc. Am. Acad. xi, 115 & 137. Stems slender annual, 4-12 in. high, leaves narrowly lanceolate, sinuate-toothed or sometimes entire, the uppermost often ovate; flowers small mostly clustered near the ends of the branches: calyx lobes a line long, little shorter than the 5 spatulate or obovate petals; capsule narrowly linear-clavate, 6-9 lines long; seeds often in a single row, angular and somewhat rhombohedral, more or less grooved upon the angles, very nearly smooth, half a line long. Eastern Oregon to California.

M. gracilentia T. & G. Fl. i, 534. Stems pubescent 12-18 inches high: leaves narrowly lanceolate muricate-scabrous, pinnatifid, the lobes short, obtuse: flowers usually clustered at the summit; calyx-lobes 2-5 lines long; petals obovate to oblanceolate, 4-8 lines long, capsule linear clavate 6-12 lines long; seeds in three rows irregularly angled, minutely tuberculate. Idaho to California.

M. congesta T. & G. l. c. Slender, a foot high; leaves linear-lanceolate, pinnatifid with numerous narrow lobes, the upper leaves broader and often lobed or toothed at base only: flowers clustered at the ends of the branches, conspicuously bracted with broad toothed bracts, which are membranaceous at base: calyx-lobes $1\frac{1}{2}$ -2 lines long: petals bright orange, 3-6 lines long: filaments all filiform: capsule clavate, half an inch long: seeds irregularly angled, minutely tuberculate, nearly a line long. Interior of Oregon to California and Nevada.

§ 2. **BARTONIA** T. & G. Fl. i, 535. Seeds numerous in double rows upon the 3 broad placentæ, horizontal, flattened, suborbicular-winged, minutely tuberculate or nearly smooth: flowers often large and showy: calyx-limb 5-cleft nearly to the base: petals 5 or 10: filaments numerous, the outer often more or less dilated or petaloid: capsule broad, oblong: leaves sessile, sinuately toothed or pinnatifid: biennials.

M. lævicaulis T. & G. l. c. 535. Stout 2-3 ft. high, branching: leaves lanceolate, 2-8 inches long: flowers sessile on short branches, very large, light yellow, opening in sunshine: calyx-tube naked, the lobes 12-15 lines long: petals acute at each end, 2-2 $\frac{1}{2}$ inches long, the filaments and slender style a little shorter: capsule 15 lines long, 3-4 lines in diameter: seeds very minutely tuberculate. On gravelly bars, Brit. Columbia to California.

M. Brandegei Watson Proc. Am. Acad. xx, 367. Stem branching, a foot high: leaves linear, pinnatifid with narrow lobes, 1-3 inches long; the bracts on the short pedicels mostly entire, very narrow: flowers in open corymbs: calyx-lobes 6-8 lines long, the 5 narrowly oblanceolate petals an inch long or more: stamens about 30, a little shorter, none petaloid: capsule narrowly oblong, 7-9 lines long by nearly 3 lines wide: seeds horizontal, flattened, with somewhat angular or rugose sides and narrow scarcely winged margin. Yakima County, Washington.

M. pumila Nutt. T. & G. Fl. i, 535. Stems 8-10 in. high, rough with a minute barbed pubescence, whitish branching towards the summit; leaves lanceolate, sinuate toothed or pinnatifid, the lower ones somewhat petioled, the upper sessile; flowers solitary or three together, terminating the loose flowering branches, slightly pedicilate, with 1 or 2 linear-setaceous bracts at the base; petals 10, lanceolate, acute, spreading, longer than the lanceolate-subulate calyx-lobes, the inner ones smaller; stamens very numerous, the outer filaments flat and somewhat dilated; capsule clavate-cylindrical, 3-valved; seeds numerous winged. Colorado, perhaps Idaho.

ORDER XLI. FICOIDEÆ Juss.

Succulent herbs or shrubs with plain triquetrous, or terete, leaves without stipules. Calyx-tube coherent to the ovary, the lobes usually 5, unequal. Petals very many and linear, or none. Stamens 5-many, with slender filaments, inserted on the calyx-tube. Styles 4-20. Fruit 4-20-celled, dehiscent stellately across the summit or circumscissile or indehiscent. Seeds usually numerous and minute with mealy albumen.

1 MOLLUGO L. Sp. 89.

Low and much branched glabrous annuals, with linear to obovate-spatulate entire opposite and apparently verticillate leaves and axillary flowers. Calyx 5-cleft nearly to the base, lobes herbaceous, membranaceously margined. Petals none. Stamens 3 or 5, rarely twice as many, hypogynous. Styles 3. Capsule free, thin, membranaceous 3-5-celled, loculicidally 3-5-valved; the partitions breaking away from the persistent central placenta. Seeds several in each cell, longitudinally sulcate on the back.

M. verticillata L. l. c. Prostrate slender stems 1-6 inches long; leaves spatulate to linear-oblancoelate, an inch long or less; pedicels umbellately fasciated at the nodes; slender, 2-3 lines long; sepals and oblong-ovoid capsule about a line and a half long; seeds reniform, shining. Brit. Columbia to California and across the continent.

ORDER XLII. CACTACEÆ. Lindl. Nat. Syst. ed. 2, 53.

Succulent spiny plants with usually angular or 2-edged leaf-like stems without leaves, or these represented by fleshy processes or spines and sessile flowers. Sepals numerous usually indefinite and confounded with the petals, imbricated either coherent with and crowning the ovary or covering its whole surface. Petals numerous, usually indefinite in several series, arising from the orifice of the calyx. Stamens indefinite cohering more or less with the petals and sepals; filaments long filiform; anthers ovate, versatile. Ovary fleshy coherent with the calyx 1-celled with numerous parietal placenta: ovules indefinite, styles united into a long tube or column; stigmas as many as the placenta. Fruit succulent, 1-celled, many seeded. Seeds ovate or obovate anatropous without albumen.

1. **Cactus.** Globose or oval plants without proper leaves, covered with spine-bearing tubercles; spines never barbed: flowers sessile, solitary, from between the tubercles.
2. **Opuntia.** Branching or jointed spiny plants with subulate [early deciduous leaves: spines always barbed: flowers from the same areola as the spines.

1 CACTUS L. Sp. Pl. 466. in part.

MAMALARIA Haw.

Roundish or somewhat cylindrical plants, destitute of woody axis, often with a somewhat milky juice, covered with conical or mammæform crowded spirally disposed tubercles which bear deciduous spines and tomentum at their extremity. Flowers sessile among the tubercles usually in a transverse zone. Tube of the calyx adherent to the ovary, the lobes 5-6 crowning the young fruit colored; petals 5-6 scarcely distinct from the calyx, longer than the sepals and united with them into a tube. Stamens filiform, in several series. Styles filiform; stigma 5-7-cleft, radiate. Fruit smooth.

C. viviparus Nutt. Fraser's Catalogue. Cespitose, the glomerules subglobose: tubercles cylindrical-ovate, bearded, marked above with a proliferous groove; flowers bright red, large, exerted, exterior segments of the calyx ciliate; fruit filiform, greenish. On summits of gravelly hills, Eastern Oregon to British Columbia, east to Missouri.

2 OPUNTIA Mill. Gard. Dict. ed. 6.

Shrubby plants with articulate branches, the joints mostly compressed and dilated, bearing fascicles of prickles or bristles arranged in a quincuncial or spiral order; flowers arising from the clusters of prickles or along the margin of the joints. Sepals and petals numerous, adnate to the ovary, not produced into a tube, the interior petaloid. Stamens numerous, shorter than the petals. Style cylindrical constricted at the base, stigmas numerous, thick, erect. Fruit umbilicate at the apex, tuberculate, often prickly.

O. polyacantha Haw. Suppl. Succ. 82. *O. Missouriensis* DC. Prostrate, forming large spreading masses: joints light-green, orbicular, tuberculate, 4-8 inches long: leaves minute, 2-3 lines long: pulvina 6-8 lines apart, with reddish-brown bristles, all armed: spines 8-15, the 5-10 exterior radiant, setiform, whitish or reddish variegated; the 3-5 interior ones stout, reddish-brown, 1-2 inches long, 2-4 of them deflexed, the other one spreading or suberect and very stout: flowers yellow or sometimes purple; stigmas 5-8; fruit ovate, dry and spiny, with shallow flat umbilicus, 1-2 inches long: seeds irregular, large. Plains and mountains, Eastern Washington to beyond the Rocky Mountains.

Var. platycarpa Coulter Rev. Cact. 436. Joints elongated-obovate [to obovate-orbicular, 3-5 inches long: pulvina 6-9 lines apart, with few straw-colored bristles, the lower ones unarmed or upper ones with few spines, or with exterior spines as in the species and mostly 1 stout spreading or deflexed reddish-brown interior one: fruit depressed-globose with a remarkably large and flat umbilicus, 4-9 lines long. Idaho to the Upper Missouri.

Var. borealis Coulter l. c. Joints elongated obovate to orbicular, 2-8 inches long: pulvina 6-9 lines apart, with few straw-colored bristles, and mostly one stout spreading or deflexed reddish-brown interior spine: fruit ovate, with depressed umbilicus, shortly spiny; seeds 2 lines broad, with narrow and acute margin. On sandy plains, Brit. Columbia to Eastern Oregon and Dakota.

ORDER XLIII. UMBELLIFERÆ Juss. Gen.

Herbs or rarely suffrutescent plants with alternate (rarely opposite) usually pinnatifid or ternately divided leaves, the petioles usually dilated and sheathing at base, and small flowers in simple or compound umbels, usually subtended by an involucre, and often by involucels. Calyx adherent to the ovary, its limb very small, 5-toothed or entire. Petals 5, inserted on the outside of the epigynous disk, usually inflexed at the point, the inflexed portion cohering with the lamina. Stamens 5 alternate with the petals, inflexed in the bud: anthers ovate, introrse. Ovary composed of two united carpels invested with the coherent calyx, 2-celled, with a solitary suspended ovule in each cell: styles 2, their bases dilated and thickened into a fleshy body (called stylopodium) which covers the top of the ovary; stigmas simple. Fruit consisting of two dry carpels which adhere by their faces (called commissures) to a common axis (called carpophore) at length separating from each other and suspended from the summit of the carpophore, each carpel indehiscent, marked with 5 longitudinal primary ribs, one opposite each petal and each stamen, and often with 5 secondary ones: in the substance of the pericarp are usually several longitudinal tubes (called vittæ), filled with a colored aromatic oil, which are commonly lodged in the spaces (intervals) between the ribs but sometimes opposite them. Seeds anatropous, usually coherent with the carpel rarely loose. Embryo minute at the base of the copious horny albumen.

§ I. Fruit with secondary ribs the most prominent or the only ones: oil-tubes solitary beneath the secondary ribs or wanting: stylopodium conical (except in *Daucus*).

* Fruit bristly primary ribs filiform, secondary ribs winged, umbels compound; leaves pinnately decomposed.

1. **Daucus.** Stylopodium depressed or wanting.

2. **Caucalis.** Stylopodium conical.

3. **CORIANDRUM** Calyx-teeth evident: fruit globose, with broad commissure.

§ II. Fruit with primary ribs only.

* Fruit strongly flattened dorsally with prominently winged ribs.

+ Cauliscent branching plants with solitary oil-tubes (except some species of *Angelica*) depressed stylopodium, filiform to winged dorsal and intermediate ribs and white flowers.

4. **Angelica.** Carpels with strong ribs, laterals forming a distinct double-winged margin to the fruit, oil-tubes one to several in the intervals, 2-10 on the commissure.
5. **Selinum.** Carpels with prominent winged ribs, the lateral ones usually the broadest; oil-tubes conspicuous, 2-4 on the commissure; seed sulcate beneath the oil-tubes.
- + + Caulescent branching plants, with solitary oil-tubes, conical stylopodium, filiform or stronger dorsal and intermediate ribs and white flowers.
6. **Heraclium.** Carpels with dorsal and intermediate ribs filiform; the broad lateral wings contiguous to those of the other carpel, strongly nerved towards the outer margin.
- + + + Short caulescent or acaulescent with solitary or numerous oil-tubes, no stylopodium, filiform dorsal and intermediate ribs.
- + + Lateral wings coherent till maturity.
7. **PASTINACA** Calyx-teeth obsolete: fruit oval, very much flattened, glabrous.
8. **Coloptera.** Carpel with dorsal and intermediate ribs filiform or winged and approximate: lateral wings broad, very thick and corky: oil-tubes small, 4-8 in the intervals, 8-14 on the commissure
9. **Leptotænia.** Carpel with dorsal and intermediate ribs filiform or obsolete, the lateral wings with thick corky margin that, is coherent with the margin of the opposite one till maturity: oil-tubes 3-6 in the intervals, 4-6 on the commissure. (Sometimes obsolete.)
10. **Peucedanum.** Carpel with dorsal and intermediate ribs filiform approximate, lateral wings broad and thin: oil-tubes 1-8 in the intervals, 2-10 on the commissure.
- + + Carpel; not coherent.
11. **Pseudocymopterus.** Carpel with dorsal and intermediate ribs prominent and acute; lateral wings rather broad and thickish, oil-tubes 1-4 in the intervals, 2-6 on the commissure.
- * * Fruit but slightly if at all flattened either way.
- + Fruit with all the ribs conspicuously winged, stylopodium depressed or wanting.
12. **Cymopterus.** Carpel somewhat flattened dorsally, with mostly 5 broad thin equal wings, the lateral wings distinct.
13. **Phellopterus.** Carpel somewhat flattened dorsally with 5 equal broad and corky-thickened wings, the wings distinct.
14. **Thaspium.** Carpels with 3 or 4 or all the ribs strongly winged: stylopodium wanting.
- + + Fruit with all the ribs prominent and equal acute or slightly winged stylopodium, conical oil-tubes numerous.
15. **Ligusticum.** Oil-tubes 2-6 in the intervals, 6-10 on the commissure.
- + + + Fruit with broad and equal corky ribs, stylopodium depressed, oil-tubes solitary.
16. **Cœlopleurum.** Carpel with very thick and prominent corky ribs.

+ + + + Fruit with very thick and corky lateral ribs, filiform dorsal and intermediate ones, stylopodium depressed, oil-tubes solitary.

17. **Orogenia.** Carpel flattened dorsally, lateral wings very corky thickened, oil-tubes very small 3 in the intervals, 2-4 on the commissure.
18. **Crantzia.** Seed terete, carpel with filiform dorsal and intermediate ribs lateral wings very thick and corky next the commissure; oil-tubes 2 on the commissure.
19. **Ænanthe.** Carpel with broad obtuse corky ribs the lateral ones largest, oil-tubes 2 on the commissure; seed semi-terete, sulcate beneath each oil-tube.

* * * Fruit flattened laterally.

+ Fruit prickly or with tuberculate scales, the ribs obsolete.

20. **Eryngium.** Calyx-lobes very prominent, rigid, often spinose, persistent.
21. **Sanicula.** Calyx-lobes somewhat foliaceous fruit sub-globose densely covered with hooked prickles, or tuberculate.
- + + Fruit neither prickly nor scaly.
- ++ Carpels flattened dorsally.

= Fruit with plane seed-face, numerous oil-tubes, depressed stylopodium and filiform ribs

22. **Pimpinella.** Calyx-teeth obsolete, carpel with equal slender ribs.
 = = Fruit with concave seed face, numerous oil-tubes and filiform ribs.
23. **Musenium.** Calyx-teeth prominent, stylopodium depressed; oil-tubes usually 3 in the intervals, unequal, 2-4 on the commissure.
24. **Eulophus.** Calyx-teeth prominent, stylopodium conical; oil-tubes 1-5 in the intervals, 4-3 on the commissure.
25. **Bupleurum.** Calyx teeth obsolete: fruit oblong, with rather broad commissure.
 ++ ++ Carpels terete or slightly flattened laterally.
 = Fruit linear-oblong, with concave seed-face and conical stylopodium.
26. **Leibergia.** Fruit flattened laterally, linear, beaked stylopodium wanting.
27. **Osmorhiza.** Calyx-tube obsolete, fruit acute at both ends, oil-tubes obsolete in mature fruit.
28. **Glycosma.** Calyx-teeth obsolete: fruit linear to linear-oblong, not attenuate at base.
 = = Fruit with concave seed-face depressed stylopodium, and numerous oil-tubes.
29. **Valæa.** Carpel somewhat flattened laterally with prominent equal filiform ribs.
 = = = Fruit with plane seed-face and depressed stylopodium.
 a. Oil-tubes numerous, ribs broad and corky.

30. Sium. Calyx-lobes minute carpels with prominent corky nearly equal ribs; seed subangular.

b. Oil-tubes solitary in all the intervals.

31. Apium. Calyx-lobes obsolete; fruit ovate or broader than long: oil-tubes 2 on the commissure.

c. Ribs filiform.

32. Zizia. Calyx-lobes prominent; stylopodium wanting; seed terete sulcate beneath the oil-tubes.

= = = = Fruit with plane seed-face conical stylopodium and solitary oil-tubes.

33. Carum. Calyx-lobes small, carpels with filiform or inconspicuous ribs seeds dorsally flattened.

34. Taniopleurum. Calyx-lobes prominent carpel with broad salient ribs.

35. Cicuta. Calyx-lobes rather prominent carpels with strong flattish corky ribs, the lateral ones the largest.

= = = = = Fruit with plane seed-face conical stylopodium and numerous oil-tubes.

36. Berula Calyx-lobes minute; carpel nearly globose with very slender ribs thick corky pericarp and terete seeds.

** ** * Carpels strongly flattened laterally stylopodium depressed.

37. Hydrocotyle. Calyx-lobes minute or none carpel with 5 primary ribs and filiform intermediate ones.

I. Fruit with secondary ribs the most prominent or the only ones: oil tubes beneath the secondary ribs or wanting.

1 DAUCUS Tourn. L. Gen. n. 333.

Bristly annual or biennial herbs with pinnately decomposed leaves foliaceous and cleft involucre bracts, entire or toothed involucre and white flowers in concave umbels. Calyx-lobes obsolete. Fruit oblong flattened dorsally. Carpel with 5 slender bristly primary ribs and 4 winged secondary ones, each bearing a single row of prominent barbed prickles. Stylopodium depressed or wanting. Oil-tube solitary in the intervals, 2 on the commissure. Seed-face concave or almost plane.

D. pusillus Michx. Fl. i, 164. Stems retrorsely papillate-hispid, from an inch to 2 feet high: leaves finely dissected into narrowly linear-segments: umbels unequally few to many-rayed; rays 6-18 lines long; pedicels very unequal. 1-8 lines long. On dry rocky or sterile ground. Brit. Columbia to California and across the continent.

D. CAROTA L. (THE CULTIVATED CARROT.) Stems bristly 1-4 feet high; leaves rather coarsely divided, the ultimate segments lanceolate and cuspidate, umbels with numerous elongated rays and prominent involucre. Escaped from gardens and extensively naturalized.

2 CAUCALIS L. Gen. n. 331.

Mostly hispid annual herbs with pinnately dissected leaves and white flowers. Calyx-lobes prominent. Fruit ovate or oblong flattened laterally. Carpel with 5 filiform bristly primary ribs, and 4 prominent winged secondary ones with barbed or hooked prickles. Stylopodium thick-conical. Oil-tubes solitary in the intervals (that is under the secondary ribs), 2 on the commissure. Seed face deeply sulcate.

C. microcarpa Hook. & Arn. Bot. Beechey 348. Stem slender, erect, 3-15 inches high, nearly glabrous: leaves much dissected; slightly hispid: umbels at the ends of the stems and branches, very unequally 3-6 rayed involucre foliaceous the bracts divided: involucels of entire or somewhat divided bractlets: rays slender, 3 inches long or less, pedicels very unequal: fruit oblong, 2-3 lines long armed with rows of hooked prickles, the primary lateral ribs near and pushed around upon the commissural face while the adjoining secondary ones become marginal. Eastern Washington and Oregon to California and Arizona.

3 CORIANDRUM L. Gen. n. 356.

Slender branching glabrous annuals with pinnately compound leaves, no involucre, involucels of several small narrow bractlets, and white flowers. Calyx-teeth prominent. Fruit globose, with broad commissure carpels with inconspicuous secondary ribs. Stylopodium conical. Oil-tubes beneath the secondary ribs. and obscure, the commissural pair larger. Seeds dorsally flattened with somewhat concave face.

C. SATIVUM L. the common coriander has escaped from gardens and is seen along roadsides in places.

II. *Fruit with primary ribs only.*

4 ANGELICA L. Gen. n. 347.

Stout perennial branching herbs with ternately or pinnately compound leaves, scanty involucre or none, involucels of small bractlets or none and large terminal umbels of usually white flowers. Calyx-teeth mostly obsolete. Fruit ovate or oblong, with prominent crenulate disk. Carpels with strong ribs, the lateral ones broadly winged, the wings distinct from those of the opposite carpel, thus forming a double-winged margin to the fruit. Stylopodium depressed or sometimes slightly conical. Oil-tubes 1-several in the intervals, 2-10 on the commissure.

* Oil-tubes solitary in all the intervals.

A. genuflexa Nutt. T. & G. Fl. i, 620. Stems stout 2-6 feet high, glabrous except the rough-pubescent inflorescence; leaves once or twice ternate, the divisions often deflexed; leaflets ovate to lanceolate, more or less acuminate, irregularly and sharply serrate: umbel equally many-rayed, with no involucre, and involucels of numerous linear bractlets, rays an inch or more long; fruiting pedicels 4-6 lines long; fruit nearly round, emarginate at base and apex, glabrous; lateral wings broader than the body: oil-tubes 2 on the commissure: seed-face plane. In wet places; Oregon to Alaska, west of the Cascades.

A. Lyallii Watson Proc. Am. Acad. xvii, 374. Stout, 4-5 feet high, glabrous; leaves once or twice ternate then quinate, the uppermost reduced to large inflated petioles; leaflets ovate to lanceolate, acute or acutish, unequally dentate; umbel unequally many-rayed with neither involucre nor involucels: rays $\frac{1}{2}$ -4 inches long; fruiting pedicels thick, a line or less long: fruit oblong to obovate, glabrous 2-3 lines long; lateral wings as broad or broader than the body, oil-tubes 2 on the commissure: seed-face broadly concave. In the mountains, Oregon to Brit. Columbia, Montana and Idaho.

A. arguta Nutt. l. c. Stout 2-4 feet high, glabrous or the inflorescence sometimes minutely puberulent: leaves ternate then pinnate or bipinnate; leaflets mostly small, ovate to lanceolate, rather acute, serrate: umbel rather equally many-rayed with neither involucre nor involucels: rays 1-3 inches long; pedicels 3-5 lines long, fruit oblong-elliptical, glabrous 3-4 lines long, dorsal and intermediate ribs thick and slightly elevated; lateral wings very corky, thick and broad as the much flattened body or broader, oil-tubes 2 on the commissure (sometimes 4 in 2 distinct pairs): seed sulcate beneath the oil-tubes with plane face. Along high mountain streams, Oregon and Washington.

A. Hendersoni C. & R. Bot. Gaz. xiii, 80. Very stout densely tomentose throughout, especially the inflorescence and whitened lower surface of the leaves: leaves quinate then pinnate; leaflets thick, broadly ovate, 2-4 inches long by 2-3 broad, obtuse, serrate: umbel equally many rayed with no involucre and involucels of numerous linear-acuminate bractlets: rays 1-2 inches long: pedicels a line or less long: fruit oblong more or less pubescent, 3 lines long: dorsal and intermediate ribs prominent; lateral wings thick and corky, as broad as the body: oil-tubes 2 on the commissure, seed deeply sulcate beneath the oil-tubes, with plane face. Bluffs moistened by the sea spray Washington and Oregon

* * Oil-tubes in pairs in some of the intervals.

A. Canbyi C. & R. Rev. Umb. 40. Rather stout, 2-3 feet high, glabrous except the puberulent inflorescence: leaves bipinnate: leaflets lanceolate to ovate-lanceolate 1-2 inches long acute or acuminate, laciniately toothed: umbel rather equally 10-20-rayed, with neither involucre nor involucels; rays 1-2 inches long: pedicels slender 3-4 lines long: flowers pinkish: stylopodium conical: fruit oblong, glabrous at maturity; dorsal and intermediate ribs thin and very prominent somewhat winged: lateral wings rather thin half as broad as the body; oil-tubes solitary in the dorsal intervals in pairs in the lateral ones, 4 on the commissure; seed-face plane. Eastern Washington to Southern Oregon.

5 SELINUM L. Gen. n. 337.

Tall stout branching perennials with pinnately decomposed leaves, few-leaved involucre, involucels of numerous bractlets and white flowers. Calyx-lobes obsolete. Fruit oblong to obovate with more or less prominent disk. Carpels with prominent winged ribs, the laterals usually broader. Oil-tubes conspicuous, 2-4 on the commissure. Seed sulcate beneath the oil-tubes, with plane face.

S. capitellatum Watson, Bot. King, 126. Very stout, 1-5 feet high, smooth except the tomentose inflorescence; leaves large with much dilated petioles bipinnate, the few leaflets oblong to linear-lanceolate, an inch or two long, coarsely laciniately toothed or lobed: umbel equally 6-12 rayed, with globose umbellets of sessile pubescent flowers having involucels of a

HERACLEUM.

few deciduous bractlets: rays 1-2 inches long: fruit sessile and dilated; receptacle, hirsute, cuneate-obovate, 3 lines long: lateral wings broader than the dorsal and intermediate ones. Along stream banks eastern Oregon to Nevada and California.

S. Kingii Watson, Bot. King, 126. Smooth, 1-2 feet high: lower leaves bipinnate the upper nearly simply pinnate with dilated petioles; leaflets ovate or linear lanceolate, 1-3 inches long, coarsely and unequally serrate; umbel 5-10 rayed, with no involucels; pedicels 2-3 lines long, fruit broadly ovate, hispid, 2-3 lines long; lateral wings broader than the narrow dorsal and intermediate ones. Aquatic in mountain swamps Eastern Washington to Nevada and California.

S. Dawsoni C. & R. Bot. Gaz., xiii, 141. A foot or so high glabrous: leaves ternate then pinnate, the small ovate acute segments laciniately toothed to entire: umbel with involucels of linear-oblong scarious bractlets longer than the pedicels and abruptly ending in a longer attenuation: pedicels 1-2 lines long, fruit oblong, smooth about 2 lines long, with prominent wings, the lateral ones but little broader. At Pelly Banks Yukon river, lat 61 deg., perhaps Northern Washington.

S. Benthami Watson. Bibl. Ind. 432. Glabrous throughout: leaves ternate then pinnate the oblong to linear-oblong acute segments 6-9 lines long, laciniately toothed or lobed to entire; umbels on stout peduncles, 10-15 rayed, with an involucre of a few linear setaceous bracts, and involucels of several elongated linear entire bractlets equalling the flowers or longer; rays about an inch long; pedicels 2-3 lines long: fruit ovate, 2 lines long, often with a single prominent calyx-tooth. Arctic shores and mountains to Queen Charlotte Islands, perhaps Northern Washington.

S. Hookeri Watson C. & R. Rev. Umb. 45. *Conioselinum Fisheri* of Anthers in part. Stout, 2-3 feet high, glabrous except the somewhat puberulent inflorescence: leaves large with much dilated petioles bipinnatifid, the narrowly ovate to linear-oblong acute segments an inch or less long, laciniately toothed or lobed to entire: umbel 10-25 rayed, with involucre of few deciduous linear-setaceous bracts, and involucels of narrowly linear more or less elongated bractlets; rays about an inch long; pedicels 2-3 lines long: fruit oblong, glabrous, 2-3 lines long, with prominent but scarcely winged dorsal and intermediate ribs and rather broadly winged-thickish lateral ribs. Ocean bluff mouth of the Columbia to Alaska.

♂ HERACLEUM L. Gen. n. 345.

Tall stout perennial herbs with large ternately compound leaves, deciduous involucres, involucels of numerous bractlets and large many-rayed umbels of white flowers with obcordate petals. Calyx-lobes small or obsolete. Fruit broadly ovate, very much flattened, somewhat pubescent. Carpel with dorsal and intermediate ribs filiform; the broad lateral wings contiguous to those of the other carpel, strongly nerved towards the outer margin. Stylopodium thick conical. Oil-tubes about half as long as the carpel 2-4 on the commissure. Seed very much flattened dorsally.

H. lanatum Michx. Fl. i, 166. Very stout, 4-8 feet high, pubescent or woolly above: petioles much dilated; leaflets petiolulate round-cordate 4-10 inches broad irregularly cut-toothed: rays 2-6 inches long: fruit 4-6 lines long, somewhat pubescent. Wet grounds, Alaska to California and across the continent.

7 PASTINACA Tourn. L. Gen. n. 362.

Calyx-lobes obsolete. Fruit oval, very much flattened, glabrous. Carpel with broad lateral wings continuous to those of the opposite carpel, and strongly nerved towards the outer margin. Stylopodium depressed but prominent. Oil-tubes small, solitary in the intervals, 2-4 on the commissure. Seed very much flattened dorsally. Tall stout biennial herbs with pinnately compound leaves and yellow flowers.

P. SATIVA L the common parsnip is introduced almost everywhere. The leaflets are ovate to oblong and cut-toothed.

8 COLOPTERA C. & R. Rev. Umbelif. 49.

Dwarf sandy ground plants with small leaves, no involucre involucels of foliaceous more or less united bractlets and yellow flowers. Calyx-lobes obsolete or evident. Fruit ovate, glabrous. Carpel with dorsal and intermediate ribs filiform or winged and approximate; lateral wings broad very thick and corky, coherent till maturity with those of the other carpel forming a broad corky margin to the fruit usually thicker than the fruit proper. Oil-tubes very small, 4-8 in the intervals, 8-14 on the commissure. Seed very flat with plane or slightly concave face.

C. Parryi C. & R. l. c 50. Acaulescent, 2-6 inches high: leaves small, ovate in outline, bipinnate with very small oblong segments: involucels of slightly united bractlets: fruit with prominent corky and undulate dorsal and intermediate wings. N. W. Wyoming, to be looked for in Idaho.

9 LEPTOTÆNIA Nutt. T. & G. Fl. i, 629.

Stout glabrous short-caulescent perennial herbs with thick often very large fusiform roots, usually pinnately decomposed leaves, involucre of few bracts or none, involucels of numerous small bractlets and yellow or purple flowers. Calyx-lobes obsolete or evident. Fruit oblong-elliptical, glabrous. Carpel with dorsal and intermediate ribs filiform or obscure and approximate; lateral wings broad very thick and corky, coherent until maturity with those of the other carpel, commissural face with a prominent central longitudinal-ridge left after separation from the carpophore. Oil-tubes 3-6 in the intervals 4-6 on the commissure, mostly small, sometimes obsolete. Seed very flat, with plane or slightly concave face.

* Oil-tubes obsolete or very obscure.

L. dissecta Nutt. l. c 630. *Ferula dissoluta* Watson *Bot Cal. i, 271*. Stems stout, 1-3 feet high, leafy at base: leaves broad, a foot or so long, ternate and thrice pinnate: segments ovate or oblong 6-12 lines long pinnatifidly lacinate-lobed and toothed, puberulent on the veins and margins; umbel 8-20 rayed, with an involucre of few linear bracts, involucels of several linear bractlets; rays 2-5 inches long: flowers yellow or purplish; fruit sessile or nearly so 5-9 lines long, about 3 lines broad: seed-face plane. Brit. Columbia to California.

L. multifida Nutt. l. c. *Ferula multifida* Gray. Stems 1-2 feet high, somewhat spreading, leaves ternate and pinnate: umbels mostly without involucre, pedicels of the fruit 3-12 lines long: fruit 4-6 lines long: seed-face concave. Brit. Columbia to California, Utah and Montana.

* * Fruit with oil-tubes and pedicels.

L. Watsoni C. & R. l. c. 52. Low, a foot high or less, rather stout, somewhat branching: leaves few and small, at or near the base, ternate-pinnately decomposed, the ultimate segments very small, ovate and cuspidate: umbel with 5-10 variously elongated divaricate rays, no involucre and involucels of few setaceous bractlets: rays 2-4 inches long: fruiting pedicels about 6 lines long and divaricate; fruit 6 lines long: oil-tubes 3 in the intervals: seed face concave. In the Wenatchee region, Washington.

L. minor Rose in Herb. Stems about a foot high, glabrous: leaves very much dissected, the alternate segments linear or filiform: umbel 8-20-rayed, with no involucre, and involucels of several linear acuminate bractlets; rays 3-4 inches long: flowers purple: fruit 6-9 lines long as long as the pedicels 4-6 lines broad; wings very corky margined: oil-tube prominent, 3 in the intervals of the distinct dorsal and intermediate ribs, 4 on the commissure. On stony hillsides in the John Day country, Oregon.

L. purpurea C. & R. l. c. *Ferula purpurea* Watson Stout many-stemmed from a large thick root; stems 2-4 feet high, whole plant glaucous with a white bloom: leaves ample very finely dissected, ultimate segments linear or filiform umbel many rayed with no involucre and involucels of several bractlets rays 3-4 inches long; flowers purple: fruit 9-12 lines long as long as the pedicels; 5-6 lines broad with very prominent corky margins to the wings: oil-tubes prominent. 3 in the intervals of the distinct dorsal and intermediate ribs, 4 on the commissure. On rocky hillsides along the Columbia river, near the mouth of the Klickitat.

L. Californica Nutt. l. c. 630. *Ferula Californica* Gray. Rather stout, 1-3 feet high, with 1 or 2 stem leaves: leaves ternate and pinnate or twice ternate; leaflets cuneate-obovate 1-2 inches long, usually 3-lobed, coarsely toothed above: umbel 15-20 rayed, with involucre of 1-2 narrow bracts or none and no involucels; rays 2-4 inches long, pedicels 2-4 lines long; fruit 5-7 lines long, 3-4 lines broad, with a thinner margin than any other species; dorsal and intermediate ribs distinct: oil-tubes 3-4 in the intervals 6 on the commissure. On dry hillsides, Southern Oregon to California.

10 PEUCEDANUM Koch Umb. f. 28 and 29, L. Gen. n. 339.

Short caulescent or acaulescent perennial or biennial herbs with fusiform or tuberous roots, ternate or pinnate to dissected leaves, no involucre, involucels usually present, and yellow, white or pinkish flowers. Calyx-lobes obsolete or evident. Fruit oblong to suborbicular. Carpel with dorsal and intermediate ribs filiform and approximate; lateral wings broad and thin, coherent till maturity with those of the other carpel, forming a broad, membranous wing to the fruit; commissural face without a prominent longitudinal ridge after separation from the carpophore. Oil-tubes 1-8 in the intervals, 2-10 on the commissure. Seed flat with plane or slightly concave face.

§ I. Mostly low, from globose tubers: leaves small more or less dissected, with short segments: wings of the fruit narrow: oil-tubes

mostly solitary in the intervals, or with accessory ones in some species.

* Always acaulescent, mostly glabrous.

+ Flowers white.

P. Hendersoni C. & R. Bot. Gaz. xiii, 210. Scapes 4-6 inches long, decumbent from a shallow constricted tuber 6-12 lines in diameter; leaves ternate then bipinnate, ultimate segments short and obtuse: umbel equally 2-5-rayed, with involuclers of linear acuminate scarious bractlets; rays 6 lines long; pedicels 1-2 lines long; fruit ovate very glabrous $2\frac{1}{2}$ lines long by 2 lines broad, with thickish narrow wings more or less involute and a rather prominent ridge on the commissural face: oil-tubes solitary in the intervals, 2 on the commissure: seed face plane. On high hill-tops, John Day Valley, Eastern Oregon.

P. Canbyi C. & R. l c 78. Scapes erect, 3-8 inches high, with a short underground stem from a thick more or less elongated root which ends in a globose tuber 6-15 lines in diameter: leaves ternate pinnate or bipinnate, ultimate segments small with 3-5 linear-oblong lobes: umbel equally 5-10-rayed, with involucler of narrowly linear scarious-margined bractlets: rays 1-2 inches long; pedicels 4-6 lines long; fruit oblong-ovate, glabrous, 4 lines long, with wings about half as broad as the body: oil-tubes solitary in the intervals, 2 or 4 on the commissure. High ridges, Eastern Oregon and Washington.

P. Geyeri Watson Proc. Am. Acad. xiv, 293. Low, glabrous; root moniliform with 2 or 3 small globose tubers: leaves ternate-quinate, with linear leaflets 4-9 lines long: umbel small with unequal rays: involucler of several linear acuminate bractlets; mature fruit unknown. Collected by Geyer Spalding and Lyall, not since reported.

P. farinosum Geyer Hook Lond. Journ. Bot. vi, 235. Somewhat caulescent: stems slender from a rather deep-seated small round tuber 4-6 lines in diameter with numerous clusters of fine rootlets on its surface: leaves 2-3-ternate, with segments more or less lobed, ultimate divisions all linear: umbel 1-3 rayed, with involuclers of few small linear bractlets: rays 1-2 inches long, fruit almost sessile, oblong-elliptical, glabrous, 3-4 lines long, 2 lines broad, with wings half as broad as the body: oil-tubes small, 2-4 in the intervals, 4-6 on the commissure: seed-face plane. From Brit. Columbia to California and Idaho.

P. Gormanii P. Watsoni C. & R. in Part. Stems 2-3 inches high from a shallow globular tuber an inch or less in diameter with fascicles of rootlets on its surface: leaves bipinnate, the ultimate divisions oblong or linear, umbel unequally 1-5 rayed with involuclers of a few setaceous bractlets or none: fruit sessile or nearly so; ovate, rough-puberulent 3 lines long with wing more than half as wide as the body and conspicuous dorsal and intermediate ribs: oil-tubes one in each rib, 2-6 on the commissure, seed-face plane. High hills opposite The Dalles.

P. evittatum C. & R. Eight to eighteen inches high from a deep-seated small tuber, glabrous: leaves once or twice ternate then more or less pinnate into linear, callous-tipped segments 6-12 lines long: umbel somewhat unequal 8-18-rayed with involuclers of numerous purplish lanceolate acuminate gamophyllus bractlets; rays 1-2 inches long, pedicels short: fruit oblong glabrous 4-6 lines long $2\frac{1}{2}$ lines broad, with very thin wings more than half as broad as the body: oil-tubes none. Ellensburg, Washington. (*G. R. Vasey, 1889*).

+ + Flowers yellow.

P. Watsoni C. & R. Bot. Gaz. xiii, 209 in Part. Low, 2-3 inches

high with a short subterranean stem from a deep-seated fusiform root: leaves bipinnate, the ultimate divisions short and linear-oblong; umbel unequally 1-5-rayed, with involuclers of more or less united, often toothed bractlets: fruit sessile or nearly so, ovate rough puberulent, 3 lines long, with narrow wings, oil-tubes obscure, seed face plane. Simcoe Mountains, Washington.

P. Cous Watson l. c. xxi, 453. Glabrous or slightly puberulent, with roughish scapes 2-6 inches high from a nearly globose tuber 6-12 lines in diameter: leaves pinnate: leaflets 3-7 parted or cleft or even entire; ultimate divisions linear-oblong: umbel unequally 3-10-rayed, with involuclers of short oblong-ovate scarious-margined bractlets, rays from nearly wanting to 2 inches long; pedicels short: fruit oblong, more or less puberulent, 2-4 lines long, 1-2 lines broad, with wings about half as broad as the body, and prominent dorsal and intermediate ribs; oil-tubes large, filling the intervals: 4-6 on the commissure: seed-face plane with central longitudinal ridge. On high gravelly ridges, John Day Valley, Oregon.

P. ambiguum Nutt. T. & G. Fl i, 626. From low acaulescent to a foot high and caulescent; glabrous: root tuberous, usually moniliform: petioles much dilated at base: leaves 1-2-pinnate with more or less elongated linear leaflets, the upper often more dissected: umbel unequally 8-18-rayed with mostly no involuclers: rays 1-4 inches long; pedicels 2-3 lines long: fruit narrowly winged: oil-tubes 2 on the commissure. Oregon to Brit. Columbia, Idaho and Montana.

Var. leptocarpum C. & R. Rev. Umb. 59. Fruit sessile or nearly so making a close somewhat divaricate cluster: rays few and very unequal. Oregon.

P. circumdatum Watson l. c. xxii, 478. Stem solitary from a deep-seated constricted tuber, glabrous or puberulent a foot or less high: leaves ternate-quinate, the ultimate divisions linear 1-4 lines long: umbel unequally 6-12-rayed, with involuclers of conspicuous broadly oblanceolate bractlets becoming scarious; rays $\frac{1}{2}$ - $3\frac{1}{2}$ inches long; pedicels very short: fruit oblong elliptical, glabrous, 3-4 lines long $1\frac{1}{2}$ lines broad, with narrow wings and very prominent dorsal and intermediate ribs: oil-tubes 4 on the commissure: seed-face concave with a prominent central ridge. Oregon and Washington to Dakota.

§ II. Stout, glabrous only in *P. Grayi*, from large roots: leaves mostly large and very finely dissected, the ultimate segments filiform or narrowly linear: fruit wings more than half as broad as the body: oil-tubes 1-3 in the intervals, (solitary in *P. Grayi* and *P. macrocarpum*).

* Flowers yellow: fruit glabrous: short caulescent.

P. Grayi C. & R. Bot Gaz. xiii, 209. *P. millefolium* Watson. Glabrous, peduncles 2-20 inches long numerous from a thick perennial root: leaves ternate-pinnately decomposed, the ultimate segments linear, elongated or short cuspidate, very numerous: umbel rather equally 6-16-rayed, with involuclers of distinct linear-subulate bractlets; rays 1-3 inches long; pedicels 5-8 lines long: fruit oblong 4-8 lines long, 2-5 lines broad, with filiform dorsal and intermediate ribs: oil-tubes usually solitary in the intervals, 2-4 on the commissure. Common on dry rocky banks Oregon and Washington to Utah.

** Flowers white.

P. eurycarpum C. & R. Rev. Umb. 61. Somewhat caulescent 6-12 inches high more or less pubescent from a long biennial caudex terminating below in a fusiform tuber: leaves bipinnate, segments pinnately incised, ultimate divisions ovate or shortly linear: umbel somewhat

equally 6-8-rayed, with involucels of conspicuous and somewhat foliaceous lanceolate or linear gamophyllus bractlets: rays 1-3 inches long: pedicels 2-5 lines long, calyx-lobes evident: fruit narrowly oblong, glabrous 4-12 lines long 2-3 lines broad, with wings about half as wide as the body, and filiform dorsal and intermediate ribs: oil-tubes solitary in the intervals, 2 or 4 on the commissure: seed face with a slight central longitudinal ridge. On dry rocky ridges and plains Brit. Columbia to California.

P. macrocarpum Nutt. l. c. 627. Caulescent, branching a foot or two high, more or less pubescent: leaves ternate-pinnately decomposed, with small linear cuspidate segments; umbel 3-12-rayed with involucels of lanceolate acuminate often united bractlets rays from $\frac{1}{2}$ -4 inches long: fruit broadly elliptical glabrous 5-9 lines long: 3-4 lines broad with wings as broad as the body, on pedicels 1-5 lines long: oil-tubes large, solitary in the intervals, 2 on the commissure. Brit. Columbia to California.

§ III. Low and rather slender, from elongated comparatively slender roots leaves rather small, more or less pinnately compound. With short segments fruit-wings never broader than the body: oil-tubes 3-6 in the intervals.

* Flowers white, fruit-wings more than half as wide as the body.

P. Nevadense Watson Proc. Am. Acad. xi, 143. Glaucescent-puberulent, shortly caulescent peduncle 3-15 inches high: leaves pinnately decomposed with small segments: umbel equally 5-10-rayed, with involucels of scarious-margined linear lanceolate bractlets: rays often 1-2 inches long; pedicels 2-5 lines long: fruit rounded to ovate, somewhat pubescent, 3-5 lines long, 2-4 lines broad, with wings almost as broad as the body and evident dorsal and intermediate ribs: oil-tubes 3 or 4 in the intervals, 4 or 6 on the commissure. From Northern Cal. to S. E. Oregon, Utah and Nevada.

** Flowers yellow, fruit wings narrower.

P. Oregonum C. & R. Rev. Umb. 64. Acaulescent and cespitose from a multicapital caudex, with very slender peduncles 1-2 inches high bearing a very small single umbel or sometimes two nearly sessile umbellets and one to few matured puberulent fruits about 2 lines long ultimate leaf segments very small, linear-oblong not cuspidate. Alpine rocks Blue and Eagle Creek Mountains, Oregon. (Cusick)

P. villosum Nutt. Watson Bot. King 131. Acaulescent more or less densely pubescent 3-8 inches high: leaves finely dissected, with very numerous narrow crowded segments: umbel somewhat equally 4-5 rayed, with involucels of ovate to linear usually very tomentose bractlets; rays about an inch long; pedicels 1-3 lines long: fruit oval, somewhat pubescent with wings half as broad as the body, and prominent dorsal and intermediate ribs: oil-tubes 3 or 4 in the intervals 4 on the commissure, seed-face plane. Northern California and Nevada to the Yukon river.

P. Donnellii C. & R. Bot. Gaz., xiii, 143. Shortly caulescent or acaulescent 6-12 inches high, glabrous from a fusiform root; leaves ternate then pinnately decomposed leaves with segments cleft into short oblong or linear lobes: umbel somewhat unequally 6-12-rayed, with involucels of linear acuminate bractlets: rays 1-4 inches long; pedicels 2-8 lines long: fruit ovate to broadly oblong, glabrous, 3-4 lines long, 2-3 lines broad, with wings less than half as broad as the body and prominent dorsal and intermediate ribs: oil-tubes small, 4-6 in the intervals, 4-6 on the commissure. In wet places, John Day Valley, Oregon.

P. Sandbergii C. & R. l. c. 79. Caulescent, branching at base, an inch or two to a foot high, from an elongated comparatively slender root

rough pubescent petioles wholly inflated, with a very conspicuous white scarios margin; leaves ternately or pinnately dissected, the ultimate segments very short, linear: umbel very unequally 6-15-rayed, with involucels of distinct linear-lanceolate bractlets; rays 1-4 inches long; pedicels a line or two long; flowers bright yellow: fruit ovate puberulent 2-2½ lines long with very narrow wings, and filiform dorsal and intermediate ribs oil-tubes 4-5 in the intervals 6 on the commissure: seed-face plane. Bare mountain tops, Northern Idaho and Montana to Brit. Columbia.

P. microcarpum Howell P. C. Pl. Coll. 1887. Caulescent, branching from the base 6-16 inches high, glabrous: leaves pinnately-decompound the ultimate segments oblong- to linear-lanceolate: minutely cuspidate: umbel somewhat equally 10-18-rayed with involucels of several linear-lanceolate bractlets 1-3 lines long; pedicels 2 lines long, flowers dark yellow: fruit oblong 3 lines long 2 lines broad with narrow wings: oil-tubes 4 on the commissure. On dry cliffs, Umpqua Valley.

§ IV. Shortly caulescent, slender from elongated comparatively slender roots; glabrous; leaves small, lanceolate or oblong in outline, pinnate or bipinnate with ovate toothed segments.

* Fruit wings half as broad as the body.

P. Hallii Watson Proc. Am. Acad. xi, 141. Peduncles elongated 6-15 inches high: leaves pinnate oblong in outline, the ovate segments ½-inch long, deeply toothed or pinnatifid: umbel equally 3-6-rayed, with small involucels; rays about an inch long; pedicels 3-4 lines long: flowers yellow: fruit broadly elliptical 3 lines long, 2 lines broad with filiform dorsal and intermediate ribs, oil-tubes 3 in the intervals 4-6 on the commissure. Northern Oregon and Washington.

* * Fruit wings much broader than the body.

P. Martindalei C. & R. Bot. Gaz. xiii, 142. Caulescent and branching, with elongated peduncles 4-12 inches high: leaves pinnate, or bipinnate with toothed or pinnatifid segment: fruit 4-7 lines long, 3-4 lines broad, with wings as broad or broader than the body, and prominent dorsal and intermediate ribs; oil-tubes solitary in the intervals, 2 on the commissure, seed-face somewhat concave with central longitudinal ridge. On bluffs of the Columbia river, near the Cascades.

Var. angustatum C. & R. l. c. 143. Usually more caulescent and sometimes taller with more dissected leaves, and wings of the fruit but half a line wide making a fruit 2 lines wide. On high mountains, Brit. Columbia to California.

§ V. Caulescent; from elongated comparatively slender roots: leaves decompound with narrow linear more or less elongated segments and usually wholly dilated petioles: bractlets of the involucels scarios-margined more or less conspicuous.

* Wings of the fruit nearly as broad as the body, thin: oil-tubes large and solitary in the intervals: dorsal and intermediate ribs prominent.

P. utriculatum Nutt. T. & G. Fl. i, 628. Caulescent to nearly aculescent, 4-12 inches high from a more or less tuberous root, puberulent or glabrous: petioles very broadly dilated; leaves ternately or pinnately decompound, with ultimate segments narrowly linear, 6 lines long or less: umbel unequally 5-20-rayed with involucels of much dilated mostly obovate often toothed petiolulate bractlets; rays about 2 inches long, pedicels 2-5 lines long; flowers yellow; fruit broadly elliptical, glabrous, 2-5 lines long, 1-3 lines broad: oil-tubes 4-6 on the commissure: seed-face some-

what concave. On open places, Brit. Columbia to California, west of the Cascade Mountains.

* * Wings of the fruit narrow and thickish oil-tubes obsolete or very indistinct and numerous in the intervals: dorsal and intermediate ribs obsolete or nearly so.

P. bicolor Watson Bot King, 129. Caulescent or scarcely so, 4-18 inches high, glabrous or slightly puberulent: petioles wholly dilated; leaves ternate-pinnately decomposed, the ultimate segments very numerous and linear: umbel very unequally 2-12-rayed, with involucl of 1-8 linear-subulate bractlets; rays 1-5 inches long; pedicels short; fruit oblong glabrous, 5-6 lines long, 1-2½ lines broad. Eastern Oregon to Nevada and Utah.

§ VI. Mostly tall and often stout, from long fleshy roots: leaves with usually broad or elongated segments: bractlets of the involucl small or none.

* Leaves with narrowly linear more or less elongated leaflets.

+ Low: flowers white.

P. Cusickii Watson Proc. Am. Acad. xxi, 453. Caulescent, 2-5 inches high, from a thick elongated root: leaves 1-2-ternate, the segments with 3-5 linear acute lobes, 3-12 lines long: umbel with 1-3 short fertile rays and involucl of narrow acuminate bractlets which are distinct or more or less united pedicels very short: fruit oblong-elliptical, 4-5 lines long the thin wings as broad as the body or narrower: oil-tubes 1-3 in the intervals, 4 or 6 on the commissure: seed-face concave. On the highest summits of Eagle Creek Mountains, Union county, Oregon.

+ + Taller: flowers yellow.

P. simplex Nutt. Watson Bot King, 129. Caulescent, 6-18 inches high, puberulent: leaves ternate or biternate; leaflets from almost filiform to linear-lanceolate, 2-4 inches long: umbel unequally 3-15-rayed, with involucl of lanceolate or setaceous bractlets; rays ½-3 inches long; pedicels 1-3 lines long: fruit broadly oblong to nearly orbicular, sometimes emarginate at each end, 3-6 lines long, 2-5 lines broad, with wings broader than the body and prominent dorsal and intermediate ribs: oil-tubes large and solitary in the intervals, 2 on the commissure: seed-face slightly concave. Eastern Washington to California, Idaho and Montana.

P. triternatum Nutt. T. & G. Fl. i, 626. Caulescent 1-3 feet high, from a deep-seated elongated fusiform root: leaves biternate or triternate: leaflets from narrowly linear to linear-lanceolate, 2-4 inches long: umbel unequally 5-18-rayed, with involucl of lanceolate or setaceous bractlets; rays ½-3 inches long; pedicels a line or more long: fruit narrowly oblong, glabrous 3-6 lines long 1½-2 lines broad with narrow wings, and somewhat prominent dorsal and intermediate ribs: oil-tubes very large and broad, solitary in the intervals, 2 on the commissure. Brit Columbia to California, very variable.

Var. macrocarpum C. & R. Rev. Umb. 70. A more robust form with broader leaflets, longer rays and fruit 6-8 lines long. About Hood River, Oregon.

Var. brevifolium C. & R. l. c. Stout 6-18 inches high, rough-puberulent with more compact leaves, stout inflated petioles, and shorter and broader often toothed leaflets. On the high hills opposite The Dalles.

Var. alatum C. & R. l. c. Leaves with very narrowly linear and elongated segments fruit 5-6 lines long with broader wings. Eastern Oregon to California.

P. lævigatum Nutt l. c. 627. Caulescent or acaulescent, 6-15 inches high, glabrous, from shallow seated long roots: leaves triternate; leaflets linear 3-12 lines long by half a line wide: umbel unequally 10-14-rayed, with involuclers obsolete or rarely 1-3 small triangular bractlets: pedicels 4-5 lines long: fruit 4-5 lines long $1\frac{1}{2}$ -2 lines broad, with narrow wings and prominent dorsal and intermediate ribs: oil-tubes 2 on the commissure: seed-face more or less concave with central longitudinal ridge. On bluffs of the Columbia River, near Celilo.

* * Leaves with lanceolate or orbicular segments.

P. leiocarpum Nutt l. c. 626. Acaulescent, glabrous, 1-2 feet high, from a very long fleshy root: leaves biternate or triternate or ternate-quinate, sometimes simply ternate; leaflets thickish, from ovate to narrowly lanceolate 1-2 inches long, petiolulate, entire, or toothed at the apex: umbel very unequally 6-15-rayed without involuclers; peduncles and rays dilated at summit: rays 1-8 inches long: pedicels variable 1-9 lines long: flowers yellow: fruit narrowly oblong 5-7 lines long $1\frac{1}{2}$ - $2\frac{1}{2}$ lines broad narrowly winged: oil-tubes large and solitary in the intervals, 4 on the commissure: seed-face somewhat concave. Brit. Columbia to California and Idaho.

P. Nuttallii Watson Bot. King. 128. Acaulescent, glabrous, 6-12 inches high: leaves once or twice ternate with ovate to orbicular leaflets with cuneate or cordate base; fruit ovate to oblong, 4 lines long, 3 lines broad, very narrowly winged: oil-tubes small, 3 in the intervals, 4 or 6 on the commissure: seed-face almost plane. Eastern Oregon to N. Nevada and Idaho.

P. Brandegei C. & R. Bot. Gaz. xiii, 210. Short caulescent, glabrous, 6-12 inches high from a thick elongated root; leaves ternately decompound the ultimate segments lanceolate, 3-12 lines long, cuspidate: umbel 6-12-rayed, with involuclers of few linear or setaceous bractlets: rays 3-6 lines long; pedicels not more than a line long, both reflexed at maturity: flowers yellow: calyx-teeth evident: fruit (immature) oblong, about 4 lines long, 2 lines broad, with wings about half as broad as the body, and prominent dorsal and intermediate ribs: oil-tubes 2-4 in the intervals 4 or 6 on the commissure. Near Walla Walla, Washington. (*Brandegee*.)

* * * Very stout and tall with large decompound leaves and linear oblong segments.

P. Suksdorfii Watson Proc. Am. Acad. xx, 369. Caulescent, 2-4 feet high: leaf-segments 1-2 inches long, entire or 2-3-cleft at the top: umbel somewhat equally 6-12-rayed with involuclers of linear acuminate bractlets; rays 1-5 inches long; pedicels 3-9 lines long: flowers yellow: fruit narrowly oblong, 9-14 lines long 3-6 lines wide with wings narrower than the body, and very prominent dorsal and intermediate ribs: oil-tubes solitary in the intervals, very large, 2 on the commissure: seed-face somewhat concave. Dry rocky mountain sides, Klickitat county, Washington.

§ VII. Low shortly caulescent or acaulescent, from a thick elongated root, glabrous: leaves ternate or pinnate with broad oblong or round coarsely cuspidate-toothed leaflets, flowers yellow: fruit-wings very broad, often several times broader than the body: oil-tubes 3-4 or solitary in the intervals.

P. Howellii Watson l. c. Short caulescent, peduncles 12-15 inches high: leaves biternate to biquinate: leaflets cuneate-orbicular to round-cordate, acutely dentate, often 3-lobed, 6-12 lines long: umbel with elongated and divaricate fertile rays with involuclers of acuminate lanceolate

bractlets; pedicels 4 lines long: fruit glabrous, broadly elliptical or nearly orbicular, emarginate, with wings broader than the body, 4 lines long, oil-tubes 3 or 4 in the intervals 4-10 on the commissure. On dry hill-sides, near Waldo, Josephine county, Oregon.

11 PSEUDOCYOPTERUS C. & R. Rev. Umb. 74.

Mostly low glabrous perennials from a thick elongated root, with bipinnate leaves, no involucre and involucels of narrow bractlets mostly longer than the flowers. Calyx-lobes evident. Fruit ovate or oblong. Carpel with dorsal and intermediate ribs very prominent and acute: lateral wings rather broad and thickish, distinct from those of the other carpel. Oil-tubes 1-4 in the intervals, 2-6 on the commissure.

P. anisatus C. & R. l. c. 75. Acaulescent, cespitose from a much branched caudex which is more or less covered with the remains of old leaves: leaves on long petioles, narrow, somewhat rigid, pinnate and the leaflets pinnately-parted into linear pungently acute segments: peduncles 6-12 inches long exceeding the leaves: umbel unequally 5-12-rayed, with involucels of linear-subulate bractlets exceeding the white or yellow flowers: rays $\frac{1}{2}$ -3 inches long: pedicels 1-3 lines long: fruit about 2 lines long, the carpel irregularly 2-5-winged; oil-tubes 1-3 in the intervals, 2 or 4 on the commissure: seed-face plane. Oregon to Wyoming, Utah and Colorado.

* * Fruit not flattened either way or but slightly so.

+ Fruit with all the ribs conspicuously winged; stylopodium depressed or wanting.

12 CYMPTERUS Raf. Journ. Phys. 1819, 100.

Mostly low perennials from thick elongated roots with more or less pinnately compound leaves, mostly no involucre, prominent involucels and white, yellow or purple flowers. Calyx-lobes more or less prominent. Fruit usually globose, somewhat flattened laterally if at all. Carpel somewhat flattened dorsally with mostly 5 broad thin equal wings, lateral wings distinct from those of the other carpel. Stylopodium depressed. Oil-tubes 1-several in the intervals, 2-8 on the commissure.

C. terebinthinus T. & G. Fl. i, 624. Shortly caulescent, decumbent, 6-18 inches long, leafy at base: leaves rather rigid, thrice pinnate; leaflets a line long or less, linear or linear oblong, entire or toothed, mucronate: umbel with 4-15 fertile rays, mostly no involucre, and involucels of short linear or lanceolate bractlets; rays $\frac{1}{2}$ -2 inches long; pedicels 1-5 lines long: flowers yellow: fruit 3-4 lines long, the 5 carpel-wings broad and thin: oil-tubes 2-5 in the intervals, 5-10 on the commissure. Brit. Columbia to California, Wyoming and Colorado.

C. glaucus Nutt. Journ. Philad. Acad. vii, 28. Leaves and peduncles clustered at the summit of a short caudex, more or less scabrous-puberulent: leaves tripinnate the ultimate segments crowded, linear-oblong, with revolute margins: peduncles at first short, elongated in fruit and exceeding the leaves: umbels 5-15-rayed, with an involucre of setaceous bracts or none and involucels of linear acute bractlets; rays 4-12 lines long; pedicels 2-3 lines long; flowers white: fruit 2- $\frac{3}{4}$ lines long, the 2-5

carpel-wings rather narrow; oil-tubes 3-5 in the broad intervals 6-8 on the commissure: seed-face deeply sulcate or involute. Nevada to Idaho and Montana.

13 PHELLOPTERUS Benth. B. & H. Gen. Plant. i, 905.

A low tomentose seashore herb with once or twice ternate or ternate-pinnate thick leaves ovate to roundish more or less confluent leaflets that are densely white-tomentose beneath, involucre and involucels of subulate bracts and glomerate white flowers. Calyx-lobes small. Fruit globose, glabrous. Carpel somewhat flattened dorsally, with 5 equal broad and corky-thickened wings; lateral wings distinct from those of the other carpel. Stylopodium depressed. Oil-tubes 2-3 in the intervals, 4-6 on the commissure. Seed-face slightly concave.

P. littoralis Schmidt. Fl. Sachel. in Mem. Acad. Petrop. 7, xii, 138. Subcaulescent: petioles elongated; leaflets callous-serrate to dentate, with impressed veinlets above, 1-2 inches long; umbel shorter than the leaves, 10-12-rayed; rays 6-12 lines long; umbellets capitate: fruit 4-5 lines in diameter the wings $1\frac{1}{2}$ lines broad. On shifting sands of the seashore, Vancouver Island to Southern Oregon.

14 THASPIUM Nutt. Gen. i, 196.

Perennial herbs with ternately divided leaves with broad serrate or toothed leaflets, mostly no involucre, involucels of small bractlets mostly yellow flowers and all the fruits pedicelled. Calyx-lobes conspicuous. Fruit ovoid to oblong, slightly flattened dorsally if at all, mostly glabrous. Carpel with 3 or 4 or all the ribs strongly winged. Stylopodium wanting; styles long. Oil-tubes solitary in the intervals, 2 on the commissure: Seed sulcate beneath the oil-tubes, almost terete or somewhat dorsally flattened with plane face.

T. aureum Nutt. l. c. Glabrous: radical leaves mostly cordate, serrate: stem leaves simply ternate: leaflets ovate to lanceolate, rounded or tapering at base, serrate: umbel 8-12-rayed; rays 6-12 lines long; pedicels about a line long, flowers deep yellow: fruit globose-ovoid, about 2 lines long, all the ribs equally winged. Thickets and woodlands through the Eastern States.

Var. trifoliatum C. & R. Bot. Gaz. xii, 136. Leaves or leaflets crenately-toothed. Ohio and Illinois to Oregon and Brit. Columbia.

Var. involucratum C. & R. l. c. Radical leaves twice or thrice ternate; leaflets as in the species: umbel with conspicuous involucre of serrate bracts and involucels of numerous toothed bractlets often as long as the pedicels which are 2-3 lines long. Kootenai county, Idaho. (*Leiberg.*)

* * Fruit with all the ribs prominent and equal; stylopodium conical: oil-tubes numerous.

15 LIGUSTICUM Linn. Gen. n. 346.

Smooth perennials from large aromatic roots; with large ternate-pinnately compound leaves, mostly no involucre, involucels of narrow bractlets and white flowers in large many-rayed um-

bels. Calyx-lobes obsolete. Fruit oblong or ovate, flattened laterally if at all, glabrous. Oil-tubes 2-6 in the intervals 6-10 on the commissure. Seed with round or angled back and plane to deeply concave face.

* Leaves ternately decomposed the broad leaflets simply toothed or serrate: seed-face plane.

L. Scoticum L. Sp. 250. Stems simple, 1-2 feet high, somewhat leafy, with glabrous inflorescence: leaves biternate; leaflets ovate, 1-2 inches long, coarsely toothed: umbel 8-15-rayed, with involuclers of several linear bractlets; rays at length 1-3 inches long: fruit narrowly oblong, 4-5 lines long, with prominent somewhat winged ribs: oil-tubes small 2 or 3 in the intervals, 6 on the commissure: seed flattened dorsally with rounded back Alaska to Brit. Columbia, perhaps Washington, also on the N. Eastern coast.

** Leaves ternate-pinnately compound with leaflets laciniately toothed or pinnatifid.

L. scopulorum Gray Proc. Am. Acad. vii, 347. Stout, 2-3 feet high, more or less leafy, with puberulent inflorescence: lower leaves often very large, twice or thrice ternate, then once or twice pinnate; segments ovate, laciniately pinnatifid; upper leaves often ternate-pinnate or simply pinnately compound: umbel of numerous rays with involuclers of several narrowly linear elongated bractlets: rays at length 2-3 inches long; pedicels 6 lines long: fruit oblong, about 3 lines long, with somewhat prominent conical stylopodium, and prominent somewhat winged ribs: oil-tubes 3-5 in the intervals, 6-8 on the commissure: seed somewhat dorsally flattened, with angled or sulcate back and face with a broad shallow cavity and central longitudinal ridge. In the coast mountains of Southern Oregon, Sierra county, California, and the mountains of Colorado.

L. tenuifolium Watson Proc. Am. Acad. xiv, 293. Stem slender, 1-2 feet high, naked above the base or with a single leaf, bearing 1-3 glabrous umbels: leaves small, ternate then pinnately decomposed, finely dissected with laciniately divided leaflets the ultimate segments linear and short: umbel few-rayed, with involuclers of 1 or 2 narrowly linear bractlets; rays about an inch long; pedicels 2-3 lines long: fruit oblong $1\frac{1}{2}$ -2 lines long, with narrow ribs: oil-tubes 3-5 in the intervals, 6-8 on the commissure. Union county, Oregon, to Colorado.

L. apifolium Gray, Proc. Am. Acad. viii, 345. Stems 2-4 feet high, few-leaved or almost naked; inflorescence puberulent: leaves mostly radical, ternate or biternate then once or twice pinnate; the segments ovate, laciniately pinnatifid: umbel of numerous rays, with involuclers of several narrowly linear elongated bractlets; rays at length about 2 inches long; pedicels 2-4 lines long: fruit oval $1\frac{1}{2}$ -2 lines long, with short conical stylopodium and narrow acute ribs: oil-tubes 3-5 in the intervals, 4-6 on the commissure: seed with round back and more or less deeply concave face, and a prominent central longitudinal ridge. In the mountains of Oregon and Washington.

L. Grayi C. & R. Rev. Umb. 88. Stems 1-2 feet high, with leaves all nearly radical, and glabrous inflorescence: leaves ternate then pinnate; the segments ovate, laciniately pinnatifid: umbel of numerous rays with involuclers of several narrowly linear elongated bractlets: rays 1-2 inches long; pedicels 2-4 lines long: fruit narrowly oblong, 2- $2\frac{1}{2}$ lines long, with short conical stylopodia and narrow prominent almost winged ribs: oil-tubes, 3-5 in the intervals, 8 on the commissure: seed strongly flattened dorsally, with angled back and face but slightly concave, with no central ridge.

Common from Washington to California.

L. verticillatum C. & R. Cont. Nat. Herb. iii, 320, t. 12. *Angelica verticillata* Hook. I have neither specimens nor description of this species, and the plate cited is not sufficient to draw one from: it is found on "shady grassy borders of pine woods of the high plains of the Nez Percés," Idaho.

16 CÆLOPLEURUM Ledeb. Fl. Ross. ii, 361.

Stout glabrous sea-coast perennials with 2-3-ternate leaves on very large inflated petioles, few-leaved involucre, involucl of numerous small bractlets and greenish-white flowers in many-rayed umbels. Calyx-lobes obsolete. Fruit globose to oblong, slightly flattened laterally if at all, glabrous. Carpel with very thick and prominent corky ribs. Oil-tubes small, one in the interval and 1 or 2 under each rib, 2-4 on the commissure, all adhering to the seed which is loose in the pericarp.

C. Gmelini Ledeb. l. c. Stems stout, 1-3 feet high: leaflets ovate, acute irregularly cut-serrate 2-3 inches long, 1-1½ inches broad: rays 1-1½ inches long: pedicels 3-4 lines long: fruit globose to oblong 2-3½ lines long, with ribs all nearly equal and seed-face plane. Alaska to the coast of Washington, also on the Northern Atlantic coast.

C. maritimum C. & R. Bot. Gaz. xiii, 145. Stems 2-3 feet high: leaflets broad, often round, usually with cordate base, very obtuse, dentate or crenate-dentate, 2½-3 inches long, 2½ inches broad: rays 2-3 inches long: pedicels 6-7 lines long: fruit oblong 3-3½ lines long, with lateral ribs broader than the others, and seed-face plane. Wet ocean bluffs near the mouth of the Columbia and southward.

17 OROGENIA Watson Bot. King. 120, t. 15.

Dwarf glabrous nearly acaulescent plants from tuberous or fusiform roots with ternate leaves and linear segments, no involucre, involucl of few linear bractlets, and white flowers in subcompound umbels with very unequal rays. Calyx-lobes minute. Fruit oblong, very slightly flattened laterally, glabrous. Carpel much flattened dorsally with filiform dorsal and intermediate ribs: laterals excessively corky-thickened, involute (that is, extended towards the other carpel leaving between the commissural faces a cavity which is divided longitudinally by a thick corky projection from the middle of each face). Oil-tubes very small, 3 in the intervals, 2-4 on the commissure.

O. linearifolia Watson l. c. Stems slender, 1-2 inches high, from a deep-seated tuber: leaves 2 or 3, once or twice ternate, upon slender petioles: leaflets entire 1-2 inches long, 1-3 lines wide, obtuse: umbels 2-4-rayed, with nearly sessile flowers: fruit 1½-2 lines long; lateral ribs and commissural projection strongly developed. Oregon and Washington to Utah.

O. fusiformis Watson Proc. Am. Acad. xxii, 474. Rather stout 3-6 inches high, from a long fusiform root: leaves 2-3-ternate, with terminal leaflets often 3-parted; leaflets an inch or less long: umbels 6-10 rayed: fruit about 3 lines long, 1½ lines broad, lateral ribs and commissural pro-

jection smaller. California and Nevada.

Var. Leibergi C. & R. Rev. Umb. 92. Tall and slender, a foot or more high, with petioles correspondingly elongated. Sand hills in the Bitterroot Mts., Idaho.

18 CRANTZIA Nutt. Gen. i, 178.

Small glabrous perennial herbs, creeping and rooting in the mud, with leaves reduced to hollow cylindrical or awl-shaped petioles, jointed by transverse partitions, minute involucre bracts, and simple few-flowered umbels of white flowers. Calyx-lobes small. Fruit globose, slightly flattened laterally, glabrous. Carpel with filiform dorsal and intermediate ribs; laterals very thick and corky next the commissure. Oil-tubes 2 on the commissure. Seed terete.

C. liniata Nutt. l. c. Leaves very obtuse, 1-3 inches long, 1-2 lines broad: fruit a line long, the thick lateral wings forming a corky margin. In salt marshes, Vancouver Island to Oregon and the Atlantic Coast.

19 CENANTHE L. Gen. n. 352.

Mostly aquatic glabrous herbs, with succulent stems, pinnate or decompose leaves, and usually involucre umbels of white flowers. Calyx-lobes rather prominent. Fruit globose, slightly flattened laterally if at all, glabrous. Carpel with broad obtuse corky ribs: laterals the largest. Stylopodium very short-conical. Oil-tubes 2 on the commissure. Seed sulcate beneath each cil-tube.

C. sarmentosa Presl. D C. Prod. iv, 138 Stems 2-5 feet high, leaves ternate and bipinnate; leaflets ovate, acuminate, toothed often lobed at base, 6-12 lines long: umbels many-rayed, with involucre of few linear bracts or none, and involucre of similar more numerous bractlets: rays an inch long or less; pedicels short: fruit about 2 lines long, with commissural face and ribs very corky. In marshes, Alaska to California.

* * * Fruit flattened laterally.

+ Prickly, or with tuberculate scales.

20 ERYNGIUM Tourn. L. Gen. n. 324.

Glabrous perennials with mostly rigid, coriaceous, spinosely toothed or divided leaves and white or blue flowers, in dense sessile bracteate heads. the outer bracts form the involucre, the inner ones, bractless, intermixed with the flowers represent the involucre. Calyx-lobes very prominent, rigid and persistent. Fruit ovoid, crowded with hyaline scales or tubercles. Carpel with ribs obsolete. Stylopodium wanting: styles short or long, often rigid. Oil-tubes mostly 3 on the back and 2 on the commissure. Seed-face plane.

E. Vaseyi C. & R. Bot. Gaz. xiii, 142. Stems from a few inches to a foot high, several from a common root and branching above: leaves oblanceolate, unequally spinulose-serrate, attenuate below: involucre of narrow thick and rigid spinose and spiny-toothed bracts, much longer than

the heads; bractlets the same: fruit with lanceolate acuminate-cuspidate calyx-lobes longer than the short styles. Wet grounds, Southern Oregon to California.

E. articulatum Hook. Fl. i, 259. Erect, a foot or so high, more or less branching throughout: radical and lower stem leaves reduced to very long jointed petioles, with or without small lanceolate blades; upper stem leaves sessile: involucre of linear cuspidate-tipped and spiny-toothed bracts much longer than the heads; bractlets tricuspidate, the middle one much the largest, scarcely longer than the flowers: fruit with lanceolate cuspidate-acuminate calyx-lobes hardly longer than the styles. Swamps and wet meadows, Brit. Columbia to California.

E. Harknessii Curran Bull. Cal. Acad. iii, 153. Erect, slender, 2-4 feet high, dichotomously branched above: radical and lower leaves consisting only of the jointed fistulous petiole, often very long: stem leaves lanceolate entire, sparingly ciliate-toothed, on jointed petioles of equal length, lacinate-fringed near the base; upper reduced to sessile lacinate bracts: heads oblong, 6-9 lines in diameter, blue involucre of 8-10 narrow bracts, exceeding the head, calyx-lobes subulate, equalling the styles. In wet places, Washington to California and Idaho.

21 SANICULA Tourn. L. Gen. n. 326.

Smooth herbs with almost naked or few-leaved stems palmate or pinnate leaves with more or less pinnatifid or incised lobes, and greenish yellow or purple flowers in irregularly compound few-rayed umbels. Calyx-lobes somewhat foliaceous, persistent. Fruit sub-globose, densely covered with hooked prickles or tuberculate. Carpel without ribs. Stylopodium depressed. Oil-tubes mostly large, 3 on the back and 2 on the commissure, or 3-19 irregularly distributed.

* Oil-tubes irregular in number and in distribution.

† Mature fruit pedicelled: leaves palmately divided.

S. aretopoides Hook. & Arn. Bot. Beechey, 141. Stems very short, from thickened rootstocks, bearing a tuft of leaves and several divergent scape-like branches 2-8 inches long, each bearing an umbel of 1-3 elongated rays: leaves deeply palmately 3-lobed, the cuneate divisions once or twice laciniately cleft or dissected with lanceolate acute spreading segments: involucre of 1-2 similar leaf-like bracts; umbellets large 3-6 lines in diameter, with conspicuous involucels of 8-12 narrowly oblanceolate mostly entire bractlets: flowers yellow: fruit short pedicellate $1\frac{1}{2}$ lines long naked at base with strong prickles above; seed-face almost plane. On plains and hillsides, Sacramento Valley, California, also Vancouver Island, Brit. Columbia, to be looked for in our range.

S. Howellii C. & R. Bot. Gaz. xiii, 81. Stems coarse, a foot or less high, often bearing tufts of stout elongated peduncles and leaves; leaves broad and palmately 3-5-lobed, the upper inclined to be pinnately lobed, the divisions rather sharply cut and toothed, the teeth mucronate-tipped: umbel unequally few-rayed, with involucre of few leaf-like bracts and involucels of very prominent bractlets sometimes much exceeding the large globose head of fruit; flowers yellow: fruit short pedicellate, prickly all over $1\frac{1}{2}$ -2 lines long, seed-face concave. Sandy seashore, Columbia river to Southern Oregon.

S. Menziesii Hook. & Arn. l. c. 142. Stem solitary, erect, from a long, thickish perpendicular root, 1-5 feet high, branching: leaves round-

cordate 2-4 inches broad, very deeply 3-5-lobed, the broad segments sharply toothed or somewhat cleft, the teeth bristle-tipped; upper leaves more narrowly lobed and laciniately toothed: umbel with 3-4 slender rays, involucre of 2-3 small leaf-like bracts, and involucels of 6-8 small entire bractlets; flowers yellow, the sterile ones nearly sessile: fruit becoming distinctly pedicellate and divergent, obovate 1-2 lines long, covered with strong prickles: seed-face plane. Brit. Columbia to California.

+ + Mature fruit sessile.

+ + Leaves pinnately divided.

S. laciniata Hook & Arn. l. c. 147. Stems more or less branching, 6-18 inches high; from a thickened root-stock: leaves mostly palmately 3-5-parted, the divisions 1-2 pinnatifid, segments laciniately toothed, the teeth spinosely pointed: umbel 3-5 rayed, with involucre of leaf-like bracts, and involucels of lanceolate spinosely pointed bractlets; flowers yellow, the sterile ones on long pedicels: fruit somewhat naked below, more prickly above $1\frac{1}{2}$ lines long: seed-face deeply sulcate somewhat involute. California to the Willamette Valley, Oregon.

S. Nevadensis Watson Proc. Am. Acad. xi, 139. Stem slender sometimes very short, simple or branching near the base, a foot or less high: leaves ternate, the divisions oblong-ovate, 3-5 lobed; the segments lobed or toothed: umbel with about 5 rays, which are sometimes branched and become 6-18 lines long in fruit; involucre of pinnatifid leaf-like bracts; involucels of small oblong acute bractlets: flowers yellow, the sterile ones pediceled: fruit prickly all over $1\frac{1}{2}$ lines long: seed-face plane. Dry open woods, Brit. Columbia to California and Nevada.

+ + Leaves more or less pinnately divided.

S. bipinnatifida Dougl. Hook. Fl. i, 258. Stems a foot or more high from a thickened rootstock: with usually a pair of opposite leaves at base and 1-3 leaves above; leaves pinnately 3-7 parted, the divisions incisely toothed or lobed, decurrent on the toothed rhachis, teeth acute or slightly pointed; umbel with 3-4 elongated rays: involucre of leaf-like bracts, and involucels of small narrow merely acute bractlets; flowers purple, in dense heads, the sterile ones on long pedicels: fruit prickly all over. Seed-face broadly concave with a prominent central longitudinal ridge. Common in open places Brit. Columbia to California.

S. bipinnata Hook. & Arn. l. c. 347. A foot or more high from a slender fusiform root: leaves twice or thrice pinnate, with divisions not at all decurrent, cuneate-oblong to ovate, incisely and mucronately toothed: umbel 3-4 rayed, with involucre of leaf-like bracts and involucels of a few small bractlets more or less united: flowers yellow: fruit tuberculate at base, prickly above: seed-face deeply sulcate, more or less involute, with a central longitudinal ridge. California to the southern boundary of Oregon.

* * Fruit neither prickly nor scaly.

22 PIMPINELLA L. Gen. n. 366.

Glabrous perennials with ternately or pinnately compound leaves, involucre and involucels scanty or none, and white or yellow flowers. Calyx-lobes obsolete: fruit oblong to ovate, glabrous, carpel with equal slender ribs: stylopodium depressed or cushion-like. Oil-tubes 2-6 in the intervals, 4-8 on the commissure: seed somewhat dorsally flattened.

P. apiodora Gray Proc. Am. Acad. vii, 345. Smooth, rather stout,

2-3 feet high: leaves mostly radical, 2-3-ternate, the cuneate-ovate leaflets laciniately pinnatifid and toothed, an inch long: umbel long-peduncled, 6-15-rayed; rays 1-2 inches long, hispidly puberulent: flowers white or pinkish: fruit broadly ovate: oil-tubes numerous in the intervals, 8 or more on the commissure. From San Francisco to Eastern Nevada.

Var. nudicaulis Gray l. c. viii, 385. Small; stem scapiform, almost leafless, scarcely a foot high. Oregon *Hall 1871*, not since found.

23 MUSENIUM, Nutt. T. & G. Fl. i, 642.

Dwarf resinous dry ground perennials, from thick elongated roots, with pinnate decomposed leaves, no involucre and involucels of a few narrow bracts. Calyx-lobes prominent. Fruit ovate or ovate oblong, carpel with equal filiform ribs, and thin pericarp: stylopodium depressed. Oil-tubes usually 3 in the intervals, the middle one the largest, 2-4 on the commissure. Seed-face broadly concave.

M. divaricatum Nutt. l. c. Decumbent, glabrous: stem short, dichotomously branching from the base: leaves bipinnatifid, with winged rhachis; segments 3-5-toothed: peduncles 2-5 inches long: umbel 10-25-rayed; rays 3-9 lines long, pedicels short: fruit smooth or nearly so, about 2 lines long; oil-tubes 3 in the interval, with accessory ones beneath the ribs, 4 on the commissure: Seed terete, with rather deeply concave face. From the plains of the upper Missouri to Oregon and Brit. Columbia.

24. EULOPHUS Nutt. DC. Prodr. iv, 248.

Glabrous perennials from deep-seated fascicled tubers, 1-5 feet high, with pinnately or ternately compound leaves, narrowly linear to oblong-linear mostly entire leaflets, the terminal one elongated, involucre and involucels of several lanceolate acuminate usually scabrous bractlets and long-peduncled umbels of white or pinkish flowers. Calyx-lobes prominent. Fruit ovate to linear-oblong glabrous. Carpel with equal filiform ribs, and thin pericarp. Stylopodium conical, with long and recurved styles. Oil-tubes 1-5 in the intervals, 4-8 on the commissure and a small group in the parenchyma of the commissural sulcus. Seed-face broadly concave, with a central longitudinal ridge.

E. Bolanderi C. & R. Rev. Umb. 112. Stems slender, 1-2 feet high; leaf divisions more or less pinnately compound; ultimate divisions narrowly linear, 6-18 lines long, the terminal ones sometimes much longer, $\frac{1}{4}$ -1 line wide: uppermost leaves simple: umbel 10-25-rayed, with prominent involucre and involucels of scarious ovate-lanceolate abruptly long acuminate bractlets, longer than the pedicels, rays 5-10 lines long; pedicels 1-2 lines long: fruit oblong: oil-tubes small 2-5 in the intervals, 6 on the commissure. Southeastern Oregon to California.

25 BUPLEURUM. L. Gen. n. 328.

Calyx-lobes obsolete. Fruit oblong with rather broad commissure. Carpel with equal very slender or prominent ribs, Stylopodium prominent and flat. Oil-tubes wanting or continuous about the seed-cavity. Ours perennial from a branching caudex, with simple entire clasping or perfoliate stem-leaves and

yellow flowers.

B. Americanum C. & R. Rev. Umb. 115. Radical leaves linear-lanceolate, cauline ones very variable, oblong to linear, more or less clasping: rays unequal, 6-24 lines long, with involucre of 3-5 unequal bracts and involucels of 5-8 rather small ovate bractlets: pedicels short: carpel with prominent ribs, oil-tubes continuous about the seed-cavity and one in each rib. Seed-face plane. Alaska to Yellowstone Park, perhaps Washington.

26 LEIBERGIA C. & R. Contr. Nat. Herb. iii, 675, t. xxvii.

Slender glabrous acaulescent plants from a small globose root, ternately divided leaves and irregular umbels of white flowers. Calyx-teeth obsolete. Fruit flattened laterally, linear, beaked, glabrous: stylopodium wanting. Carpels only slightly flattened dorsally, with 5 filiform ribs, the 2 lateral a little more prominent and turned inward. Oil-tubes small, solitary in the intervals, 2 on the commissure. Seed-face slightly concave but when dry becoming more or less involute.

L. orogenioides C. & R. l. c. Stem slender 6-20 inches high; leaves nearly as long as the flowering peduncle: leaflets linear, $1\frac{1}{2}$ -4 inches long, entire or with a few teeth or linear lobes: rays of the umbel 3-10, very slender, often spreading, 1-6 inches long; umbellets with few flowers and fruits: involucre none; involucels of few small bracts that are somewhat united at base: fruit 4 lines long, flattened laterally but terete at base, terete and somewhat beaked at apex. Along small streams, Coeur d'Alene Mountains Idaho, Spokane Co., Washington.

27 OSMORHIZA Jour. Phys. lxxxix.

Perennials from thick aromatic roots, with ternately decom- pound leaves, ovate variously toothed leaflets, involucre and involucels few-leaved or wanting and white flowers in few-rayed and few-fruited umbels. Calyx-lobes obsolete. Fruit linear to linear-oblong, caudate, attenuate at base, acute above, very bristly on the ribs. Carpel slightly flattened dorsally or not at all, nearly pentagonal in section, with equal ribs and thin pericarp. Oil-tubes obsolete in mature fruit.

O. nuda Torr. Pac. R. R. Rep. iv, 93. Stems rather slender, 1-3 feet high, divaricately branched, somewhat pubescent or glabrous: leaves twice ternate; leaflets 6-24 lines long, toothed and cleft: umbel long peduncled, 3-6-rayed, mostly naked; rays slender, spreading 2-4 inches long: pedicels 2-12 lines long: fruit with not very prominent ribs: stylopodium and style very short, seed-face concave. Very common in wooded districts. Alaska to California and the Rocky mountains.

28 GLYCOSMA Nutt. T. & G. Fl. i, 639.

Mostly tall perennials from thick aromatic roots with ternately decom- pound leaves, ovate variously toothed leaflets, mostly without involucre or involucels, and white flowers in few-rayed umbels. Calyx-teeth obsolete. Fruit linear to linear-oblong, not attenuate at base, acute above, glabrous or somewhat

bristly on the ribs. Carpels slightly flattened dorsally or not at all, with 5 acutely carinate equal ribs. Stylopodium mostly depressed. Oil-tubes obsolete in mature fruit. Seed-face concave.

G. occidentalis Nutt. l. c. Rather stout, puberulent or pubescent: leaves 2-3-ternate; leaflets 1-4 inches long, acute, coarsely serrate, rarely incised: umbel 5-12-rayed, naked or with 1 or 2 involucreal bracts; rays 1-5 inches long, mostly erect: pedicels 1-3 lines long: fruit 7-12 lines long obtuse at base, glabrous, with prominent acute ribs: stylopodium half to a line long: seed-face concave. In the higher mountains, Brit. Columbia to California, Montana and the Wahsatch.

G. ambiguum Gray Proc. Am. Acad. viii, 386. Glabrous or hairy near the nodes: leaves 2-3 ternate: leaflets 1-2 inches long, acute, shortly toothed or cleft: umbel 4-8-rayed, naked; rays about 2 inches long, somewhat spreading; pedicels 1-3 lines long: fruit 6-7 lines long acutish at base, sometimes bristly, with prominent ribs: styles half a line long: seed-face concave. Western Washington and Oregon to California.

29 VELÆA DC. Prodr. iv, 230.

DEWEYA T. & G.

Perennial herbs from thick elongated roots with mostly radical pinnate or ternate leaves, conspicuous involucre and yellow flowers. Calyx-lobes obsolete or prominent. Fruit oblong to orbicular, glabrous or pubescent. Carpel somewhat flattened laterally, with prominent and equal filiform ribs (the intermediates somewhat distant from the laterals) and a thin pericarp. Oil-tubes conspicuous, 3-6 in the intervals, 4-10 on the commissure. Seed terete, the face strongly involute, enclosing a central cavity.

V. glauca C. & R. Contrib. Nat. Herb. iii, 321. Shortly caulescent, slender, 8-18 inches high, erect or somewhat spreading, glabrous and somewhat glaucous: radical leaves small, bi- or tri-ternate; stem leaves often simply ternate; leaflets small, 4-8 lines long, mostly cordate or truncate at base, often 3-lobed or 3-parted, irregularly toothed: umbel 7-15-rayed, with no involucre and involucreal bracts of small linear bracts: rays 1-3 inches long; pedicels a line long or less: fruit orbicular, a line in diameter; carpophore parted below the middle, flowers yellow. On dry hillsides in open woods, Southwestern Oregon.

V. Kelloggii C. & R. Rev. Umb. 121. *Deweya Kelloggii* Gray. Acaulescent or nearly so, mostly puberulent; 2-3 feet high: leaves tri-ternate; leaflets ovate, half to less than an inch long, mostly 3-lobed: umbel 8-16-rayed, mostly with no involucre, and involucreal bracts of small linear bracts; rays 2-3 inches long: fruit 1-2 lines long, almost as broad, somewhat notched at base, with filiform ribs: oil-tubes 3 in the dorsal intervals, 5-6 in the lateral ones, 8-18 on the commissure. Southern Oregon to Southern California.

V. Howellii C. & R. l. c. 122. Glabrous throughout, short-caulescent; 2-4 inches high: leaves 1-3, thickish about 18 lines long, with ovate outline, pinnatifid, the oblong segments irregularly cuspidate-toothed and lobed, with revolute margins; umbel 3-6-rayed, with no involucre and involucreal bracts exceeding the leaves and forming the principal part of the foliage of the plant; rays 6-8 lines long; pedi-

cels about a line long, calyx-lobes prominent: fruit (immature) oblong, glabrous: oil-tubes several in the intervals. In the Siskiyou mountains at high elevations, southwest of Ashland, Oregon.

30 SIUM L. Gen. n. 348.

Smooth perennials, growing in water or wet places, with pinnate leaves, serrate or pinnatifid leaflets, involucre and involucels of numerous narrow bracts, and numerous white flowers. Calyx-lobes minute. Fruit ovate to oblong, glabrous. Carpels with prominent corky nearly equal ribs. Stylopodium depressed. Style short. Oil-tubes 1-3 in the intervals, 2-6 on the commissure. Seed subangular with plane face.

S. cicutifolium Gmelin. Syst. ii, 482. Stout, 2-6 feet high: leaflets 3-8 pairs, linear to lanceolate, sharply serrate; mostly acuminate, 2-5 inches long, submerged leaves when present finely dissected: umbel many-rayed; rays 12-18 lines long; pedicels 1-3 lines long: oil-tubes 2-6 on the commissure. Apparently throughout North America.

31 ZIZIA Koch Umbel. 129.

Smooth perennial herbs with mostly simple or ternate leaves, no involucre, involucels of small bractlets and yellow flowers: the central fruit of each umbellet sessile, calyx-teeth prominent. Fruit oblong, glabrous. Stylopodium wanting. Styles long. Oil-tubes large and solitary in the broad intervals, 20 on the commissure and a small one in each rib. Seed terete, sulcate.

Z. cordata Koch l. c. Radical leaves mostly long-petioled, cordate or even rounder, crenately toothed, very rarely lobed or divided; stem leaves simply ternate or quinate, the leaflets ovate to lanceolate, serrate incised, or even parted: fruit ovate. Throughout Canada and the Atlantic States and Oregon.

32 CARUM Linn.

Smooth erect slender herbs with tuberous or fusiform fascicled roots, pinnate leaves with few linear leaflets, involucre and involucels of few to many bracts and white flowers. Calyx-lobes small. Fruit ovate or oblong, glabrous, carpel with filiform or inconspicuous ribs. Oil-tubes 2-6 on the commissure. Seed dorsally flattened, more or less sulcate beneath the oil-tubes.

C. Gairdneri Gray Proc. Am. Acad. vii, 344. Stems 1-4 feet high, from fascicled-tuberous or fusiform roots: leaves few usually simply pinnate, with 3-7 linear leaflets 2-6 inches long; upper leaves usually simple: umbels 6-15-rayed with involucre of several bracts or none and involucels of linear acuminate bractlets: rays about 18 lines long: fruit ovate, small, with long styles: seed terete. From Brit. Columbia and Montana to Utah and California.

C. Oregona Watson Proc. Am. Acad. xx, 368. "Closely resembling the preceding, but the lower leaves more divided, with shorter linear lobes; fruit oblong, larger with long styles: seed flattened dorsally, sulcate beneath the oil-tubes and slightly concave on the face, with central longitudinal ridge." Brit. Columbia to California and Nevada.

33 TÆNIOPLEURUM C. & R. Bot. Gaz. Nov. 1889.

Smooth erect herbs, from a fascicle of thickened fibers, with ternate-pinnate leaves, toothed leaflets, involucre and involucels of numerous conspicuous bracts and white flowers. Calyx-lobes prominent. Fruit oblong, glabrous flattened latterly. Carpel with broad, salient ribs. Stylopodium prominent and conical. Oil-tubes solitary in the intervals, very large, two on the commissure. Seeds dorsally flattened, sulcate beneath the oil-tubes, becoming loose in the pericarp, and invested by a layer of secreting cells.

T. Howellii C & R. l. c. Stems rather stout, 3-4 feet high, leaves few, ternate then once or twice pinnate; leaflets lanceolate to ovate, strongly toothed or lobed; umbels many-rayed, with involucre of long narrowly oblanceolate bracts and involucels of prominent lanceolate scarious-margined bractlets; ray 1-3 inches long; pedicels 3-5 lines long. Wet places Grants Pass, Oregon.

34 CICUTA L. Gen. n. 354.

Tall branching glabrous perennial herbs with pinnately or ternately compound leaves, involucre small or wanting, involucels of several small bractlets and many-rayed umbels of small flowers. Calyx-lobes rather prominent. Fruit oblong to nearly orbicular, glabrous. Stylopodium conical. Carpels with strong flattish corky ribs, the laterals the largest. Seed nearly terete, or somewhat dorsally flattened, with plane face. Oil-tubes solitary in the intervals, 2 on the commissure.

C. occidentalis Greene Pitt. ii, 7. Stem stout, 3-6 feet high, green, scarcely glaucous, paniculate from toward the base: leaves bipinnate; leaflets 2-3 inches long, narrowly lanceolate, coarsely serrate: umbel many-rayed; involucre usually wanting; involucels of few narrow lanceolate bractlets: rays 1-4 inches long; pedicels 2-4 lines long: fruit broadly ovate to oval, the lateral ribs much larger than the others: oil-tubes broad and conspicuous, the commissural pair contiguous. In marshes and wet places. Alaska to California and the Rocky Mountains.

C. purpurata Greene l. c. 8. Stems 3-4 feet high, purple glaucous, conspicuously striate, paniculate from the middle: leaves bipinnate; leaflets ovate-lanceolate, 1-2 inches long closely and often deeply serrate, the teeth a little falcate; umbels many, long peduncled; involucre and involucels wanting or deciduous: flowers dull and inconspicuous: fruit orbicular, ribs of the carpels broad and low: oil-tubes small. Springy and boggy places near Cle Elum, Washington.

C. vagans Greene l. c. Stem branching from the very base, the branches diffuse or reclining, 3-5 feet long, abundantly floriferous; herbage purplish or glaucous: radical leaves 2 feet long bi- or tri-pinnate; leaflets 2 inches long, lanceolate, somewhat cuneate below and entire, but from below the middle bearing rather remote short but salient serrate teeth: flowers dull, fruit orbicular; the ribs very broad and low; oil-tube small, cross-section of seed nearly reniform. Borders of Lake Pend d'Oreille, Idaho.

35 HYDROCOTYLE Tourn.

Low perennial herbs growing in water or wet places with slen-

der creeping stems, orbicular-peltate or reniform leaves and small white flowers in simple or proliferous umbels. Calyx teeth minute or obsolete. Fruit more or less orbicular. Carpels with 5 primary ribs, the dorsal marginal, broad or filiform; intermediate filiform, usually curved; laterals filiform or broad, distinct from those of the other carpel or confluent: a prominent oil-bearing layer beneath the epidermis occasionally containing small oil-tubes.

H. ranunculoides L. f. Suppl. 177. Stems rather slender 6-12 inches long: leaves thickish, round-reniform, 6-18 lines in diameter, 3-7-cleft, with crenate lobes: peduncles 1-3 inches long, reflexed in fruit: umbel capitate, 5-10-flowered: fruit with rather obscure ribs, strongly flattened laterally: stylopodium depressed. In ponds, Oregon to California and across the continent.

ORDER XLIV. ARALIACEÆ Vent. Tabl. iii, 2.

Shrubs, trees or perennial herbs with compound or simple leaves without stipules, the petioles thickened and dilated at base, and umbellate paniculate, or racemose inflorescence. Calyx adherent to the ovary, the limb usually very small, entire or toothed. Petals 5-10, valvate in the bud, very rarely none. Stamens as many as petals and alternate with them: filaments short: anthers introrse. Ovary crowned with an epigynous disk, 2-15-celled, with a solitary suspended ovule in each cell: styles erect and connivent or spreading: stigma simple. Fruit drupaceous or baccate, sometimes nearly dry, but the carpels not separating. Seed solitary in each cell, anatropous. Embryo short, at the base of copious fleshy albumen.

1. **Aralia**. Petals imbricate in the bud, drupes 5-celled: pedicels not jointed.
2. **Echinopanax**. Petals valvate in the bud, drupes 2-3-celled, pedicels not jointed.

1 ARALIA. Vaillant.

Perennial herbs or shrubs with alternate digitate or compound leaves and small flowers in racemed umbels. Calyx 5-toothed or entire. Petals 5, ovate, slightly imbricate. Stamens 5. Disk depressed or rarely conical. Ovary 2-5-celled; styles few or connate at base, at length divaricate; stigmas terminal. Fruit laterally compressed, becoming 3-5-angled, fleshy externally, endocarp chartaceous.

A. Californica Watson. Herbaceous, unarmed and nearly glabrous, 8-10 feet high from a large thick root: leaves bipinnate, or the upper pinnate with 1 or 2 pairs of leaflets, which are cordate-ovate, 4-8 inches long or more, shortly acuminate, simply or doubly serrate with short acute teeth, uppermost leaves ovate-lanceolate: umbels in loose terminal and axillary compound or simple racemose panicles, which are a foot or two long and more or less glandular-tomentose; rays numerous, 4-6 lines long; involucre of several linear bractlets; flowers $1\frac{1}{2}$ -2 lines long; disk and

stylopodium obsolete; styles united to the middle. Shaded mountain ravines California.

Var. acuminata Watson in Herb. Leaflets long acuminate, pedicels 10-14 lines long. Mountain streams Southern Oregon.

2 ECHINOPANAX Decaisne & Planch. in Rev. Hortie, 1854, 105.

Densely prickly shrubs with large palmately lobed leaves and greenish-white flowers in dense paniculate umbels. Calyx-teeth obsolete. Petals 5, valvate in the bud. Stamens 5, alternate with the petals: filaments filiform; anthers ovate to oblong. Ovary 2-3-celled: styles 2, filiform: stigma terminal. Fruit laterally compressed, drupaceous; endocarp indurated.

E. horridum Decaisne & Planch. l. c. Very prickly throughout: stems erect from a decumbent base, 4-12 feet high, leafy at the top: leaves roundish-cordate, prickly both sides, palmately lobed, aculeate-dentate, more or less pubescent beneath, 6-24 inches long: inflorescence terminal, densely tomentose: rays subtended by a scarios laciniately cut bract: petals ovate, with a broad base: styles united to the middle. In mountain swamps, Oregon to the arctic regions.

ORDER XLV. CORNACEÆ Link. Handb. ii, 2.

Trees, shrubs or rarely herbs with opposite mostly entire pinnately veined leaves without stipules and cymose or capitulate inflorescence, with or without an involucre. Calyx adherent to the ovary; the limb 4-5-toothed or lobed, valvate in the bud. Petals distinct, as many as the calyx-lobes and alternate with them, inserted on the margin of the epigynous disk, valvate in the bud: stamens 4-5, inserted with the petals and alternate with them: anthers introrse, mostly cordate. Ovary one-celled with a single pendulous ovule. Style single. Fruit drupelets covered with the remains of the calyx. Seed anatropous. Embryo nearly as long as the fleshy albumen.

1 CORNUS Tourn. (Dogwood)

Trees, shrubs or herbs with opposite entire leaves and small perfect flowers in dichotomous cymes or involucrate heads. Limb of the calyx 4-toothed, minute. Petals oblong, spreading. Filaments filiform. Style subclavate; stigma obtuse or capitate. Drupelets not connate.

* Flowers greenish or purple, in a close head, surrounded by a conspicuous involucre of white petal-like bracts: fruit bright red.

+ Low and herbaceous, from slender, creeping root-stocks.

C. Canadensis L. Sp. i, 118. Stems simple, 4-8 inches high; leaves scarcely petioled, mostly in an apparent whorl of 4 or 6 near the summit, oval to obovate pointed at both ends, somewhat appressed-pubescent on both sides 2-3 inches long, near the middle of the stem; a pair of smaller leaves and scale-like bracts below; peduncles 1-3 inches long: involucre

bracts 4, white or cream-color, ovate, 3-8 lines long: fruit globular: stone smooth, not flattened, a little higher than broad. In the higher mountains and along the coast, across the continent as far north as forests grow, south to California and New Jersey.

C. Suecica L. l. c. Stems sometimes branching above, 5-20 inches high: leaves sessile, all opposite, becoming smaller downwards, ovate or oval, acute, nerves all arising at or near the base, appressed-pubescent on both sides, uppermost leaves 1-3 inches long: peduncle 1-3 inches long: involucre bracts 4, white or cream-color, ovate 3-6 lines long: flowers dark purple: fruit globular: stone flattened, mostly with a shallow furrow on each face, acute, as broad as high. Alaska and across the continent: perhaps N. Washington.

+ + Shrubs or trees.

C. Nuttallii Audubon Birds 467, T. & G. Fl. i, 652. A tree 20-75 feet high: leaves mostly obovate, on petioles 3-12 lines long, usually woolly-pubescent beneath, with intermixed appressed hairs: involucre bracts 4-6 or more, narrowly oblong to obovate or even round, obtuse, $1\frac{1}{2}$ -2 inches long: heads of flowers 6-12 lines in diameter: fruit crowded among the abortive ovaries, crowned with the broad persistent calyx: stone 4-5 lines high, 3-4 lines broad. Brit. Columbia to California west of the Cascade Mountains.

* * Flowers yellowish, in sessile umbels, appearing before the leaves, involucre with 4 small deciduous bracts.

C. sessilis Torr. Durand Pl. Pratt. 89. Shrub 10-15 feet high with greenish bark: leaves short-petioled, approximate, ovate, short acuminate, nearly smooth above, pale beneath, with appressed and silky pubescence: umbels terminal but becoming lateral by the development of the shoot: involucre bracts 3-4 lines long, about as long as the slender silky pedicels: fruit oblong, 6-7 lines long, 3-5 lines wide: stone oblong somewhat pointed and longitudinally rigid, 4-5 lines long, 2-2 $\frac{1}{2}$ lines broad. Northern California, perhaps reaches our limits.

* * * Flowers white or cream-colored, cymose, not involucre: fruit white, lead-colored or blue: leaves opposite.

C. pubescens Nutt Sylv. iii, 54. Shrub 6-20 feet high with smooth red or purplish slender branches branchlets and inflorescence more or less hirsute: petioles 3-12 lines long; leaves from narrowly to broadly ovate or oval, acute or somewhat acuminate mostly acute at base; appressed-pubescent or glabrous above, whitish silky-pubescent beneath flowers in more or less compact cymes; calyx-teeth minute: fruit white; stone somewhat compressed, mostly oblique, with a more or less prominently furrowed edge about 2 lines long by 2 $\frac{1}{2}$ lines broad, the sides apt to have more or less prominent ridges. In alluvial places, Brit. Columbia to California west of the Cascade Mountains.

C. Baileyi C. & E. Bot. Gaz. xv. 89. Erect shrub with reddish-brown mostly smooth branches: branchlets and inflorescence pubescent to woolly: petiole 6-12 lines long; leaves from lanceolate to ovate, acute or short-acuminate, acute or obtuse at base, appressed-pubescent to glabrous above, white beneath and with woolly hairs variously intermingled with appressed ones: flowers in small rather compact cymes: calyx-teeth from small to prominent; fruit white or bluish: stone decidedly compressed, flat-topped rarely oblique, with a very prominently furrowed edge, much broader than high. About the Great Lakes and westward to the Cascades of the Columbia.

C. stolonifera Michx. Fl. i, 92. Shrub 3-9 feet high, erect or ros-

trate, stoloniferous, with branches usually bright red-purple and smooth: branchlets and inflorescence appressed-pubescent: petioles 3-18 lines long: leaves from lanceolate to broadly ovate or oblong, short- or long-acuminate or only acute, mostly obtuse at base, minutely appressed-pubescent above, more or less white and appressed pubescent beneath with straight rigid hairs: flowers mostly in small cymes: calyx-teeth minute: fruit white or lead-color; stones very variable, from ovate and pointed scarcely flattened, higher than broad, to more or less flattened, broader than high, these extremes completely connected by intermediate shapes and dimensions, all with more or less furrowed edge. From New Brunswick to the District of Columbia and westward to the Cascade Mountains and Erit. Columbia, New Mexico and Arizona.

C. glabrata Benth. Bot. Sulph. 18. A shrub 4-12 feet high, with erect and mostly bushy smooth branches bearing usually crowded small leaves: branchlets and inflorescence glabrous or nearly so: petioles short and slender: leaves lanceolate to nearly ovate or oblong, acute at each end glabrous to sparsely and minutely appressed pubescent on both sides, the lower surface but little paler than the upper: flowers in numerous small open cymes: calyx-teeth prominent: fruit white or light blue: stones but little compressed, not furrowed, broader than high. Along streams, southwest Oregon to California.

ORDER LXVI GARRYACEÆ Lindl. Bot. Reg. xx, t. 1686

Shrubs or small trees with opposite persistent entire leaves and diœcious flowers in aments or catkins. Calyx adnate to the ovary, the limb 4-toothed valvate in the bud. Petals none. Stamens 4, inserted on the epigynous disk. Ovary 1-celled, with 2 pendulous ovules. Fruit baccate, crowned with the remains of the calyx. seeds anatropous. Embryo nearly as long as the fleshy albumen.

I GARRYA Dougl. Lindl. l. c.

Evergreen shrubs with greenish bark, opposite entire coriaceous leaves and diœcious flowers in axillary pendulous aments, solitary or in threes between the decussately connate bracts. Calyx of the sterile flowers 4-parted, with linear valvate segments. Stamens 4: filaments distinct: disk and rudimentary ovary none. Calyx of the fertile flowers with a shortly 2-lobed or obsolete limb: disk and rudimentary stamens none. Ovary 1-celled with 2 pendulous ovules, Styles 2, stigmatic on the inner side, persistent. Berry 1-2-seeded.

G. Fremontii Torr. Pac. R. Rep. iv, 133. A shrub 4-12 feet high, becoming glabrous: petioles 3-9 lines long: leaves ovate to oblong or elliptical, mostly acute at each end, usually somewhat mucronate, entire, smooth or nearly so on both sides: fertile aments $2\frac{1}{2}$ -5 inches long: bracts prominent, connate to above the middle, acute, somewhat silky: fruit globose, becoming glabrous, short-pedicellate, 2-3 lines in diameter. On dry hillsides, Oregon to California.

G. elliptica Dougl. Lindl. l. c. A stout shrub or small tree 5-16 feet high: petioles 3-6 line long: leaves elliptical, rounded at base, round or acute and mucronate at the apex, undulate on the margins, smooth above, densely tomentose beneath, 2-5 inches long: sterile aments 3-15 inches

long, the bracts truncate to acute, silky: fertile aments stouter, $1\frac{1}{2}$ –4 inches long, with acute or acuminate bracts: fruit globose, densely silky-tomentose sessile, 3–5 lines in diameter. Along the coast of Oregon and California.

G. buxifolia Gray Proc. Am. Acad. vii, 349. A small shrub 2–4 feet high: leaves oblong-elliptical, 12–18 lines long, 4–8 lines broad, acute at each end, glabrous above, densely white-silky beneath: petioles 1–3 lines long: fertile aments 1–3 inches long, the short bracts acute, more or less silky: fruit glabrous, globose, sessile, $2\frac{1}{2}$ –3 lines in diameter. On dry hillsides, southwestern Oregon to Mendocino County California.

DIVISION II. GAMOPETALÆ.

Floral envelopes consisting usually of both calyx and corolla, the petals usually more or less united into a gamopetalous corolla.

SYNOPTICAL KEY TO THE GAMOPETALOUS ORDERS.

a. Ovary inferior.

* Filaments and anthers distinct, leaves opposite.

47. **Viburnaceæ.** Shrubs with simple or pinnate leaves and no stipules. Stamens 4 or 5; styles 1 or none. Fruit a 1-5-celled, 1-few-seeded berry or capsule. Seeds albuminous.

48. **ubiaceæ.** Herbs or shrubs with opposite, stipulate or verticillate leaves. Flowers regular, 4-5-merous. Style 1, entire or cleft. Fruit dry, indehiscent, 2-4-celled, 2-4-seeded. Seeds albuminous.

49. **Valerianaceæ.** Herbs with simple or pinnate opposite leaves, without stipules. Flowers irregular. Stamens 1-4; fewer than the lobes of the corolla. Ovary 3-celled, becoming a 1-celled, 1-seeded achene-like fruit. Seeds without albumen.

50. **Dipsacaceæ.** Herbs with opposite or verticillate leaves, without stipules and capitate involucrate inflorescence. Stamens 2-4; as many as or fewer than the lobes of the corolla. Ovary simple, 1-celled, with a single suspended ovule. Seeds albuminous.

* * Stamens 5; anthers or filaments united into a tube around the 2-cleft or entire style. Leaves various, without stipules.

51. **Compositæ.** Herbs, shrubs or trees with opposite or alternate leaves without stipules and 1-numerous flowers in a capitate cluster, surrounded by an involucre. Calyx reduced to a pappus or obsolete. Filaments mostly distinct. Fruit an achene. Seeds without albumen.

52. **Lobeliaceæ.** Herbs with alternate, simple leaves and irregular scattered or racemose flowers. Filaments united: anthers sometimes distinct. Fruit a 1-2-celled, many-seeded capsule; more or less inferior. Seeds with fleshy albumen

* * * Stamens distinct. Leaves alternate.

53. **Campanulaceæ.** Herbs with simple leaves, without stipules. Flowers regular, 5-merous. Style one, 2-5 lobed. Fruit a 2-5-celled, many-seeded capsule with placentæ in the axis. Seed with fleshy albumen.

b. Ovary superior or nearly so, compound.

* Corolla regular. Stamens not didynamous.

+ Fruit 5-many-celled.

54. **Vacciniaceæ.** Shrubs with simple leaves without stipules. Flowers regular, 4-5-merous. Anthers opening by terminal pores. Style one. Fruit a 4-10-celled many-seeded berry.

55. **Ericaceæ.** Shrubs with simple, mostly alternate leaves without stipules. Flowers 4-5-merous. Styles one. Anther-cells opening by

- a terminal pore or chink. Fruit a 4-10-celled, 5-many-seeded capsule with central (rarely parietal) placenta.
56. **Monotropaceæ.** Scaly-bracted herbs without green foliage. Flowers regular, 4-5-merous; style 1, anther cells opening by a chink. Fruit a 1-5-celled, many-seeded loculicidal capsule.
+ + Fruit 1-celled, with a central basal placenta.
57. **Armeriaceæ.** Maritime acaulescent herbs with entire leaves. Flowers 5-merous; petals nearly distinct. Fruit a 1-seeded utricle, enclosed in the scarious calyx.
58. **Primulaceæ.** Herbs with mostly entire alternate leaves. Flowers mostly 5-merous. Stamens opposite the lobes of the corolla, which is wanting in *Glaur.* Style, one. Fruit a 5-valved, few to many-seeded capsule with basal placenta.
59. **Oleaceæ.** Shrubs or trees with opposite pinnate or simple leaves. Flowers 4-merous, perfect or dioecious. Petals often wanting. Stamens usually 2. Style one. Fruit a simple samara, usually 1-celled and 1-seeded, or a 2-celled capsule or drupe.
60. **Apocynaceæ.** Perennial herbs with milky juice, opposite, entire leaves and 5-merous flowers. Corolla convolute in the bud. Anthers nearly free. Pollen powdery. Fruit 2 carpels united by their styles or stigmas, becoming distinct follicles with numerous comose seeds.
61. **Asclepiadaceæ.** Perennial herbs with milky juice; opposite, entire leaves and 5-merous flowers. Corolla and calyx nearly valvate in the bud. Anthers attached to the stigma. Pollen in waxy masses. Fruit 2 carpels, united by their styles or stigmas; becoming distinct follicles with numerous seeds.
62. **Gentianaceæ.** Glabrous herbs with simple and opposite or 3-foliate and alternate leaves and not scorpioid inflorescence. Flowers 4 or 5-merous. Styles one or none. Stigmas 1 or 2. Fruit a 1-celled, septical few-many-seeded capsule with 2 parietal placenta.
63. **Polemoniaceæ.** Herbs, rarely shrubby, with opposite or alternate, simple or compound leaves. Flowers 5-merous. Styles 3-cleft. Fruit a 3-celled, 3-many-seeded loculicidal capsule with central placenta.
64. **Hydroleaceæ.** Herbs rarely shrubby, with alternate, rarely opposite, often compound leaves and scorpioid inflorescence. Flowers 5-merous. Styles 2, usually more or less distinct. Fruit a 1-celled loculicidal few-many-seeded capsule.
65. **Ehretiaceæ.** Herbs, mostly rough-hairy, with alternate or the lower opposite, entire leaves, and scorpioid inflorescence. Flowers 5-merous. Styles single. Ovary 4-celled and mostly 4-lobed, with central placenta. Fruit 1-4 1-seeded nutlets.
66. **Convolvulaceæ.** Herbs mostly twining, with alternate leaves or parasitic and without green herbage. Flowers mostly 5-merous. Styles 1 or 2. Fruit a 2-celled, 1-4-seeded 2-valved or circumscissile capsule.
67. **Solanaceæ.** Herbs or shrubs with alternate, simple or pinnate leaves. Flowers 5-merous. Style simple. Corolla valvate or plaited in the bud. Fruit a 2-celled many-seeded capsule or berry.

Herbs with alternate leaves and racemose flowers. Flowers 5-merous. Style single; corolla irregular, imbricate in the bud. Fruit a 2-celled, many-seeded capsule. *Verbascum* in *Rhinanthaceæ*.

* * Flowers irregular. Fertile stamens 2 or 4 and didynamous.

+ Fruit capsular, 1-2-celled. Style single.

++ Seeds albuminous.

68. **Rhinanthaceæ.** Herbs or shrubs with alternate or opposite leaves. Corolla imbricate in the bud. Capsule 2-celled, with central placentæ, few-many-seeded.
69. **Orobanchaceæ.** Parasitic herbs, without green herbage: scales alternate; capsule 1-celled, 2-valved, many-seeded, with 2-4 parietal placentæ.

++ ++ Seeds without albumen.

70. **Pinguiculaceæ.** Herbs with capillary dissected or entire leaves. Stamens 2; anthers 1-celled. Capsule 1-celled, many-seeded, with central placentæ.

+ + Fruit of 2 or 4 distinct or united 1-seeded nutlets.

71. **Labiataæ.** Mostly aromatic herbs or shrubs with square stems and opposite, simple leaves. Stamens 4 or 2. Ovary 4-lobed around the 2-cleft style, forming as many distinct nutlets.
72. **Verbenaceæ.** Herbs or shrubs with opposite or whorled leaves. Stamens 4. Ovary not lobed, 2-4-celled at maturity, splitting into 4 1-seeded nutlets.

+ + + Fruit a 2-celled, circumscissile capsule.

73. **Plantaginaceæ.** Acaulescent herbs. Flowers 4-merous: corolla scarious. Stamens 2 or 4. Style 1. Fruit a 2-celled, 2-few-seeded capsule.

ORDER XLVII. VIBURNACEÆ, Dumort. Coum. Bot. 56.

CAPRIFOLIACEÆ, Vent. Tabl. ii, 593.

Shrubs or herbs with opposite leaves normally without stipules and regular or irregular hermaphrodite flowers. Calyx-tube adnate to the 2-5-celled ovary. Stamens as many as lobes of the corolla (in *Linnaea* one fewer) and alternate with them, inserted on its tube or base. Embryo small, in the axis of fleshy albumen. Corolla-lobes generally imbricated in the bud. Ovules anatropous, when solitary, suspended and resupinate; the rhaphe dorsal; seed-coat adherent to the albumen.

TRIBE I. Corolla rotate or open campanulate, regular style short and 2-5-parted, or as many sessile stigmas.

1. **Viburnum.** Shrubs with simple or merely lobed leaves: nutlet of the berry-like drupe only 1, flattened.
2. **Sambucus.** Shrubs or shrubby trees with pinnate leaves: nutlets of the berry-like fruit, 2-5.

TRIBE II. Corolla from campanulate to tubular; often irregular; styles elongated; stigma capitate.

3. **Linnaea.** Creeping undershrubs with simple leaves: corolla campanulate, 5-lobed, obscurely irregular: stamens 4, unequal; ovary 3-

celled, two of the cells containing several imperfect ovules, the third a solitary fertile ovule; fruit dry; 1-seeded.

4. **Symphoricarpos.** Shrubs with simple or merely lobed leaves: corolla campanulate, regular or nearly so, 4-5-lobed: stamens as many as lobes of the corolla: ovary 4-celled, but the berry-like fruit only 2-seeded.
5. **Lonicera.** Climbing or erect herbs with simple leaves: corolla tubular, more or less irregular, commonly 2-lipped: stamens 5: ovary and berry-like fruit 2-3-celled, several-seeded.

Tribe 1. Sambuceæ H. B. K. Corolla regular, short, rotate or open-campanulate, 5 lobed. Styles short, or hardly any: stigmas 3-5; ovary 1-5-celled: ovules solitary. Fruit baccate-drupaceous, with 1-5 seed-like nutlets; inflorescence terminal and cymose.

1 VIBURNUM Tourn.

Shrubs or small trees with petioled, undivided or lobed stipulate or pseudostipulate leaves and mostly white flowers in terminal cymes, the marginal ones sometimes sterile and radiant. Limb of the calyx 5-toothed. Corolla rotate, sometimes somewhat tubular or campanulate, 5-lobed. Stamens 5: ovary 1-5-celled, one of the cells containing a single suspended ovule, the other abortive: stigmas 3, sessile. Fruit drupaceous, with a thin pulp, 2-seeded. Embryo minute, at the extremity of the fleshy albumen.

§ 1. Cyme never radiant: drupes blue or dark purple or black.

V. ellipticum Hook. Fl. i, 280. 'An erect shrub 2-10 feet high; winter buds scaly: leaves from orbicular-oval to elliptical-oblong, rounded at both ends, dentate above the middle, not lobed, at length rather coriaceous, 3-5-nerved from the base, the nerves ascending or parallel, pubescent with simple hairs or glabrate above; on slender petioles; stipules subulate to setaceous: cymes pedunculate, with 5-7 primary rays. Corolla 4-5 lines in diameter: filaments equalling the corolla: stone of the fruit deeply and broadly sulcate on both faces, the furrow of one face divided by a median ridge. On rocky ridges, Washington to California.

§ 2. **OPULUS** Tourn. Cymes radiant or not radiant: drupes light red, acid, edible, globose.

V. Opulus L. Sp. 268. Usually nearly or quite glabrous: stems 4-10 feet high: winter buds scaly: leaves dilated, 3-lobed, with acuminate lobes, incisely dentate or the upper ones entire, rounded or broadly cuneate at base, palmately or pedately 3-5-ribbed, on slender petioles bearing 2 or more glands at or near the summit and usually setaceous stipules near the base: cymes rather ample, terminating several-leaved branchlets, radiant: anthers exerted: fruit nearly a half inch long, red, juicy, globose; stone flat, orbicular, even. In swamps and along mountain streams, Oregon to British Columbia, Pennsylvania.

V. pauciflorum Pylaie in Herb. T. & G. Fl. ii, 17. A straggling shrub 2-10 feet high with rather slender branches: leaves roundish or broadly oval in outline, unequally dentate, many of them obscurely or distinctly 3-lobed, about 5-nerved at base, loosely veined, glabrous or sparsely pubescent; 1-4 inches long: cymes small, terminating short and

merely 2-leaved branchlets, involucrate with slender, subulate caducous bracts, destitute of neutral, radiant flowers: stamens very short: berries light red, 4-6 lines in diameter, globose to oblong; stone flat, orbicular, not furrowed on the sides. In swamps and marshes along mountain streams, Oregon to Alaska, the Rocky Mountains, New Hampshire and Labrador.

2. SAMBUCUS TOURN. (ELDER).

Small trees or shrubs with warty bark, pinnately compound leaves and compound thyrsoid or fastigiata cymes of small white or reddish flowers. Limb of the calyx small, 5-cleft, at length obsolete. Corolla rotate, or nearly so. Stamens 5. Ovary 3-5-celled, forming small, baccate drupelets, with 3-5 cartilaginous nutlets. Embryo nearly the length of the albumen.

* Cymes compound, thyrsoid-paniculate; the axis continued and sending off 3-4 pairs of lateral primary branches, these mostly trifold and again bifid or trifid: early flowering and fruiting.

S. arborescens Nutt. Mss. *S. pubens* var. *arborescens* T. & G. Fl. ii, 13. A large shrub or small tree, 10-30 feet high with spreading branches: leaves ample; leaflets lanceolate to ovate, scarcely acuminate, closely serrate with strong, lanceolate teeth; 1-6 inches long: thyrsoid cyme ovate to semi-orbicular; flowers white to yellowish, usually drying brownish; fruit small, scarlet. On rich, alluvial lands along rivers, etc. Oregon to British Columbia.

S. pubens Michx. Fl. i, 180. Stems 2-12 feet high with spreading branches; leaves from pubescent to nearly glabrous: leaflets 5-7, ovate-oblong to ovate-lanceolate, acuminate, thickly and sharply serrate: thyrsiform cyme ovate or oblong: flowers dull white, drying brownish: fruit scarlet, oily: nutlet minutely punctate-rugulose. Rocky banks and open woods, Oregon to Alaska and across the continent.

S. leiosperma Leiberg Proc. Biol. Soc. of Wash. xi, 40. Shrubby, 4-7 feet high, forming with its spreading stems loose, open clumps: pith of two-year old shoots yellowish-brown: leaflets 5-7, oblong to lanceolate, 2-4 inches long, 6-18 lines broad, acute or acuminate, subsessile or shortly petioled, sharply serrate, the apices of the teeth usually inflexed, smooth or with a scattered, short pubescence, especially on the petioles and the lower surface of the leaf along the midrib; stipules present on the flowering shoots, subulate, about lines long: cyme oblong, somewhat flattened in fruit, scabrous-puberulent, the branches membranaceously margined at the forks: flowers yellowish-white: berry scarlet, containing 3-5 seed-like, very smooth nutlets 1-1½ lines long. In the Cascade Mountains from Crater Lake, Oregon to Alaska.

S. melanocarpa Gray Proc. Am. Acad. xix, 76. Stems 2-8 feet high: glabrous or the young leaves slightly pubescent: leaflets 5-7, rarely 9: cyme convex, as broad as high: flowers white: fruit black, without bloom. In the mountains of eastern Oregon to California and the Rocky Mountains.

** Cymes compound, depressed or fastigiata, 5-rayed; 4 external rays once to thrice 5-rayed, but the rays unequal, the 2 outer ones stronger, or in ultimate divisions reduced to these; central rays smaller and at length reduced to 3-flowered cymelets or to single flowers: berries never red; nutlets punctate-rugulose.

S. glauca Nutt. T. & G. Fl. ii, 13. A large shrub or small tree 12-30 feet high and 2-12 inches in diameter covered with a dark, close, very distinctly and rather finely fissured bark; glabrous throughout: leaflets

lanceolate to narrowly oblong, thickish, sharply serrulate, the lower ones rarely 3-parted; cymes very large, flat: fruit blue with a dense bloom. Common from British Columbia to California.

Tribe 2. Lonicereæ R. Br. Corolla elongated or at least campanulate, commonly more or less irregular. Styles elongated. Stigma mostly capitate. Stipules or stipular appendages seldom seen.

3 LINNÆA Gronov. L. Gen. ed. i, 118. (TWIN-FLOWER.)

Creeping or trailing evergreen herbs with broadly oval, sparingly crenate leaves and showy, drooping flowers, on 2-flowered peduncles. Calyx with the limb 5-parted into subulate-lanceolate lobes constricted above, the globular tube, deciduous from the fruit. Corolla campanulate-funnelform, not gibbous, almost equally 5-lobed. Stamens 4, 2 long and 2 shorter. Ovary 3-celled, 2 of the cells containing several abortive ovules; the other with a solitary, suspended, perfect ovule, forming the single seed in the dry and indehiscent coriaceous 3-celled small fruit. Style exserted: stigmas capitate.

L. borealis Gronov. L. Fl. Lap. t. 12 f. 4. Somewhat pubescent; branches filiform, leaves round to obovate, 6-12 lines long, crenately few-toothed; somewhat rugose-veiny, tapering into a short petiole: peduncles filiform, terminating, ascending, short leafy branches bearing at summit a pair of small, leafy bracts and from the axil of each a filiform, 1-flowered pedicel, rarely the axis prolonged and bearing another pair of flowers: pedicels similarly 2-bracteolate at summit and a pair of larger ovate, glandular-hairy inner bractlets subtending the ovary, soon connivent over it or enclosing and even adnate to the akene-like fruit: flowers nodding: corolla purplish to rose-color or almost white, a half inch or less long. In forests, California to Alaska and across the continent.

L. longiflora. *L. borealis* var. *longiflora* Torr. Stems filiform, 1-4 feet long, trailing and sending up numerous erect, filiform branches: leaves round to obovate, crenate-toothed above, 4-12 lines long, narrowed below to a short petiole: peduncles filiform, 2-4 inches long, terminating in the erect branches, 2-bracteate at the summit, 2-flowered; pedicels filiform, 2-bracteolate and the flowers subtended by an involucre of two ovate, hairy bracts: corolla pink or rose-color, to nearly white, funnelform, 6-8 lines long. In forests, Washington to California.

4 SYMPHORICARPOS Dill. Elth. 371, t. 278. (SNOWBERRY.)

Low, branching shrubs with entire or lobed leaves on short petioles, scaly leaf-buds and 2-bracteolate small flowers, usually crowded in axillary or terminal spikes or clusters, rarely solitary. Calyx with a globular tube and 4-5-toothed, persistent limb. Corolla regular, not gibbous, from short-campanulate to salverform, 4-5 lobed. Stamens as many as lobes of the corolla, inserted on its throat. Ovary 4-celled; 2 cells containing a few sterile ovules, the alternate cells containing a single, suspended ovule. Fruit a globose, berry-like drupe containing 2 small and seed-like, bony, smooth nutlets, each filled by a seed.

§ 1. Corolla urceolate or open-campanulate, only 2-3 lines long.

S. occidentalis Hook. Fl. i, 285. Glabrous or strictly pubescent: robust; leaves oval or oblong, thickish, 2 inches long; axillary flower clusters not rarely pedunculate, sometimes becoming spicate, 4-12 lines long: corolla 3 lines long, 5-cleft to below the middle; densely villous-hirsute with long hairs within: stamens and style more or less exserted; style glabrous; fruit white. Rocky grounds, eastern Oregon to Michigan and north to lat. 64 degrees.

S. racemosus Michx. Fl. i, 107. An erect shrub, 2-10 feet high, with slender branches: leaves round-oval to oblong, 6-18 lines long, entire, or those of young and vigorous shoots sometimes irregularly lobed or toothed, smooth above, more or less pubescent beneath: flowers in short and several-flowered axillary clusters or spikes: corolla 2-3 lines long, 5-lobed above the middle, villous-bearded within; narrowed at base: stamens not exserted; style glabrous, not exceeding the stamens: fruit white, 3-8 lines in diameter. Common, California to Alaska and across the continent.

S. pauciflorus *S. racemosus* var. *pauciflorus* Robbins, at least in part. A prostrate shrub with slender stems 1-3 feet long: leaves oval to oblong, 6-18 lines long; the lower ones and those of vigorous shoots variously lobed or toothed: flowers in small, 1-few-flowered, loose spikes; corolla small, 5-lobed above the middle, villous within: stamens not exserted; style glabrous, not longer than the corolla: fruit white when mature, depressed globose, 3-6 lines in diameter. In forests, Oregon and Washington, west of the Cascade Mountains.

S. acutus *S. mollis* var. *acutus* Gray Syn Fl. i, 14. Low, diffuse or decumbent, soft-pubescent; leaves oblong-lanceolate to oblong, acute at both ends or acuminate, sometimes irregularly and acutely dentate, very soft-tomentulose; flowers solitary or in short clusters; corolla open-campanulate, with a broad base, 5-lobed above the middle, barely pubescent within; stamens and style included. Washington to California, east of the Cascade Mountains.

§ 2. Corolla from oblong-campanulate to salverform, 5-lobed only at the summit: flowers mostly axillary.

S. rotundifolius Gray Pl. Wright ii 66. Tomentulose or glabrate: stems rigid, much-branched, 1-3 feet high: leaves from orbicular to oblong-elliptical, thickish, 6-9 lines long: entire or coarsely lobed: corolla elongated-campanulate, 3-4 lines long, its tube pubescent within below the stamens, twice or thrice the length of the broad lobes: stamens and style included: fruit white, globular or oblong; nutlets oval, equally broad and obtuse at both ends. On rocky ridges in mountainous districts, Washington to California and New Mexico.

S. oreophilus Gray Journ Linn. Soc. xiv, 12. Glabrous or sometimes with soft pubescence: leaves oblong to broadly oval, thickish, 6-10 lines long: corolla tubular, 4-6 lines long, its tube almost glabrous within, 4 or 5 times as long as the broad lobes: nutlets of the white drupe oblong, flattened attenuate and pointed at base. Mountains of eastern Oregon to California and Arizona.

5 XYLOSTEON Tourn.

LONICERA § XYLOSTEON DC. Prodr. iv, 333.

Erect or merely trailing shrubs with membranaceous leaves that are all distinct, and rather small flowers on usually 2-flow-

ered axillary peduncles. Tube of the calyx ovoid or glandular, the limb 5-toothed or obsolete. Corolla from campanulate to tubular, more or less gibbous at base, the limb somewhat irregular and more or less bilabiate. Stamens 5, inserted on the tube of the corolla. Style slender: stigma capitate. Ovary 2-3-celled, with several pendulous ovules in each cell, becoming a few-seeded berry.

X. villosum Michx Fl. i, 106. *Lonicera cœrulea* of American authors. Low, 1-2 feet high, pubescent or glabrate: leaves thin, pale or glaucescent, ovate-oblong, obtuse, entire, an inch or more long: peduncles shorter than the flowers: corolla ochroleucous, gibbous at base, narrowly funnelform, scarcely at all bilabiate: bracts subulate or linear, commonly larger than the ovaries: ovaries completely united forming a roundish or ovoid black but glaucous berry. In moist grounds, California to Alaska and across the continent.

X. conjugialis *Lonicera conjugialis* Kell. Shrub 3-5 feet high, fully branching and bushy: leaves thickish, bright green, pubescent when young ovate or oval, acute or acuminate, 1-2½ inches long, short petioled: peduncles slender, 3-5 times the length of the dark, narrow flowers: bracts subulate, caducous; corolla 4-5 lines long, gibbous-campanulate, the upper lip crenately 5-lobed, throat and lower part of filaments and style very hirsute: berries dark red, almost wholly connate. On the high mountains at 6,000-10,000 feet altitude, Washington to California.

X. Utahensis *Lonicera Utahensis* Watson. Stems erect, 3-5 feet high with loose, slender spreading branches: leaves oblong, subcordate at base, obtuse glabrous, 2 inches long by one inch broad, on petioles 1-2 lines long: peduncles axillary: bracts shorter than the ovaries: corolla 5 lines long, obtusely saccate at base, bilabiate, the lobes half shorter than the broad tube; style included: berries red, nearly distinct, globular, 2-3 lines in diameter, 2-4-seeded, on short peduncles. On high mountains, Oregon to British Columbia, Montana and Utah.

X. involucreatum Richard App. Frankl. Journ. 6. *Lonicera involucreata* Banks. An erect shrub 2-10 feet high with slender erect branches: leaves ovate-elliptical to lanceolate, acutish to acuminate, 2-3 inches long, petioled: peduncles 1-2 inches long: corolla yellowish, viscid-pubescent, 6-8 lines long, tubular funnelform, with 5 short, scarcely unequal lobes; bractlets 2, viscid-pubescent at first, short, ovate or obovate, in fruit enlarging and loosely enclosing or surrounding the fruit: berries distinct, black. On high mountains, Oregon to British Columbia and the Rocky Mountains.

X. Ledebourii *Lonicera Ledebourii* Esch. Stems stout, 5-20 feet long, often with the long vine-like branches reclining on or half climbing over other shrubs or small trees: leaves ovate to lanceolate acute or acuminate, short-petiolate 2-3 inches long, pubescent on the veins beneath and on the margins: peduncles short: the flowers subtended by a pair of large, ovate foliaceous bracts, calyx-limb obsolete: corolla strongly gibbous at base, strictly salverform above the gibbosity, the short rounded lobes spreading abruptly; berries distinct, black. Tide lands and river bottoms, California to Alaska.

6. CAPRIFOLIUM Juss.

LONICERA § CAPRIFOLIUM DC l. c. (HONEYSUCKLE)

Mostly twining shrubs with the upper leaves often connate-perfoliate, and showy flowers sessile in spiked whorls at the

ends of the branches. Tube of the calyx ovoid or globular, the limb 5-toothed or truncate. Corolla tubular, more or less gibbous at base, the limb mostly bilabiate. Stamens 5, inserted on the tube of the corolla. Ovary 2 celled with several pendulous ovules in each cell becoming a few-several-seeded berry.

C. ciliosum Pursh. Fl. 160. *Lonicera ciliosa* Poir. Stems twining or depressed and almost prostrate, 2-20 feet long, slender, leaves ovate or oval, glaucous beneath, usually ciliate, otherwise glabrous 2-3 inches long, uppermost 1 or 2 pairs connate into an oval or orbicular disk: whorls of flowers single and terminal or rarely 2 or 3 and occasionally from the axils of the penultimate pair of leaves. Corolla glabrous or sparingly pilose-pubescent, yellow or crimson-scarlet, the limb slightly bilabiate, very much shorter than the elongated tube; stamens and style but little exerted. Common in wooded districts, California to British Columbia and Montana.

C. hispidulum Lindl. Bot. Reg. t. 1761, *Lonicera hispidula* Dougl. Stems slender, twining or trailing, 2-10 feet long, hirsute or pilose-hispid when young: leaves rather rigid, ovate or cordate, obtuse, 6-12 lines long, glaucous and villous-hirsute beneath, glabrous above, the lower ones petioled, the upper one or two pairs connate-perfoliate: whorls of flowers on slender peduncles; flowers small, rose-color, 6-10 lines long, strongly bilabiate, the linear, lower lip nearly as long as the gibbous tube; filaments slightly hairy below, exerted: ovaries glabrous. Common on rocky places, western Oregon and Washington.

C. Californicum *Lonicera Californica* T. & G. Stems slender, twining or trailing 6-10 feet or more long; branches glabrous: leaves somewhat coriaceous; ovate-oblong, 1-2 inches long, glabrous, glaucous beneath, not ciliate, uppermost usually connate-perfoliate: flowers in rather distinct whorls, the peduncle and rachis clothed with glandular and hispid hairs intermixed; corolla 6-8 lines long, yellowish, bilabiate, the short tubes conspicuously gibbous, lower lip linear, the upper with four very short, rounded lobes: ovaries glandular. On dry rocky hillsides, Southern Oregon to California.

ORDER XLVIII. RUBIACEÆ B. Juss. Hort. Train 1759.

Trees shrubs or herbs with opposite or whorled entire leaves and regular flowers. Tube of the calyx adherent to the ovary, the limb mostly 4-5-parted or toothed. Corolla inserted upon the summit of the calyx tube, composed of as many united petals as there are lobes of the calyx, mostly valvate in the bud. Stamens inserted into the tube of the corolla, equal in number and alternate with its lobes: anthers introrse. Ovary 2-celled with a single ovule in each cell, or 3-several-celled with 1-several ovules in each cell. Style single, sometimes with 2 or more lobes or stigmas. Seeds anatropous or amphitropous, solitary, few or numerous in each cell. Embryo straight or slightly curved, in the axis or at the extremity of copious, densely fleshy or horny albumen.

- 1. Galium.** Herbs with whorled leaves and no apparent stipules: fruit 2-lobed and 2-seeded.
- 2. Kelloggia.** Herbs with opposite leaves and stipules between the petioles; flowers in cymes; fruit 2 lobed and 2-seeded.

1 GALIUM TOURN. (BEDSTRAW. CLEAVERS).

Herbaceous or rarely suffrutescent plants with square stems, opposite or verticillate leaves and perfect or rarely polygamous small flowers in axillary or terminal simple or paniculate cymes or solitary. Calyx-tube ovate globose or oblong; the limb obsolete. Corolla rotate, 4-parted, rarely 3-parted: stamens as many as lobes of the corolla, short. Styles 2, more or less united at base: stigma globose. Fruit 2-lobed, dry or baccate, separable at maturity into 2 indehiscent, 1-seeded carpels.

§ Fruit dry.

* Annuals; fruit more or less hispidulous or hirsute, without hooked bristles: flowers hermaphrodite, white or whitish.

G. Aparine L. Sp. i, 108. Stems coarse, reclining, 1-8 feet long; intransversely hispid on the angles; leaves 6-8 in the whorls, oblanceolate to almost linear, 1-2 inches long, cuspidate acuminate, retrorsely hispid on the margin and midrib: peduncles rather long, 1-3 in the upper axils or terminal, bearing 1-3 pedicellate flowers: corolla 1-2 lines in diameter, whitish: fruit not pendulous rather large, granulate-tuberculate, the tubercles tipped with uncinatè bristles. In rich lands along streams, etc., California to Alaska and across the continent. (Europe).

G. spurium L. Sp. i, 106? *G. Aparine* var. *minor* Hook. Stems slender, branching from the base, diffuse, 1-2 feet long, retrorsely hispid on the angles: leaves 6-8 in the whorl, linear-oblanceolate, cuspidate, 6-15 lines long, retrorsely scabrous on the veins and margin, the axillary umbellate cymes 3-9-flowered: corolla about 1 line in diameter, white or greenish: fruit large, more or less fine-tuberculate and uncinatè-hispid. On stony hillsides, California to British Columbia and the Rocky Mountains, east of the Cascade Mountains.

G. bifolium Watson Bot King 134, t. 14. Smooth and glabrous: stems slender, 2-12 inches high, mostly erect, sparingly branched: leaves 2-4 in the whorl, lanceolate, 4-8 lines long, when 4 the alternate pair much smaller: peduncles solitary, lateral and terminal, naked, 1-flowered, when in fruit about equalling the leaves, spreading: corolla minute, white; fruit small, minutely hispid, recurved at the end of the peduncle. In open places on the high mountains, Washington to California, Nevada and Utah.

** Wholly herbaceous perennials: flowers not diœcious: bristles on the fruit short and uncinatè or none.

+ Leaves in fours throughout or fewer.

G. Oreganum Britton Bull. Torr. Club xxi, 31. *G. Kamtschaticum* of authors as to the Pacific Coast plant. Stems slender, numerous and radiately spreading from the crown of a rather thick root, 6-18 inches long: leaves oblong to ovate, acute or acutish or the lowest obtuse 6-18 lines long, 4-6 lines broad, distinctly 3 nerved, ciliate on the margins and usually also on the upper side of the nerves: cymes mostly terminal, rather few-flowered; flowers dull cream color, on short diverging pedicels; fruit hispid. In the Cascade and Coast mountains, Oregon to Alaska.

G. boreale L. p i, 108. Stems erect, 1-2 feet high, mostly glabrous: very leafy: leaves from linear to broadly-lanceolate, 1-2 inches long, obtuse, distinctly 3-nerved, often with fascicles of smaller ones in the axils: the uppermost reduced to pairs of oblong or oval bracts: flowers in numerous close cymes collected in a terminal and ample thyriform panicle,

bright white, fragrant: fruit small, hispidulous when young, often soon glabrous. Rocky banks of streams, Oregon to Alaska and across the continent

+ + Pointless leaves in fours, fives or sixes; small, 1-nerved.

G. trifidum L. Sp. i, 105. Stems almost filiform; erect; branching, 6-20 inches high, smooth, except the retrorsely hispid angles; leaves linear to oblanceolate, obtuse, 4-8 lines long; the midrib beneath and the margin sparsely hispidulous: peduncles scattered, 1-several-flowered; flowers white, sometimes 3-merous: fruit small, smooth. In wet places, California to Alaska and across the continent.

+ + + Leaves in sixes, sometimes fives or on the branchlets fours, cuspidately mucronate or acuminate.

G. asperrimum Gray Pl. Fendl. 60 and Bot. Cal. i, 284. Stems erect or diffusely ascending, but weak, 1-2 feet long; leaves lanceolate, 6-12 lines long; cymes twice or thrice dichotomous, with filiform peduncles and pedicels: corolla white or turning purplish: ovary merely puberulent or scabrous: fruit granulate-scabrous and sometimes minutely hispidulous. Shady places in mountains, eastern Oregon to California and New Mexico.

G. triflorum Michx. Fl. i, 80. Stems slender, diffusely procumbent, smoothish, 1-3 feet long; leaves elliptical-lanceolate to narrowly oblong, 1-2 inches long; cymes once or twice 3-rayed: pedicels soon divaricate; corolla yellowish-white to greenish, its lobes hardly surpassing the bristles of the ovary: fruit uncinately-hispid. In forests, California to Alaska and across the continent.

* * * Perennials with somewhat woody base: leaves 4, in the whorls, without any roughness; fruit hirsute with long and straight bristles.

G. multiflorum Kell. Proc. Cal. Acad. ii, 97. Suffrutescent at base: minutely scabrous to pruinose or glabrous: stems erect, tufted, 2-12 inches high; leaves in fours or the uppermost ones in twos, sessile, ovate to oblong-lanceolate, mucronate-apiculate or abruptly acuminate, 4-8 lines long, with 2 or sometimes 4 lateral nerves from the base: flowers yellowish or greenish, dioecious monœcious or perfect, solitary or somewhat cymose or thyrsoid-paniculate: fruit usually covered with long white bristles. In dry or rocky gulches, southern Oregon to California, Nevada and Utah.

Var. Watsoni Gray Syn. Fl. i, pt. 2, 40. Mostly glabrous and smooth: leaves thinner, oblong-lanceolate; commonly about 6 lines long by 2 lines broad, with lateral nerves either distinct or obsolete. In dry gulches, southeastern Oregon to Arizona and Idaho.

§ 2 Genus **RELBUNIUM** Endl. Leaves 4 in the whorls, one-nerved. Fruit baccate.

G. Nuttallii Gray Pl. Wright i, 80. Suffrutescent, tall and climbing, often 3-4 feet high, mostly glabrous except the minutely aculeolate-hispidulous angles of the stems and margins of the leaves. These also sometimes naked: leaves small, oval to linear-oblong, mucronate, mucronulate, or obtuse: fruit smooth and glabrous. In thickets and open woods, Southern Oregon and California.

G. Bolanderi Gray Proc. Am. Acad. vii, 350. Herbaceous from a woody root, diffuse, a foot or two high, glabrous, sometimes pubescent: angles of the stem not at all or hardly scabrous: leaves oblong-linear or lanceolate, rather acute, about 6 lines long, thickish, with margins and midrib either smooth and naked or sparsely hispidulous, those of the

branches not rarely opposite: corolla dull purple; fruit white, smooth juicy, drying black. Dry grounds, southern Oregon and western California.

G. Andrewsii Gray Proc. Amer. Acad vi, 538. Depressed: caespitose, and with slender creeping rootstocks: glabrous or nearly so: the matted tufts 3-10 inches high: leaves very crowded, acerose-subulate, usually shining, naked or sparsely spinulose-ciliate, 2-6 lines long: flowers dioecious, staminate slender-pedicelled, in few-flowered terminal cymes; pistillate solitary, subtended by a whorl of leaves that are longer than the at length deflexed peduncle: fruit dark-colored, smooth. Dry hills, southern Oregon and California

2 KELLOGGIA Torr. Bot. Wilkes 332, t. 6.

Herbs with opposite leaves and loosely cymose-panicled, small flowers. Flowers commonly 4-merous; calyx-tube obovoid, somewhat flattened laterally; teeth 4, subulate persistent. Corolla funnellform, the lobes naked, valvate in bud. Stamens as many as lobes of the corolla, and inserted on its tube, more or less exserted: filaments flattened; anthers oblong-linear, attached above the base. Styles filiform, exserted: stigmas 2. Ovary 2-celled, ovules erect from the base, anatropous. Fruit dry and coriaceous, separating at maturity into 2 closed carpels which are conformed and adherent to the seed, somewhat reniform in cross section. Embryo comparatively large in fleshy albumen.

K. galioides Torr. Bot. Wilkes 332 t. 6. Glabrous or minutely pubescent; stems slender, 4-12 inches high: leaves lanceolate, sessile, 1-2 inches long, the stipules small and scarios: flowers small, in a loose dichotomous cyme, the long pedicels thickened above and articulated with the flower; corolla funnellform, white or pinkish, 3-5 lines long, pubescent on the outside: fruit small, oblong, coriaceous, uncinat-hispid. In shady places, Washington to California.

ORDER XLIX. VALERIANACEÆ Batsch Tab. Affin. 227.

Herbs, rarely shrubby, with opposite, simple or divided leaves without stipules and usually small flowers in dichotomous cymes that are often glomerate when young, frequently corymbose or paniculate. Tube of the calyx adherent to the ovary: the limb various, sometimes forming a plumous pappus, occasionally obsolete. Corolla tubular funnellform or obconical, often gibbose anteriorly or spurred, the limb mostly 5-lobed and more or less irregular, imbricate in bud. Stamens distinct, inserted into the corolla; anthers introrse. Ovary mostly 3-celled, 2 of the cells empty, the other containing a single suspended ovule: style filiform stigmas 2-3, or united into one. Fruit membranaceous or coriaceous, indehiscent; 1-celled or frequently 3 celled with 2 of the cells empty, sometimes 2-celled by the confluence of the empty cells, 1-seeded. Seeds anatropous with a membranaceous testa and no albumen.

* Limb of the calyx inrolled and concealed in flower, evolute and pappus-like in fruit.

1. *Valeriana*. Mostly tall perennial herbs with simple or sparingly branched stems; corolla salverform, the limb not spurred.

* * Limb of the calyx obsolete.

2. *Plectritis*. Stems often simple, at least not dichotomous: cymes thyrsoïdly congested at the summit of the stem or branches: corolla gibbous or spurred at base: fruit usually winged laterally.
3. *Valerianella*. Stems dichotomously branched, the branchlets terminated by cymules of small flowers: fruit not winged.

1 VALERIANA Tourn

Perennial herbs with strong-scented mostly thickened rootstocks or roots, simple or pinnate leaves and white or flesh colored perfect or polygamo-dicœious; flowers in terminal often paniced cymes. Limb of the calyx involute and concealed in the flowering state, evolute in fruit, formed of several plumose bristles, deciduous. Corolla with more or less cylindrical or obconical tube, which is often gibbous but not spurred at base, the limb about equally 5-lobed. Stamens 3; abortive cells of the ovary small or obscure, obliterated in the achene-like fruit.

V. edulis Nutt. T & G. Fl. ii, 48. Glabrous or glabrate; the nascent herbage tomentulose-puberulent sometimes remaining so on the leaf margins, stems erect, from a large fusiform perpendicular stock that branches below into thickened roots, 1-3 feet high: leaves thickish, nervously veined, the radical oblanceolate to spatulate, tapering into a margined petiole, entire or some sparingly laciniate-pinnatifid: cauline rarely none, commonly 1-3 pairs, sessile, pinnately parted into 3-7 linear or lanceolate divisions; flowers polygamo-dicœious, yellowish white, sessile in the cymules which form an elongated thyriform naked panicle, fruit ovate, puberulent or glabrous. Wet plains and prairies, eastern Oregon to British Columbia, east to the Rocky Mountains and Ohio.

V. sylvatica Banks Richard App. Frankl. Journ. ed. 2, 2. Stems erect from creeping rootstocks 8-10 inches high: radical leaves mostly simple, ovate to oblong, sometimes some of them 3-5-foliolate: cauline more or less petioled, 3-11-foliolate or parted, the divisions entire or rarely few-toothed: flowers more or less dimorphous; corolla light rose-color, 2-3 lines long or more, the tube short: stigma nearly entire: fruiting cyme open, at length thyrsoïd-paniculate. Wet mountain valleys, California to British Columbia and across the continent.

V. Sitcensis Bong. Veg. Sitc. 145. Stems rather stout, 1-5 feet high, often branching: radical leaves mostly 3-5-foliolate, the terminal one always much the largest: cauline short petioled, 3-5-foliolate, the divisions orbicular to oblong-ovate or of the upper ones ovate-lanceolate, not rarely dentate or repand: cymes contracted; corolla funnellform; 3-4 lines long; white or more commonly pinkish: stigma entire. In moist woods and wet places, Oregon to Alaska and the northern Rocky Mountains.

V. Columbiana Piper Bot. Gaz. xxi, 485. Stems erect from a rather slender caudex 10 inches high, minutely puberulent, especially below: radical leaves ovate, entire obtuse at apex an inch long glabrous, their petioles 2-3 times as long, narrowly margined, puberulent; cauline 2 pairs, 3-divided: the basal segments ovate-lanceolate, obtuse, entire, the terminal segment 3-cleft into ovate-acute lobes; petioles as long as the blade or shorter, nearly glabrous: inflorescence loosely cymose, the whitish flowers sessile in the cymules: peduncles puberulent: corolla seven lines.

long, the tube twice the length of the limb, hairy at base within: stamens glabrous: stigma minutely 3-lobed: bracts linear-subulate, as long as the glabrous fruit. Wenatchee Washington.

2 PLECTRITIS Lindl. Bot. Reg. t. 1095.

Low smooth annuals with opposite mostly entire leaves and small flowers in terminal heads or spikes. Calyx-limb truncate, entire or obsolete; tube of the corolla gibbous anteriorly, spurred at base; the limb 5-cleft, more or less bilabiate. Stamens 3. Stigma capitate. Fruit with a coriaceous, somewhat triangular, fertile cell, the two empty ones often open their full length, each forming an involute wing; in one species almost wingless.

* Fruit somewhat meniscoidal, only obtusely angled dorsally: cotyledons incumbent, that is parallel to the ventral face and expanded wings.

P. macrocera T. & G. Fl. ii, 50. Stems slender, 2-10 inches high, simple or sparingly branched: flowers small, usually in 2-4 somewhat distant and spicately disposed verticillastrate clusters: corolla narrow, white or pinkish, 1-2 lines long with a spur usually as long as the tube: limb somewhat equally spreading, hardly bilabiate, or equally 4-lobed and the posterior lobe emarginate-bifid: fruit glabrous or puberulent, obtuse or lightly lineate-sulcate on the dorsal angle, the broad wing circumscribing the ventral face of the achene, spreading or incurved. On dry hillsides, British Columbia to California, Nevada and Arizona.

** Fruit strongly carinate-angled dorsally: cotyledons transverse to the ventral face, accumbent

+ Wings conspicuous, more or less introrse, in the last species small.

P. congesta DC Prodr iv, 631. Stems often rather stout, 4-20 inches high, simple or sparingly branched: flowers 1-4 lines long in a capituliform or oblong simple or interrupted thyrus, or sparingly verticillastrate below: corolla rose or flesh color with obviously bilabiate limb and spur half or less the length of the very gibbous throat: fruit broadly winged and with prominent but rather obtuse keel, glabrous or puberulent to short villous. On moist, usually shady slopes, British Columbia to California.

P. anomala Suksdorf *Valerianella anomala* Gray Stems stoutish, 8-20 inches high, freely branching: flowers small, in several approximate verticillastrate clusters; corolla white, a line long, wholly destitute of spur, at most a small mammæform gibbosity near the base of the short and broadly funneliform throat; limb small, obscurely bilabiate, usually 4-lobed and posterior lobe emarginate or 2-cleft: fruit $1\frac{1}{2}$ lines long, acutely angled, with sharp edge on the back, with broad wings usually inflexed at base and expanding above. In moist meadows and woodlands along the lower Columbia River

P. aphanoptera Suksdorf *Valerianella aphanoptera* Gray. Stems slender and weak, 1-2 feet high, branching: flowers small, in 2-4 verticillastrate clusters: corolla only a line long, white, with obviously bilabiate limb and short basal spur; fruit puberulent or glabrate, trigonous; dorsal angle salient but rather obtuse, lateral angles with distinct but narrow incurved wings. Along streams, Southern Oregon.

+ + Wings wholly wanting to the triquetrous fruit, the lateral angle of which resembles the dorsal.

P. samolifolia Hoek in Engler, Jahrb iii, 37. A span to a foot high: verticillate clusters 2-4, small; corolla a line or so in length, obscurely bilabiate, with short conical-saccate spur; achene-like fruit of the shape of buckwheat, glabrous or a little pubescent, about a line long. Low grounds along the Columbia River and coast of California.

3 VALERIANELLA Tourn. (CORN SALAD).

Low glabrous annuals with opposite leaves and small flowers in terminal, capitate clusters. Calyx-limb none or a mere toothed or oblique border. Corolla with nearly regular 4-parted limb, funnellform or more open throat, with or without a small saccate gibbosity at its base anteriorly, and a short, proper tube. Stamens 3; fruit 3-celled, two of them empty and manifest, or often enlarged and closed, sometimes at length confluent into one.

V. OLITORIA Poll. Hist. Pl. Palat i. 30. Plants 4-10 inches high, dichotomous, pubescent on the angles; upper leaves sparingly toothed at the base, ciliate; the radical petioled: flowers pale blue in small glomerules: stigma of 3 very small linear-oblong lobes: fruit compressed, oblique, at length broader than long, glabrous, the partition between the empty cells often imperfect. In fields and waste places near Portland, Oregon. Introduced from Europe.

ORDER L. DIPSACACEÆ Lindl. Veg. King 699.

Herbs or suffrutescent plants (none of them native of America) with opposite or verticillate sessile leaves without stipules: the flowers aggregated in a dense involucrate head upon a common receptacle, each usually subtended by a chaff-like bract and surrounded at the base by a very short closely appressed monophyllous involucl. Tube of the calyx adherent to the ovary or sometimes free except at the summit the limb various, sometimes forming a hairy or plumose pappus. Corolla tubular: the limb 5-cleft or 4-cleft by the union of the two upper lobes. Stamens 4, inserted into the corolla towards the base, distinct, or rarely with the filaments united in pairs: anthers introrse. Ovary 1-celled, with a single suspended ovule. Fruit membranaceous or acheneiform, indehiscent, crowned with the limb of the calyx. Seed anatropous with a very thin testa. Embryo nearly the length of the fleshy albumen.

1 DIPSACUS Tourn. (TEASEL).

Stout, erect hairy or prickly herbs with opposite leaves and large, oblong or roundish head of small flowers: the expansion of the flowers commencing about the middle and proceeding in opposite directions. Involucre of rigid, spreading unequal bracts. Bracts of the receptacle rigid, acuminate. Involucl sessile, 4-angled, 8-ribbed, 4-toothed. Calyx-limb cup-shaped, 4-lobed. Corolla funnellform, 4-cleft.

D. SYLVESTRIS Mill. Dict. Stems stout, 2-5 feet high prickly; lanceolate-oblong, connate at base, 4-6 inches long; involucre as long as the heads; bracts of the receptacle tipped with a long and straight flexible awn; corolla flesh-color. In waste places and old fields. Naturalized from Europe.

ORDER LI. COMPOSITÆ Vaill. Act. Acad. Paris 143.

Herbs, shrubs or small trees with various leaves and small flowers in dense, closely involucrate heads on a simple receptacle, the heads often resembling a single flower. Flowers 5-merous or sometimes 4-merous. Tube of the calyx wholly adnate to the ovary, its limb none or obsolete or developed into a cup or teeth scales awns or capillary bristles. Corolla epigynous, valvate in the bud. Stamens as many as lobes of the corolla and alternate with them, inserted on the corolla-tube; anthers united by their edges into a tube, commonly with sterile tips or appendages, the cells introrse, discharging the pollen within the tube, this forced out by the lengthening of the style. Style in all fertile flowers 2-cleft or lobed at summit and bearing introrse-marginal stigmas; ovary 1-celled, with a solitary anatropous ovule erect from the base. Fruit an achene. Seed with a straight embryo and no albumen.

Herbs are said to be *homogamous* when all its flowers are alike in sex; *heterogamous* when unlike (generally marginal flowers pistillate or neutral, and central hermaphrodite or by abortion only staminate): *androgynous* when of pistillate and staminate flowers: *monœcious* or *diœcious* when the flowers of different sexes are in different heads either on the same or different plants: *radiate* when there are enlarged ligulate flowers in the margin: *ligulate* when all the flowers have ligulate corollas: *discoid* when there are no enlarged marginal corollas.

SUBORDER I. TUBULIFLORÆ.

Herbs or shrubs with watery or resinous, rarely somewhat milky juice. Corollas tubular and regular in all the hermaphrodite flowers.

* Heads homogamous and discoid flowers all hermaphrodite, never yellow; anthers not caudate at base.

I. Eupatoriaceæ. Style-branches elongated, more or less clavate-thickened upward and obtuse, minutely papillose-puberulent, stigmatic only below the middle.

** Heads homogamous or heterogamous; flowers not rarely yellow: style-branches of hermaphrodite flowers with stigmatic lines mostly prominulous and extending either to the naked summit or to a more or less distinct pubescent or hispidulous tip or appendage.

II. Asteroideæ. Anthers not cordate at base; style-branches in hermaphrodite flowers flattened and with a distinct terminal appendage: disk corollas generally yellow: rays of same or different color.

EUPATORIUM

- III. Inuloideæ.** Anthers caudate: style-branches of hermaphrodite flowers slender, destitute of any terminal appendage, the stigmatic lines extending to or vanishing near the naked obtuse or truncate summit.
- IV. Helianthoideæ.** Anthers not caudate: style-branches with truncate or variously appendiculate pubescent or hispid tips: involucre not scarious: receptacle with chaffy bracts subtending at least the outer disk flowers: pappus none or various: never of fine capillary bristles.
- V. Helenioideæ.** Anthers not caudate: style-branches truncate or variously appendiculate: involucre not scarious: receptacle without any bracts subtending the flowers: pappus from setiform to paleaceous or none.
- VI. Anthenideæ.** Anthers not caudate: style-branches mostly truncate: involucre of dry and scarious bracts, receptacle without or sometimes with bracts subtending the flowers: pappus coroniform or of short paleæ or none.
- VII. Senecionideæ.** Anthers not caudate; style-branches of hermaphrodite flowers mostly obtuse or truncate, with or without short appendages: involucre of mostly equal not scarious bracts: receptacle without bracts subtending the flowers: pappus of soft-capillary bristles
- VIII. Carduineæ.** Anthers conspicuously caudate, and with elongated, mostly connate cartilaginous appendages at tip: style branches short or united, without appendage, stigmatic quite to the obtuse summit, smooth and naked, but sometimes a pubescent or hispidulous ring or node below: involucre much imbricated: receptacle densely setose or fimbriate or favose: pappus usually of many plumose bristles: heads never truly radiate

SUBORDER II. LIGULIFLORÆ.

Herbs with milky juice. Corollas all ligulate and flowers all hermaphrodite.

- IX. Cichoriaceæ.** Anthers not caudate: style-branches filiform, naked, stigmatic only toward the base: receptacle naked or paleaceous.

Tribe I. EUPATORIEÆ. DC. Prodr. v, 104. Heads homogenous, discoid: Flowers hermaphrodite, with tubular and regular corollas; receptacle in a few genera paleaceous, in most naked. Anthers without tails at base. Style-branches elongated, more or less clavate or thickened upward, minutely papillose or puberulous, or glabrous; the stigmatic lines only near the base and inconspicuous. Flowers never yellow.

1. **Eupatorium.** Involucre of more than 4 bracts: achenes 5-angled, destitute of intervening ribs: pappus of wholly capillary scarious bristles
2. **Coleosanthus.** Bracts of the involucre not herbaceous striate-nerved: achenes 10-costate or striate: pappus a single series of capillary bristles.

1 EUPATORIUM Tourn. Inst. t. 259.

Perennial herbs or somewhat shrubby plants with opposite (rarely alternate or verticillate) mostly entire leaves that are often connate at base, and mostly corymbose heads of purple blue or white flowers. Heads 3-many-flowered. Involucre cyl-

indrical or campanulate; the scales imbricated in 2-3 or more series or sometimes nearly equal in a single series. Receptacle flat, naked. Corolla tubular-infundibuliform or often with a campanulate limb, 5-toothed. Anthers included. Branches of the style mostly exerted and elongated cylindraceous or somewhat flattened, obtuse. Achenes 5-angled, without intermediate striæ. Pappus a single series of very slender capillary bristles.

E. occidentale Hook Fl. i, 303 Nearly glabrous: stems slender, 8-12 inches high, somewhat woody at base: leaves alternate, rarely opposite, ovate with a truncate or subcordate or roundish base, acute or acuminate, sparingly dentate repand or entire, rather short petioled: cymes small and rather compact, usually paniculate: heads 15-25-flowered: scales of the involucre linear, acute, nearly equal in 1 or 2 series, nearly nerveless; hardly longer than the mature achenes. Corolla white to purple: achenes slender glabrous. On cliffs and in stony places, eastern Washington to southern Oregon, California and Nevada.

2 COLEOSANTHUS Cass. Dict. x, 36.

BRICKELLIA EU. *Sk. ii, 290.*

Herbs or undershrubs with opposite or alternate leaves and variously disposed heads of white or flesh-colored flowers in late summer. Scales of the campanulate involucre imbricated lanceolate or linear, the exterior shorter, none herbaceous. Receptacle flat, naked. Corolla slender, 5-toothed at summit, the teeth mostly glandular externally. Pappus a single series of barbelate or subplumose or merely scabrous bristles. Achenes 10-costate or 10-striate.

* Heads 35-50-flowered, 6-9 lines high, pappus bristles merely scabrous or densely serrulate.

+ Pubescent to almost glabrous: leaves sessile or subsessile all alternate, cordate, seldom an inch long: stems herbaceous from a ligneous base, 10-16 inches high or more, leafy to the top: heads mostly single, terminating corymbose, leafy branches.

C. Greenei O. Ktze. *Rev Gen i, 328* *Brickellia Greenei* Gray. Very viscid-pubescent: stems slender, 10-16 inches high, numerous from a woody, perennial base, sparingly branched above or simple: leaves ovate, obtuse, somewhat serrate, sessile or somewhat petioled, the uppermost forming accessory loose bracts to the involucre proper: heads terminal, 9 lines high; involucre bracts lanceolate and linear, acuminate glabrous: achenes not glandular, glabrous or the upper part hirtellous with a few-scattered hairs on the ribs: pappus bristles subplumous. In gravelly gulches and along streams, southern Oregon and northern California.

C. oblongifolia O. Ktze. l. c. *Brickellia oblongifolia* Nutt. Slightly viscidulous: stems herbaceous from a lignescens base 10-20 inches high: leaves oblong or some upper ones lanceolate: involucre bracts all acute or muricately pointed; outer ones oblong-lanceolate, inner ones narrowly-linear: achenes sprinkled with minute glands, often a few bristles on the ribs near the summit. In gravelly or dry soil, British Columbia to eastern Oregon.

C. linifolia O. Ktze. l. c. *Brickellia linifolia* Eaton. Minutely glandular-pubescent: stems very numerous, 12-16 inches high from a stout, woody base, cymose at the summit: leaves numerous, alternate sessile, elliptical-lanceolate, entire, obscurely 3-nerved, 9-12 lines long,

heads large, solitary, on elongated somewhat leafy branches: involucre 40-50-flowered, the scales in several series, outer ones ovate, inner ones linear, acute, style-branches club-shaped, exserted: achenes with a double row of minute bristles along the striæ not glandular: pappus obscurely plumose. Sandy bottoms and rocky gulches, eastern Washington to Utah.

+ + Barely pubescent or glabrate perennials: heads not viscid: leaves slender-petioled, at least the lower ones opposite.

C. grandiflorus O. Ktze. l. c. *Brickellia grandiflora* Nutt. Puberulent or almost glabrous: stems 2-3 feet high, paniculately branched: leaves broadly or narrowly deltoid-cordate or the upper deltoid-lanceolate, coarsely dentate-serrate with an entire usually acuminate apex, 1-4 inches long: involucre about 40-flowered, its bracts papery and scarious when dried, the short outer ones ovate, the inner ones oblong-linear, obtuse or acutish or some exterior ones with loose subulate acuminations: pappus white; achenes sparingly setulose toward the summit. On hills along streams, Oregon to the Sierra Nevadas. Montana and Arizona.

* * Heads 3-25-flowered not over 6 lines long: pappus-bristles scabrous or not manifestly barbellate: heads sessile or short-peduncled, terminating short leafy branchlets or in axillary clusters forming a spiciform paniculate or interrupted thyrsus.

+ Involucre naked at base, all the bracts dry and chartaceous, glabrous and smooth, the outermost short and appressed, wholly destitute of green tips.

C. californicus O. Ktze. l. c. *Brickellia Californica* Gray. Minutely puberulent: stems 2-3 feet high; virgately branched: leaves ovate, obtuse, rarely subcordate, somewhat crenate-dentate, commonly an inch or less long, mostly surpassed by the small clusters of heads, these rather spicately glomerate, forming an uninterrupted strict thyrsus: involucre bracts all obtuse or the innermost linear ones abruptly acute, short outermost ones oval and ovate: heads 10-20-flowered, 4-5 lines high. On rocky banks of the Rogue River to California, Nevada and Arizona.

+ + Involucre of firmer bracts the outer with greenish and somewhat spreading tips, outermost loose and herbaceous and passing into the small leaves of the branchlets.

C. microphyllus O. Ktze, l. c. *Brickellia microphylla* Gray. Viscidly pubescent and glandular: stems 12-18 inches high, much branched from a woody base: leaves alternate, short petioled, ovate, coarsely toothed 4-7 lines long, those of the branchlets much smaller and sessile, heads small, 15-20-flowered, clustered at the end of the branchlets: involucre bracts imbricated, in many rows, outer ones ovate, herbaceous with squarrose tips, inner ones erect, lanceolate, acute: pappus scabrous: achenes slightly setulose. Eastern Oregon to California, Nevada, Colorado and Montana.

Tribe 11. ASTEROIDEÆ. Heads either heterogamous and radiate, the ligulate ray flowers feminine or rarely neutral, or homogamous with the flowers all hermaphrodite and tubular or rarely the female flowers with filiform corolla and no ligule or in Baccharis dioecious and the female corollas all filiform. Receptacle seldom paleaceous. Corolla of the hermaphrodite flowers regularly 5-lobed, rarely 4-lobed. Anthers obtuse and entire or barely emarginate at base. Style branches of hermaphrodite flowers flattened, conspicuously margined by the stigmatic lines, and extending into a hispid or papillose appendage. Pappus various or sometimes none. Leaves mostly alternate. Disk flowers usually yellow.

SUBTRIBE I. *HOMOCHROMÆ*. Disk wholly of hermaphrodite flowers, of the same color as the ray when that is present, mostly yellow:

3. *Grindelia*. Pappus of few elongated awns or rigid bristles, heads usually radiate, solitary at the ends of the branches: coarse herbs with sessile rigid mostly serrate leaves.
4. *Chrysopsis*. Pappus of numerous setose bristles both in disk and ray, manifestly double, the inner capillary, the outer very short and squamellate, low leafy stemmed perennials with sessile entire or nearly entire leaves.
5. *Ammodia*. Pappus of slender setose bristles obscurely double, the inner capillary, the outer very short and setulose or obsolete: low perennial herbs.
6. *Eriocarpum*. Pappus white or nearly so, of exceedingly unequal somewhat flattened barbellate bristles: achenes short, densely silky; low herbs with narrow sparsely dentate leaves.
7. *Pyrrocoma*. Pappus reddish-brwn or fulvous, of numerous uniform slender rigid bristles: achenes linear, elongated, somewhat turbinate, 3-angled and striate: glabrous, rigid perennial herbs with mostly radical leaves.
8. *Stenotus*. Pappus commonly bright white, of numerous soft unequal densely scabrous capillary bristles: achenes oblong-turbinate densely silky-vilous: glabrous shrubby plants with narrow entire leaves.
9. *Macronema*. Pappus of soft slender bristles: achenes slender, compressed, few-nerved: soft pubescent low and many-stemmed suffrutescent plants with thinnish sessile entire leaves.
10. *Chrysothamnus*. Pappus of soft subequal bristles: achenes narrow, not compressed: shrubby or half shrubby plants with narrow entire subcoriaceous leaves.
11. *Euthamia*. Pappus of numerous equal capillary scabrous bristles in one or more series: achenes short and turbinate: villous pubescent: perennial herbs with linear entire 1-nerved leaves.
12. *Solidago*. Pappus of numerous capillary scabrous bristles: achenes terete or angulate 5-12-nerved or costate: perennial herbs with entire or serrate leaves.

SUBTRIBE II. *HETEROCHROMÆ*. Disk flowers mostly yellow the rays white, red, purple or blue; seldom yellow.

13. *Bellis*. Pappus none: achenes obovate and compressed, nerveless except at the margins: low perennial herbs with all radical leaves.
14. *Boltonia*. Pappus of several short-setulose squamellæ and 2-4 elongated rigid awns: achenes obovate, very flat, with callous or winged margin: leafy-stemmed perennials.
15. *Townsendia*. Pappus a single series of long awns: achenes obovate or oblong, much compressed, with thickish or callous margins: depressed or low many-stemmed herbs.
16. *Sericocarpus*. Pappus of numerous unequal scabrous bristles: achenes narrow, little compressed, 2-nerved, silky-pubescent: leafy-stemmed perennials.
17. *Aster*. Pappus of numerous dull white scabrous bristles: achenes compressed: leafy-stemmed herbs with paniced or somewhat corymbose heads of flowers.

18. **Eucephalus.** Pappus copious the bristles unequal: achenes oblong, compressed, villous: perennial herbs without radical leaves.
19. **Oreastrum.** Pappus a single series of brownish scabrous barbellate bristles: achenes subterete, 5-costate: acaulescent perennials with narrow entire leaves and scapiform monocephalous branches.
20. **Machæranthera.** Pappus a single series of rather rigid unequal bristles: achenes narrowed downward, compressed, few-nerved, the faces somewhat striate: leafy-stemmed, branching biennials or annuals.
21. **Erigeron.** Pappus scanty and fragile: achenes small, mostly 2-nerved: annual or perennial herbs.

SUBTRIBE III. BACCHARIDEÆ. Heads discoid and unisexual. Corolla of the fertile flowers filiform.

22. **Baccharis.** Pappus copious, of fine and soft bristles, accrescent after flowering: achenes compressed, 5-10 costate; shrubby or herbaceous perennials.

Subtribe 1, Homochromeæ. Gray Syn. Fl. 1. Pt. 11, 52. Disk wholly of hermaphrodite flowers, of the same color as the ray when that is present, mostly yellow: these corollas tubular with more or less amplified throat and 4-5-lobed limb. Receptacle not chaffy, flat or merely convex. Involucre closely imbricate, mostly in several series.

3 GRINDELIA Willd. Mag. Nat. Berl 1807, 259. (GUM PLANT.)

Perennial biennial or suffrutescent plants with entire or serrate, somewhat pellucid-punctate or reticulate leaves the radical ones usually spatulate; the cauline sessile or partly clasping; and middle-sized or large heads of yellow flowers terminating the branches. Herbage balsamic-viscid. heads many-flowered. Involucre hemispherical or subglobose; the scales imbricated, in several series. Receptacle flat, foveolate. Corolla of the ray ligulate, pistillate or neutral, in a single series (in one species wanting); of the disk tubular infundibuliform, 5-toothed, perfect; branches of the style linear, rather acute, the hairy appendages as long as the stigmatic portion. Achenes obovate or oval, somewhat angled, glabrous. Pappus of 2-8 caducous nearly smooth awns or corneous bristles.

G. integrifolia DC. Prodr v, 415. Stems rather stout, 1-3 feet high, usually corymbosely branched above and bearing several or numerous heads: pubescence soft villous sometimes sparse or none; leaves of soft texture, commonly entire, sometimes serrate, cauline 3-4 inches long, mostly tapering from a broad base to an acute or acuminate apex: radical spatulate and obtuse: heads large, naked or surrounded by foliaceous bracts passing into leaves: bracts of the involucre with mostly elongated setaceous subulate points to the bracts: achenes truncate and with an irregular undulate or obscurely 3-5 toothed border around the terminal are la; pappus awns stout, flattish. Along swales and ditches. British Columbia to Oregon west of the Cascade Mts. Flowering in summer.

G. Hendersoni Greene Pitt ii, 18. Flowering stems erect, a foot high, sparsely hirsute: leaves (on sterile basal branches) 6-8 inches long, blade oblanceolate, closely dentate or serrate, tapering to a

winged petiole of its own length, heads large, the involucre bracts squarrose and very glutinous, achenes neither angled nor striate, the terminal border low and entire; awns of the pappus 2 or 3, flattened and corneous, barbellate along the edges. Dry rocky banks of Lummi Island northern shore of the Gulf of Georgia. *Henderson.*

G. Oregona Gray Syn. ii. 1, Pt. 11, 118. Stems rather stout and tall, branched above, leaves thickish not rigid, sparsely denticulate or entire, mostly obtuse, oblong, spatulate or ligulate, or the upper lanceolate, the larger 4 inches long by an inch wide, whole herbage glabrous: heads large, bracts of the involucre with erect or spreading slender linear-subulate tips; achenes squarely truncate and even at the summit, not bordered nor toothed, minutely striate; awns of the pappus 1-3. In dry soil, Oregon to Idaho

G. nana Nutt. Trans. Am. Phil. Soc. viii, 314 Stems rather slender, 6-30 inches high, the larger plants corymbosely and fully branched above, herbage wholly glabrous: leaves thinnish, lanceolate to linear or the lower spatulate, entire or spinulose serrate heads 5-6 lines high: bracts of the involucre with slender and squarrose soon revolute tips; achenes narrow, excisely truncate or bidentate, at summit: awns of the pappus mostly 2. On dry hillsides. Washington to California.

G. discoidea Nutt. l. c. 315 Whole herbage glabrous. stems slender, several from the same root, fastigiately branched, leaves oblong-linear, tapering to the base, sessile, somewhat spinulose serrulate above: heads 5-7 lines high almost globose: scales of the involucre with short subulate squarrose recurved tips: rays none, achenes auriculate bordered at the summit; pappus of 2 bristles. On dry banks of the Columbia river east of the Cascades.

4 CHRYSOPSIS Elliot Sk. 11 333.

Mostly perennial herbs with oblong or linear usually entire sessile leaves and middle-sized heads of yellow flowers terminating the stem and branches. Heads many-flowered, radiate. Scales of the involucre linear imbricated: receptacle somewhat alveolate, flat. Corolla of the ray flowers ligulate, pistillate, in a single series disk corollas tubular, 5-toothed, perfect: Style branches mostly terminated by linear or linear-subulate hispid tips, often longer than the flat stigmatic portion. Achenes obovate or linear-oblong, compressed. Pappus of the disk and ray similar, double, the outer short squamellate-setose or somewhat chaffy, the inner of numerous scabrous capillary bristles.

C. villosa Nutt Hook Fl. ii 22. Stems 1-2 feet high, villous-pubescent and sparsely hirsute, erect, simple or corymbosely branched, very leafy: leaves one inch or more long, 1 nerved slightly veiny, canescently strigose on both sides, mucronate, entire or rarely with a few sharp scattered teeth, hispidly ciliate toward the base, the upper linear-oblong, the lower oblong-spatulate: heads solitary or somewhat corymbose at the ends of the branches, on short peduncles: scales of the broadly campanulate involucre linear-subulate, strigosely pubescent; achenes obovate, villous; exterior pappus setose squamellate. Dry plains and river bars. Oregon to Ill. and the Saskatchewan.

C. hirsuta Greene, Pitt. iii. 296. "Low, slender, the tufted and leafy stems only 6 or 8 inches high, very leafy and the leaves ascending

spatulately oblanceolate, acute, green and granular-glandular beneath a sparse rather stiffly hirsute pubescence, the leafy bracts subtending the 2 or 3 subsessile heads hirsute-ciliate, as are also the small outer bracts of the turinate involucre, the others merely granular viscidulous: rays very few (about 5 to 8), deep yellow: pappus with an outer series of short very narrow paleæ Banks of Hangman Creek, near Spokane, Washington. C. V. Piper."

5. AMMODIA Nutt. Trans. Am. Phil. Soc. n. Ser. vii 321.

Somewhat viscid and pubescent perennials with entire leaves and middle-sized heads of yellow flowers terminating the stem and branches. Heads many-flowered; the flowers all perfect and tubular. Scales of the campanulate involucre scarious-membranaceous, 1-nerved, imbricated in few series, the outermost shortest, Receptacle flat, alveolate-toothed. Branches of the style subulate-filiform, the appendages longer than the stigmatic portion. Achenes fusiform or somewhat compressed, pubescent. Pappus of copious minutely scabrous capillary bristles.

A. oregana Nutt. l. c. *Chrysopsis Oregana* Gray. Stems a foot high, many from the same root, paniculately branched. leaves alternate, oblong, entire, veiny, sessile: peduncles somewhat glandular; heads irregularly paniculate corymbose: scales of the involucre linear or lanceolate, 1-nerved, the innermost as long as the flowers, the outermost short and appressed: corollas all similar, slender, slightly dilated upwards, 5-toothed, pale yellow nearly hid in the copious white pappus. On gravelly bars along streams, Washington to California.

6 ERIOCARPUM Nutt. Trans. Am. Phil. Soc. vii, 321.

Perennial or annual herbs with spinulose-dentate leaves and (in ours) rayless heads of yellow flowers. Heads many-flowered: involucre hemispherical, its bracts rigid appressed-imbricate with the outer successively shorter, all with abrupt and more or less spreading herbaceous tips. Disk corollas narrow merely 5-toothed. Achenes densely silky, mostly short and turbinate. Pappus white, of very unequal usually short and somewhat flattened awnlike barbellate bristles.

E. grindelioides Nutt. l. c. *Aplopappus Nuttallii* T. & G. Cinereous-tomentose, becoming glabrate in age: stems 6-12 inches long, numerous from a woody caudex: leaves from spatulate oblong to almost lanceolate, rather sparsely pectinately dentate: heads few, terminating the branches, 8-10 lines high: involucre hemispherical, its bracts rather few ranked, and with slightly spreading greenish tips: style appendages oblong-lanceolate. Idaho to the Saskatchewan, New Mexico and Arizona.

7 PYRROCOMA Hook. Fl. 1, 306.

Perennial rigid herbs with simple stems, coriaceous alternate leaves and showy heads of yellow flowers terminal or in the axils of the upper leaves. Heads many-flowered, radiate. Bracts of the hemispherical or campanulate involucre rigid, somewhat foliaceous, nerveless, oblong with more or less squarrose or herbaceous tips. Receptacle flat, alveolate-toothed. Ray-flowers num-

erous, pistillate, sometimes infertile or inconspicuous: disk-flowers cylindrical, slightly dilated upward, with short erect teeth. Style-branches of the ray-flowers often unequal, or one of them abortive, glabrous: those of the disk-flowers subulate-linear, elongated, the hispid appendages much longer than the stigmatic portion. Achenes linear, elongated, somewhat 3-angled and striate glabrous or rarely hairy. Pappus reddish-brown or fulvous, of copious and uniform slender rigid bristles

* Heads large and discoid the sterile rays being hardly apparent or very small for the size of the head: achenes glabrous and smooth, slender but flattish, 4-costate or nerved often finely striate

P. carthamoides. Hook. Fl. i, 306. t. 107. Stems rigid several from the same root, 6-12 inches high, leafy, scabro puberulent when young, becoming smooth, bearing a solitary terminal large head and sometimes one or two in axils: leaves from spatulate to oblong or lanceolate: coriaceous, sparingly spinulose-serrulate the lowest 3-4 inches long, tapering into slender petioles: involucre hemispherical, 6-10 lines high, often leafy-subtended at base, its proper bracts coriaceous rigid, from oblong to broadly lanceolate or the innermost linear, more or less scarious-margined, most of them tipped with an abrupt mucro or cusp, the outer commonly loose and becoming leaf-like either entire or spinulose-denticulate: rays almost always present and rather numerous but their ligules inconspicuous, being short involute and concealed in the pappus. On plains and rocky hillsides; British Columbia to Oregon and Idaho.

P. radiata Nutt. Trans. Am. Phil. Soc. n. ser. vii 333. Whole plant glabrous: stem stout, 12-18 inches high: leaves thick, the radical and lower cauline obovate-oblong, the lowest 3-6 inches long by 2 inches broad, petioled, the upper cauline ovate-lanceolate or oblong: heads usually several and somewhat corymbose, an inch high and broad, bracts of the involucre numerous, broad or broadish: rays very narrow, exerted but inconspicuous: achenes 4 lines long, about the length of the rigid expanding pappus, the bristles of which are barbellate-scabrous. Dry plains near Walla Walla, Washington

P. usickii Greene Eryth. ii, 59 *Aplopappus carthamoides* Var. *Cusickii* Gray. Stems 6-18 inches high ascending few-leaved: leaves mostly spatulate-lanceolate: heads comparatively small and few-flowered, terminal and subterminal: bracts of the involucre rather few, lanceolate, mostly acute or acuminate. Union County, Oregon *Cusick*.

* * Heads middle-sized to small, evidently radiate: the exerted rays often infertile but styliferous

P. racemosa T. & G. Fl. ii, 244. Stems glabrous, 12-18 inches high, bearing 3-7 racemose heads at the summit: leaves glabrous, lanceolate, slightly spinulose-serrate, the upper acute, oblong-lanceolate, partly clasping, the lower tapering to the base, somewhat petioled: heads hemispherical, less than an inch in diameter: involucre imbricated, in 3 series its ovate oblong scales pubescent; ray-flowers conspicuous and fertile: disk corollas shorter than the pappus: achenes sparsely hirsute. Plains of the Columbia.

* * Heads obovoid, sessile and often clustered: involucre as long as the disk, the scales linear-oblong, with short distinct herbaceous tips imbricated in several series: achenes glabrous.

P. paniculata T & G l. c. Glabrous. Stems a foot high, branched at the summit: leaves oblong-lanceolate, mucronate, obscurely and remotely

serrulate, the cauline partly clasping: heads numerous, 6-8 lines high, sessile and somewhat clustered along the branches: bracts of the involucre oblong, obtuse, mucronate: rays 10-12, slender: achenes slightly hairy toward the summit. Plains of the Columbia near Walla Walla, Washington

P. arguta T & G l c. Glabrous. Stems 10-12 inches high: leaves spatulate-lanceolate, somewhat acuminate, sharply serrate, the cauline partly clasping: heads axillary and terminal, clustered, sessile, bracts of the involucre lanceolate, acute: rays 10-12, usually infertile. Plains of the Columbia near Walla Walla, Washington.

P. glomerata T & G l. c. Glabrous. Stem simple or branched: leaves oblong lanceolate or the lower spatulate lanceolate; very acute, mostly entire, the cauline partly clasping: heads 6 lines long, nearly as broad, clustered and disposed in an interrupted spike: rays 8-10, usually fertile. Plains of the Columbia near Walla Walla, Washington.

P. congesta Greene Pitt. iii, 2: Glabrous throughout except a scanty pubescence about the inflorescence: stems rather slender, 1-30 inches high, several from the thick ligneous root, ascending, simple, leafy below, fliferous from below the middle: radical leaves lanceolate, acute at both ends, entire, the blade 3-4 inches long, on a slender petiole as long; cauline smaller, tapering to a small winged petiole. Heads clustered in the axils of all the reduced cauline leaves: involucre campanulate, 4-5 lines high, its bracts rigid oblong, 3-nerved, with acute green tips: pappus tawny, of coarse very unequal bristles: only the outer disk flowers fertile, the achenes of these oblong, appressed pilose: abortive achenes of ray and inner disk densely silky-pubescent. On dry hillsides, western base of the Coast mountains near Waldo, Oregon.

P. hirta Greene Eryth. ii, 69 *Aplopappus hirtus* Gray. Hirsutely pubescent and villous, even to the involucre, or at base lanuginose: stems 8-12 inches high, rather simple ascending, bearing few or scattered pedunculate heads: leaves membranaceous, pectinately serrate with long and salient slender-subulate teeth: cauline an inch or two long: radical sometimes 4 inches long and with margined petioles: involucre hemispherical, half inch or more high, its bracts rather loose, linear, acuminate or acute, all about equalling the disk, the outer mainly foliaceous: rays 20 or more conspicuous: achenes rather short, sericeous-pubescent: pappus whitish. Astern:regon and Washington

P. Howellii Greene l. c. 70 *Aplopappus Howellii* Gray. Sericeous-tomentose: stems 6-1 inches long ascending branching from the base: leaves all narrowly lanceolate, acute, entire or rarely denticulate: heads solitary, terminating the stem and branches, rather few-flowered involucre 6-10 lines high, its bracts linear, rather obtuse, all of equal length: rays conspicuous; style appendages long and slender: achenes oblong linear, nearly as long as the rigid pappus, pubescent. On dry ridges, Crain Creek, Eastern Oregon.

P. lanceolata *Aplopappus lanceolatus* T. & G. Stems 6-24 inches high at first lanuginose, at length nearly glabrous: leaves coriaceous the radical and lowest cauline lanceolate, acute irregularly spinulose-toothed, petioled: the upper small and bract like, linear-lanceolate, partly clasping: heads 2-5: involucre hemispherical, its bracts lanceolate-oblong, chartaceous, unequal, imbricated: rays 2-25 pistillate: style appendages lanceolate acute about the length of the stigmatic portion: achenes silky. Idaho to British Columbia and the plains of the Saskatchewan.

P. Hallii *Aplopappus Hallii* Gray. Glabrous throughout: stems 12-20 inches high, paniculately branched from a suffrutescent or even more woody base, very leafy: leaves lanceolate or linear, 8-12 lines long by 2-3 lines broad rather rigid, mostly scabrous on the margins, midrib promi-

ment beneath: heads paniculate, terminating short branchlets or sometimes rather congested: involucre obovate, 4-5 lines high, its bracts broadish-linear, imbricated in several ranks, the outer successively shorter, the short tips merely mucronate-acute: rays about 10: style appendages lanceolate, rather obtuse, about as long as the stigmatic portion: pappus barely sordid. Base of the Cascade Mountains of Oregon and Washington.

P. tenuicaulis *Aplopappus tenuicaulis* Eaton Bot. King. 16. Silky-tomentose or at length nearly glabrous stems 6-15 inches long, very slender, curved and ascending from a fusiform caudex: leaves all narrowly lanceolate, rather rigid, the radical 2-3 inches long, 2-3 lines wide, entire or sparingly denticulate, narrowed into a very short petiole; cauline ones sessile by a dilated base: heads small, 2-6, racemose, on slender peduncles: involucre hemispherical, the broadly oblong scales tomentose on the back and rather obtuse rays about 20: disk-flowers numerous: style-branches linear-lanceolate, hispid, twice as long as the stigmatic portion: achenes silky-villous; pappus white, of unequal almost plumulose capillary bristles. In alkaline meadows, Eastern Oregon to Nevada.

8 STENOTUS Nutt, Trans. Am. Phil. Soc. vii, 334.

Dwarf herbaceous plants with linear or lanceolate 1-3-nerved rigid persistent entire alternate or crowded leaves and middle-sized heads of yellow flowers. Involucre hemispherical, its scales oblong-ovate to orbicular, 1-nerved, membranaceous with scarios margins, of equal or moderately unequal length, closely appressed and imbricated. Receptacle flat, alveolate-toothed. Heads many-flowered, radiate. Rays 8-12, ligulate, pistillate, oval to oblong: disk corollas perfect, dilated toward the summit, deeply 5-toothed, Style branches broad and flat with the pubescent appendages various in form. Achenes oblong-turbinate, densely silky villous. Pappus commonly bright white, of numerous soft unequal densely scabrous capillary bristles.

S. Lyallii *Aplopappus Lyallii* Gray. Viscid puberulent: stems 6-12 inches high, equally leafy up to the head: leaves obovate-spatulate to oblanceolate: heads solitary at the ends of the stem or branches, radiate: involucre hemispherical 6 lines high, glandular, its bracts acute, sometimes 2 or 3 of the outermost oblong and more foliaceous: rays 15-20, conspicuous: style appendages not longer than the stigmatic portion: achenes and ovaries glabrous or nearly so. Alpine region of eastern Oregon to British Columbia, Montana and Colorado.

S. lanuginosus Greene Eryth. ii, 72. *Aplopappus lanuginosus* Gray. Floccose-tomentose: stems 8-10 inches high from creeping root-stocks, leafy: leaves soft, narrowly spatulate or the upper linear, the sparse uppermost almost filiform, 1-2 inches long: heads solitary, terminal, radiate, many-flowered: involucre 6 lines high; its bracts lanceolate, acute or acuminate thin, nearly equal in 2 series. outer barely greenish: style appendages elongate-subulate: achenes sericeous-canescens. Alpine in the mountains of eastern Oregon and Washington to Montana.

S. Brandegei. *Aplopappus Brandegei* Gray. Stems 8-10 inches high from a tufted caudex, cinereous-pubescent or puberulent, and the involucre lanuginose-tomentose: radical leaves obovate or spatulate or roundish, 6-8 lines long, contracted into a slender petiole; cauline few and sparse, small, 3 lines long, oblong or lanceolate: involucre 3-4 lines high, its lanceolate bracts loose, nearly equal: style appendages triangular-subulate: young achenes hirsute-pubescent: pappus rather scanty. Mountains of Washington in the Yakima district.

S. acaulis Nutt. Trans. Am. Phil. Soc. vii, 334. *Aplopappus acaulis* Gray. Depressed-cespitose from a multicapital lignescens caudex: leaves rigid and persistent, crowded on the crown of the caudex and a few on the scapiform flowering stems, from spatulate to oblanceolate or linear, $\frac{1}{2}$ -3 inches long mucronate more or less 3-nerved commonly scabrous: scapiform flowering stems 1-10 inches high: heads mostly solitary, many-flowered, radiate: bracts of the involucre from ovate to ovate-lanceolate, mucronately acute or acuminate, destitute of greenish tips the outer a little shortest: style appendages subulate: achenes canescently villous. Dry rocks on the mountains at 6000-8000 feet, eastern Oregon to California and Saskatchewan.

S. stenophyllus Greene Eryth. ii, 72. *Aplopappus stenophyllus* Gray. Hirtellous-scabrous; suffruticulose spreading: stems numerous 1-3 inches long: leaves very narrow, linear-spatulate to filiform, 6-12 lines long 1-nerved persistent: scapiform peduncles 1-2 inches long: heads solitary, radiate: involucre 6 lines high, its bracts linear, equal, in 1 or 2 series glandular puberulent: style appendages subulate: achenes canescently villous. On rocky ridges, eastern Washington to northeastern California and Idaho

9 MACRONEMA Nutt, Trans. Am. Phil. Soc. vii, 322.

Low and viscidly-pubescent much branched shrubby plants, the fastigiate leafy branches terminated by solitary rather large heads, with entire sessile leaves and yellow flowers. Heads many-flowered, the rays 6-8, ligulate, pistillate, or none: disk-flowers tubular, perfect. Bracts of the involucre few, loose, somewhat in two series, nearly equal, linear-lanceolate, 1-nerved, the exterior mostly with foliaceous spreading tips, commonly with one or more foliaceous bracts at the base resembling the upper leaves. Receptacle flat, areolate. Branches of the style much exerted, the appendages elongated, subulate, hirsute, much longer than the flat stigmatic partion. Achenes large, much compressed. Pappus of copious somewhat unequal scabrous capillary bristles.

M. suffruticosa Nutt. l. c. *Aplopappus suffruticosus* Gray. Stems 6-8 inches long from a low woody base, leafy to the summit: leaves oblong-linear to lanceolate, acute, somewhat narrowed toward the base, 12-18 lines long by about 2 lines broad: heads mostly solitary, terminating the branches: involucre simple and loose, 8-10 lines high, its bracts mostly with foliaceous tips: ray-flowers 2-3 linear-oblong, pistillate: achenes oblong or slightly obovate, flat, 1-3-nerved on each side: pappus ferruginous. In the mountains of eastern Oregon to California and Wyoming

M. molle Greene Eryth ii, 73. *Aplopappus Greenei* var *mollis* Gray. Cinereous-pubescent to canescent-tomentose, even to the involucre: branches about a foot high from a shrubby base: leaves somewhat lanceolate, 6-12 lines long, 2-3 lines broad: heads solitary or few and crowded, 6 lines high bracts of the involucre in about three series, lanceolate, all more or less foliaceous: rays 2-7, 3-4 lines long: disk flowers 10-16. In the mountains of eastern Oregon and Washington.

M. Greenei Greene l. c. *Aplopappus Greenei* Gray. Glabrous or above very obscurely viscid-puberulent, about a foot high, branching from a shrubby base: leaves spatulate-oblong to somewhat lanceolate, 6-12 lines long, 2-3 lines broad, obtuse or mucronate: heads solitary or few and crowded, half inch high: bracts of the involucre in about 3 series, lance

ovate to linear, all but the innermost with conspicuous and spreading mostly elongated-subulate foliaceous tips: rays 2-7, 3 or 4 lines long: disk-flowers 10-16. Achenes soft-pubescent. In the mountains of eastern Oregon and Washington to California.

10 CHRYSOTHAMNUS Nutt. Trans Am. Phil. Soc. viii, 323.

Perennial herbs or suffruticose plants with linear or oblong sessile alternate leaves and rather small corymbose heads of yellow flowers. Heads 5-flowered, rarely 6- or 7-flowered involucre campanulate, its bracts imbricated mostly concave or carinate, dry and chartaceous, destitute of green tips. Receptacle flat, alveolate-toothed, the teeth fleshy or somewhat lacerate. Corolla narrow. Style branches with exserted subulate or setaceous-filiform appendages. Achenes slender somewhat compressed, silky villous. Pappus simple, of copious capillary bristles.

C. pumilus Nutt. Trans. Phil. Soc. vii, 323. *Bigelovia Douglasii* var *pumila* Gray. Branches erect, numerous, 6-10 inches high, glabrous, very leafy: leaves an inch long or more, glabrous slightly glutinous, narrowly linear, very acute, 3-nerved, often involute or occasionally somewhat twisted: involucre 2-3 lines high the bracts not very distinctly 4-ranked, the outer short, ovate-lanceolate, the inner oblong-linear, not acute, faintly carinate. Dry plains eastern Washington to Montana and Utah.

C. puberulus Greene Eryth. iii, 93. *Bigelovia Douglasii* var *puberula* Gray. Puberulent to almost hispidulous throughout: branches numerous, 6-10 inches high, very leafy: leaves narrowly linear very acute 10-15 lines long, 3-nerved: involucre 2-3 lines high, the bracts 4-ranked, the outer ovate-lanceolate, the inner oblong-linear. On desert plains, Idaho to Utah and Nevada.

C. viscidiflorus Nutt. l. c. 324, *Bigelovia Douglasii* Gray. Shrub 2-6 feet high, fastigiately branched: leaves 2 inches long, narrowly linear, very acute, rather firm, 3 nerved, their margins more or less distinctly serrulate scabrous: heads numerous, in an ample fastigiate terminal corymb, 3-4 lines high: bracts of the involucre linear-oblong, abruptly acute, 2-4 in each vertical rank. Plains of the Columbia.

C. speciosus Nutt. l. c. *Bigelovia graveolens* Gray in part. Shrub 2-4 feet high with rather slender stems terminated by an ample rather open cymous corymb of yellow flowers: leaves very narrowly linear and branches of the inflorescence minutely white-tomentose: bracts of the involucre firm acutish, not ciliate tomentose on the back, at least near the tip, in 3-4 vertical ranks: tube of the corolla slender, almost glabrous, the limb rather deeply 5-lobed. Dry plains Washington to California and Idaho.

var albicaulis Nutt. l. c. Stems and branches densely lanate-tomentose: tube of the corolla clothed with long villous or somewhat arachnoid hairs. Idaho.

C. nanus *Aparganum nanus* Eaton. A low branching heath-like shrub 3-8 inches high, glabrous and somewhat glutinous: leaves crowded, 3-6 lines long, linear-spatulate, rigid channelled, acute and with minute leaves fascicled in their axils: heads small, corolla imbed; involucre turbinate, of numerous lanceolate carinate chartaceous bracts with scarious margins, very acute the outer ones small and passing into the leaves: rays 4-6, disk-

flowers 8-9 as long as the rays; branches of the style linear-subulate, the hirsute appendages much longer than the stigmatic portion. Plains of the higher mountains, Washington to Nevada, Idaho and Utah.

C. Bloomeri Greene Eryth, iii, 115 *Aplopappus Bloomeri* Gray. A shrub 1-2 feet high with numerous slender virgate branches, glabrous, more or less glutinous, leafy to the top: leaves narrowly linear with tapering base, or spatulate-linear, mucronate, scarcely punctate, 1-2 inches long: heads narrowly paniced or corymbed, leafy-bracted, 8-10 lines high 10-25-flowered: bracts of the oblong cylindraceous involucre imbricated in 3 or 4 ranks, chartaceo-coriaceous with a greenish midrib and scarious margins, the inner linear-oblong, thinner and villous-ciliate, obtuse, a little shorter than the disk; the outer shorter and abruptly tipped with a subulate foliaceous appendage: rays 1-4 or none, oblong, conspicuously exerted: style-appendages subulate-filiform, much exerted: achenes linear, finely pubescent. Dry ridges of the higher mountains of British Columbia to California and Nevada.

C. resinosus *Ericameria resinosus* Nutt. Shrubby, 6-8 inches high, very much branched, glabrous, becoming very glutinous, leafy: leaves filiform-linear, about an inch long, acute, tapering to the base, mostly with some very short ones fascicled in their axils: heads loosely corymbose, 5 lines high, 8-12 flowered: bracts of the involucre lanceolate, acute: achenes hirsute when young. On shelving rocks in the Blue Mountains of Oregon.

11 SOLIDAGO Vaillant. (GOLDEN ROD)

Perennial herbs with mostly simple strict or virgate stems, sessile alternate cauline leaves and small yellow flowers in ample terminal panicles. Heads few to many-flowered, mostly radiate; disk-flowers tubular, perfect. Bracts of the involucre imbricated, appressed, destitute of foliaceous or herbaceous tips. Receptacle narrow mostly alveolate. Appendages of the style lanceolate. Achenes somewhat terete, many ribbed. Pappus simple, of numerous scabrous capillary bristles.

S. confertiflora DC. Prodr. v. 339. Stems simple, leafy to the thyrsus, 1-3 feet high, glabrous, angular above: leaves oval-lanceolate, or oblong-lanceolate, serrate at the apex, entire below, the lower 3-4 inches long by 6 lines broad, the radical attenuated into long petioles: upper part of the stem and inflorescence resinous: heads numerous, in an elongated compound thyrsus, 8-15-flowered: bracts of the involucre linear, erect: rays few and small. On gravelly plains British Columbia to Oregon.

S. hesperius *S. humilis* var. *nana* Gray. Stems erect, 2-10 inches high, leafy to the inflorescence; leaves spatulate to obovate, 1-2 inches long: heads few in a close glomerule or more numerous in a spiciform thyrsus: bracts of the involucre oblong-linear: achenes pubescent. On the highest peaks of the Cascade and Rocky mountains.

S. Tolmieana Gray Syn. Fl. i pt. ii 151. Low, a foot or less high, leafy up to the short and rather broad inflorescence of spiciform somewhat corymbosely disposed clusters: leaves thickish and veins very inconspicuous, linear or lanceolate (2 or three inches long), entire, rarely with some minute serratures, the margins usually scabrous-ciliate, glabrous and smooth: heads about 10 lines high crowded in thyrsoid inflorescence, not secund: involucrel bracts lanceolate acutish, thin: rays rather small 8-15: achenes pubescent. Oregon and Washington to Idaho.

S. Missouriensis Nutt. Journ. Acad. Philad. vii. 32. Smooth and glabrous: stems a foot or more high, simple or sometimes fastigiately branched at the summit: leaves rigid, crowded, often fasciated in the upper axils, linear-lanceolate, acute, with very scabrous margins, the lower tapering to the base, sharply and sparsely serrulate toward the apex: the radical oblong-spatulate, petioled, 3-5-nerved, reticulated, the uppermost entire and scarcely if at all nerved: racemes rather dense, slender at length recurved-spreading, forming a short and crowded pyramidal panicle: bracts imbricated: rays 6-10, rather short, achenes slightly pubescent. Dry prairies, Idaho to the Assiniboine and the southeastern states.

S. serotina Ait. Hort. Kew. iii. 211. Stems stout, 2-8 feet high very smooth and glabrous up to or near the ample secund panicle: leaves lanceolate or broader, 3-10 inches long, sharply and saliently serrate, glabrous both sides: heads very numerous, crowded: rather large and full, 3 lines high: bracts of the involucre broadly linear-oblong or linear: rays 7-14, conspicuous achenes more or less pubescent. In rich alluvial lands, Oregon to British Columbia and eastward.

S. elongata Nutt. Trans. Am. Phil. Soc. xii, 327. Stems rather slender, 2-4 feet high, smooth or minutely pubescent, strict: leaves lanceolate, acute or acuminate at both ends, sparingly serrate, nearly glabrous, obscurely 3-nerved: panicle elongated, virgate or narrowly pyramidal, 6-10 inches long, the racemes at length somewhat spreading: bracts of the involucre linear subulate: rays small and slender: achenes pubescent. Common in dry grounds, British Columbia to California.

S. Californica Nutt. l. c. Stems rather stout, 2-4 feet high canescently puberulent or pubescent: leaves oblong or the upper oblong-lanceolate and the lower obovate, obtuse or apiculate, entire or the lower with some small teeth, canescently puberulent or beneath more pubescent: panicle virgate, 4-12 inches long, dense, the racemiform clusters erect or barely spreading in age, when elongated mostly secund and even with the apex at length recurved, heads 3-4 lines long: bracts of the involucre lanceolate oblong or oblong-linear, mostly obtuse, externally somewhat puberulent: rays 7-12 fewer than the disk-flowers: achenes minutely pubescent. Dry grounds, southern Oregon to California, the borders of Nevada and Mexico.

12 EUTHAMIA Cass Dict. xxxvii, 471.

Erect scabrous perennials with narrow alternate leaves and numerous small heads of yellow flowers in terminal corymbose panicles. Heads many-flowered, the ray flowers more numerous than those of the disk, and never surpassing them in height. Receptacle fimbriate, or the alveoli pilose. Achenes villous-pubescent, short and turbinate.

E. occidentalis Nutt Trans. Am. Phil. Soc. vii, 326. Stems numerous from extensively creeping rootstocks, 2-6 feet high, loosely branched, the branches terminated by small clusters of mostly pedicellate heads: leaves numerous, linear, entire, smooth, usually 3-nerved, the margins obscurely scabrous: bracts of the involucre linear-lanceolate, acute: rays 16-20; disk flowers 8-14: alveoli of the receptacle pilose.

Subtribe ii. Heterochromæa Gray. *Syn. Fl. i p. 2 54.* Ray flowers blue, red or purple to white, or by yellow or wanting in certain species. Disk of hermaphrodite and mostly fertile flowers, their

corolla yellow or rarely cream-color, sometimes changing to purple.
Receptacle naked.

13 BELLIS L. (DAISY)

Ours low perennial herbs with spatulate leaves and solitary heads of various colored flowers terminating simple scapes. Heads many-flowered, the ray-flowers pistillate, in a single series, those of the disk tubular and perfect. Involucre campanulate, its bracts somewhat in a double series, foliaceous, herbaceous or somewhat membranaceous, equal. The receptacle conical, slightly alveolate. Branches of the style tipped with a short triangular appendage. Achenes obovate, compressed, slightly hairy or hispid. Pappus none.

B. PERENNIS L. Sp. 1248. Leaves all radical: spatulate-obovate, crenately dentate, obscurely 3-nerved, 1-2 inches long. heads large terminating simple scapes: bracts of the involucre oblong, obtuse, somewhat foliaceous, equal: ray-flowers narrow, twice as long as the involucre. Escaped from gardens and becoming naturalized along the coast.

14 BOLTANIA L'Her. Vert. Angl. 27.

Glabrous perennial herbs with striate-angled stems, sessile entire leaves and rather showy heads of white, purple or violet flowers. Heads many-flowered, the ray-flowers numerous, pistillate, in a single series; disk-flowers tubular perfect. Scales of the hemispherical involucre imbricated, somewhat in 2 series, appressed, scarcely as long as the disk, with somewhat membranaceous margins. Receptacle hemispherical or conical, obscurely alveolate. Branches of the style linear-oblong, with very short appendages. Achenes compressed, obovate, margined with a callous wing, in the ray often 3-winged. Pappus of several setose bristles and frequently with 2-4 more or less elongated subulate awns.

B. occidentalis *B. latissima* var. *occidentalis* Gray. Stems 2-6 feet high, cymose-paniculate at summit: leaves broadly lanceolate or the upper linear-lanceolate: heads short-peduncled: bracts of the involucre oblong, obtuse: ray flowers white, 4-5 lines long: awns of the pappus present and conspicuous, the setulose squamellæ small. River-bottoms of Union county, Oregon.

15 TOWNSENDIA. Hook. Fl. ii, 16 t. 119.

Depressed or low many-stemmed herbs with from linear to spatulate entire leaves and comparatively large heads, of from violet or rose purple to white ray-flowers. Involucre broad, many-flowered, imbricate: the bracts lanceolate, with scarious margins and tips, outer usually shorter and inner more membranaceous. Receptacle broad, merely areolate, flat. Style-appendages lanceolate. Achenes obovate or oblong much compressed and with thickish or mostly callous margins, those of

the ray sometimes triangular. Pappus a single series of long awns or of coarse and rigid bristles or in the ray reduced to squamellæ or paleæ.

T. Barryi Eaton Am. Bot. v. viii, 212. Stems erect, stout, naked and pedunculiform above, 2-6 inches high, the taller forms sometimes branching: leaves mostly spatulate: bracts of the very broad involucre lanceolate, thinish, with rather soft attenuate tips or the outer barely acuminate: achenes narrowly obovate canescently pubescent the hairs simple or many of them 2-dentate at tip. Pappus of ray-flowers plurisetose, like that of the disk. Idaho to Wyoming and Montana.

T. florifer Gray Proc. Am. Acad. xvi, 84. Cinereous-hirsute: stems rather slender, 4-10 inches long, leafy: leaves linear or the lowest lanceolate-spatulate, acute, mostly apiculate-acuminate: heads rather large, pedunculate: bracts of the involucre linear-lanceolate not prominently acuminate nearly equal: achenes oblong-obovate, pubescent: pappus of numerous setose barbellulate bristles. On sandy banks and arid plains of the Columbia.

16 SERICOCARPUS Nees Ast. 148.

Perennial herbs with alternate commonly entire and sessile leaves, and small heads of white flowers usually fascicled in a terminal compact cyme. Heads 12-15-flowered, the rays about 5, distant. Bracts of the obovate-oblong or turbinate-cylindrical involucre closely imbricated in several series, nerveless or obscurely 1-nerved, the lower portion cartilaginous, appressed, the apex herbaceous, often spreading. Receptacle small, alveolate, the alveola toothed or lacerate ciliate. Appendages of the style lanceolate-subulate, minute and hispid, longer than the stigmatic portion. Achenes obpyramidal, short, densely silky. Pappus simple, composed of rather numerous and rigid unequal scabrous bristles, some of them thickened upward.

S. rigidus Lindl. Hook. Fl. ii, 14. Minutely scabrous: stems slender, 1-2 feet high, mostly simple, leafy: leaves rigid, oblong spatulate obtuse, often mucronate, entire, somewhat 3-nerved, the margins ciliate-scabrous 10-12 lines long: heads about 15-flowered, clustered in small compact corymbs: bracts of the turbinate involucre narrowly oblong or linear, 1-nerved, the inner ones about equalling the disk, somewhat scarious: the outer shorter and with somewhat squarrose greenish tips: rays but little if at all exerted achenes when mature about half as long as the white pappus, slender, not very densely silky. On dry ridges Oregon and Washington to the Sierra Nevada in California.

S. Oregonensis Nutt. Trans. Am. Phil. Soc. vii, 302. Nearly glabrous: stems rather stout, 2-3 feet high, corymbosely branched above: leaves broadly lanceolate, acutish entire 1-nerved, scabrous 1-2 inches long by 6 lines broad, thickish, narrowed below: heads about 15-flowered, clustered in small compact corymbs: bracts of the turbinate involucre oblong-linear 1-nerved: rays conspicuously exerted: achenes slender, fully half as long as the white pappus, slender, not very densely silky. On dry or gravelly plains western Oregon and Washington.

17, ASTER Tourn. Inst. 174. L. Gen. n. 954.

Perennial, or rarely annual herbs with alternate entire or serrate leaves and racemose paniculate or corymbose heads of flowers with white, purple or blue ray, and yellow, often changing to purple, disk corollas. Heads many flowered; the ray-flowers in a single series, not very numerous, pistillate; those of the disk tubular, perfect. Bracts of the involucre more or less imbricated, usually with herbaceous or foliaceous tips. Receptacle flat or convex, naked. Appendages of the style (in the disk-flowers) lanceolate or subulate, acute, rarely triangular. Pappus simple; of numerous, often unequal, scabrous capillary bristles. Achenes usually compressed.

* Involucre well imbricated: the bracts appressed and coriaceous with short and abrupt mostly obtuse herbaceous or foliaceous, spreading tips: achenes narrow, 5-10-nerved: rays showy, blue or violet: leaves of firm texture, more or less scabrous.

A. radulinus Gray Proc. Am. Acad. viii, 386. Rough-pubescent throughout: stems rather stout, 6-20 inches high, branching above and bearing an open corymb of middle-sized heads: leaves rigid and coriaceous, oblong or the lower obovate-spatulate, sharply serrate above, tapering below into a narrow entire base, prominently reticulate-veiny, scabrous both sides, the midrib very prominent beneath: peduncles short: involucre obconical, 4-5 lines long, its bracts rigid, appressed, lanceolate or oblong, obtuse to abruptly pointed or mucronate, more or less glandular-pubescent, the tips mostly green: rays 15-18, white to purple: achenes minutely pubescent. Dry open ground, British Columbia to California and Idaho.

A. conspicuus Lindl. Hook. Fl. ii, 7. Scabrous: stems 1-3 feet high, stout, rigid, bearing several or numerous corymbosely cymose heads, leaves rigid, ovate, oblong, or the lower obovate, acute, ample, often 4-6 inches long, by 1-4 inches broad, acutely serrate, reticulate-venulose as well as veiny: involucre broadly campanulate, about equalling the disk, 5-6 lines high, its bracts in several series, minutely glandular-puberulent or viscidulous, lanceolate, acute; the greenish tips a little spreading: rays half inch long, violet: achenes minutely pubescent. In the mountains of Eastern Washington and Idaho, to British Columbia and the Saskatchewan.

* * Involucre and usually branchlets viscidly or pruinose-glandular, either well imbricated or loose: rays showy, violet to purple: achenes mostly several-nerved and narrow: pubescence not sericeous: leaves all entire or the lower with few and rare teeth, cauline all sessile or partly clasping.

A. integrifolius Nutt. Trans. Am. Phil. Soc. n. s. vii, 291. Stems stout, simple 6-12 inches high or more, villous-pubescent, the summit and the simple corymb glandular and viscid: leaves of firm texture, oblong or spatulate, or the upper ones lanceolate, the larger ones 4-7 inches long, sometimes obsoletely repand-serrulate, apiculate, traversed by a strong midrib-venulose-reticulated, glabrate, half-clasping: lowest tapering into a long stout wing-margined petiole with clasping base: heads fully half inch high, hemispherical: involucre and branchlets viscid-glandular: its bracts few-ranked, linear, ascending, not squarrose; the outer sometimes short and rather close, commonly larger and more foliaceous, nearly equalling the inner; these equalling the disk: rays 15-25, bluish-purple, half-inch long: achenes compressed-fusiform, 5-nerved, and sometimes with intermediate nerves, sparsely pubescent: pappus decidedly rigid. Open and moist

subalpine woods and meadows in the Cascade mountains, Washington to California and Montana.

A. campestris Nutt. l. c. 293 Pruinose-puberulent and viscidulous; stems 10-15 inches high, branching: leaves linear, about an inch long by 2-4 lines broad or the lower lingulate-spatulate, mostly glabrate, same obscurely 3-nerved: involucre 3-4 lines high hemispherical, of rather few-ranked and little unequal linear, acute bracts pruinose-glandular: rays 3-4 lines long, light violet or purple. Low grounds and plains British Columbia to California, Idaho and Montana.

A. modestus Lindl. Hook. Fl. ii, 8. Merely pubescent or glabrate: stems rather slender, 2-3 feet high, simple, very leafy: leaves thinnish, lanceolate or broader, 1-4 inches long, sparingly and acutely serrate or denticulate, very acute, mostly narrowed to a sessile or partly clasping, but not auriculate base: heads hemispherical, numerous and usually thyrsoïdly or cymosely congested at the summit of the stem: bracts of the involucre loose and more or less herbaceous almost from the base, linear, attenuate, all equalling the disk: rays numerous and narrow, pale blue to violet: style appendages lanceolate: achenes hirsute. Along mountain streams, British Columbia to Oregon. Saskatchewan and Pembina.

* * Heads and inflorescence, various, radical leaves all acute or attenuate at base, not glandular nor viscid nor silky-canescenscent: achenes compressed, few nerved.

A. Geyeri. *A. laevis* Var. *Geyeri* Gray. Whole plant very smooth and glabrous: stem stout, a foot or two high, rigid: leaves from ovate or oblong to lanceolate, 4 or 5 inches long, decreasing upward to subulate bracts; radical and lowest cauline contracted below into a winged petiole; upper all with auriculate or subcordate partly clasping base: heads sparsely thyrsoïd-paniculate, on short and rigid branchlets: involucre campanulate, the whitish subcoriaceous bracts mostly attenuate-acute, with obscure green tips: rays 20-30, broadish, sky-blue to violet: achenes glabrous or nearly so, 4-5 ribbed. Valleys of Idaho to the Rocky mountains.

A. commutatus Gray Syn. Fl. i, Pt. 2, 185. Stems rather slender, 1-2 feet high, with divergent branches, cinereous or green: leaves small, all linear and entire scarcely narrowed at the abrupt, closely sessile or partly clasping base, uppermost of the branchlets passing into involucre bracts, the e mostly with obtuse tips: heads numerous, racemosely disposed, 3-4 lines high and broad: involucre of squarrose or at least spreading herbaceous obtuse or merely pointed tips: rays 20-30, white: achenes canescenscent-hirsute. On plains and river banks Eastern Oregon and Washington to Utah and Dakota.

A. chammissonis Gray Bot. Wilkes 341. Glabrous or above somewhat hirsute: stems 2-5 feet high paniculately branched: leaves lanceolate, acute entire or the larger obscurely serrate, 2-5 inches long, scabrous with sparse appressed pubescence, or glabrous, those of the flowering branchlets becoming small or minute and squarrose-spreading: heads loosely panicked, 5-6 lines high: involucre broadly campanulate or somewhat obconical; its bracts numerous and imbricated in several ranks, thickish, linear-spatulate, with short and rounded green tips, the outer successively shorter: rays 20-25 purple or violet, nearly half inch long: achenes sparsely and minutely pubescent. In moist thickets of Southern Oregon to California.

A. menziesii Lindl. Hook. Fl. ii, 12. Minutely hoary with a fine pubescence, or glabrate below; 1-2 feet high: stems and branches virgate, rigid: leaves lanceolate or linear, acute, entire, or the lower obtusely serrate, rather rigid, 1-2 inches long by 2-4 lines broad: heads racemose or panicked, 4-5 lines high: involucre campanulate, its bracts numerous and imbricated in several ranks, thickish, linear, with short usually somewhat

dilated and obtuse green tips, appressed, the outer successively shorter: rays about 20, purple or violet, nearly half-inch long: achenes compressed minutely pubescent. In Southern Oregon to California.

A. Hallii Gray Proc. Am. Acad. viii, 388. Stems slender, strict, 1-2 feet high, leafy to the top, bearing numerous, short racemously disposed flowering branches, these minutely pubescent; leaves, 1-2 inches long by 1-2 lines broad, entire, scabrous-ciliate, otherwise smooth and glabrous, neither dilated nor contracted at base: heads numerous, 3-4 lines high, somewhat racemously paniculate and crowded: involucre campanulate, glabrous; the bracts subspatulate-linear, with oval or oblong green tips, rather close and erect: rays white or whitish, 2-3 lines long. Along ditches and embankments, Willamette Valley, Oregon.

A. Fremonti Gray Syn. Fl. 1, Pt. 2, 191. Stems slender, erect, 1-2 feet high, glabrous or the upper parts soft-pubescent: leaves thinnish, the margins either quite naked and smooth or obscurely ciliate-scabrous, radical and lowest cauline oblong or oblanceolate, or somewhat obovate, 1-3 inches long, tapering into a slender margined petiole; cauline from oblong-lanceolate to linear, commonly half-clasping at base: heads solitary in the smaller specimens, several in the larger, 4-6 lines high, somewhat naked-peduncled: bracts of the involucre narrowly linear, obtuse or acutish, or the inner acute, some of the outer shorter, all loose and similiar: rays numerous, 4-6 lines long. In wet mountain meadows, Cascade mountains near Mt. Hood to the Rocky mountains.

A. occidentalis. Nutt. T. & G. Fl. ii, 164. Smooth and glabrous, or minutely pubescent below the heads, slender, 1-2 feet high; small plants simple, bearing several to numerous corymbose or paniculate heads: leaves mainly linear and narrow; cauline 1-3 inches long by 1-3 lines broad, rarely lanceolate and larger; radical, sometimes lanceolate-spatulate, with long tapering base: heads 4-6 lines high: involucral bracts narrowly- or subulate-linear acute or acutish, thinnish, loose, obviously imbricated of two or three lengths: rays light violet, 4-5 lines long. In moist meadows in Eastern Oregon and Washington to the Rocky mountains.

Var. intermedius Gray Syn. Fl. i, Pt. 2, 192. Stems slender, 1-2 feet high rather rigid; somewhat sparingly leafy, with paniculate flowering branches: radical and sometimes cauline leaves lanceolate: short outer bracts of the involucre often quite obtuse. On edge of wet mountain meadows of Washington to California.

A. Oreganus Nutt. T. & G. Fl. ii, 164. Nearly glabrous: stem rather slender, 2 feet high, paniculate branched at summit or bearing several to many, paniculate heads: leaves linear-lanceolate, entire: heads about 3 lines high; bracts of the involucre loose, the outer ones herbaceous, lanceolate, acute, not longer than the thin and narrow inner ones: rays about 2 lines long white or purplish. On wet banks of streams, Oregon and Washington to Idaho.

A. Douglasii Lindl. DC. Prodr. v, 239. Glabrous or nearly so: stems 2-6 feet high with erect or ascending branches, bearing several or numerous paniculate heads: leaves, lanceolate, 2-6 inches long, tapering to both ends, more or less petioled, commonly serrate along the middle by acute and appressed or erect teeth: heads numerous, 5-6 lines high: bracts of the involucre linear, acute, loosely imbricated, the small green tips commonly spreading outer foliaceous ones few and not dilated, often wanting: rays 20-30, violet to purple, 6-8 lines long: achenes smooth. Common along streams and river bottoms of Northern California to British Columbia.

A. foliaceus Lindl. DC. Prodr. v, 228. Smooth and glabrous or the upper part of stem tomentulose or pubescent: leaves from broadly

lanceolate to oblong or the lower spatulate, entire or nearly so, 2-6 inches long: heads 5-6 lines high, often solitary: bracts of the involucre lanceolate to linear, nearly equal, the outer conspicuously foliaceous and spreading or sometimes more imbricated and squarrose: rays violet to purple, 6-10 lines long. Along streams and in wet mountain meadows, Alaska to California and the Rocky mountains. The following varieties are perhaps good species but material is not now at hand for a thorough study of their character.

Var. frondeus Gray Syn. Fl. i, Pt. 2, 193. Stems simple or with sparing erect flowering branches, sparsely leaved: leaves comparatively ample, 4-5 inches long, the lower tapering into winged petioles, upper often with clasping base: heads solitary or few, naked-pedunculate, broad: involucre bracts linear-lanceolate, loose and not imbricate, all equalling the disk occasionally the outermost broader and leaf-like. Subalpine in the Cascade and Rocky mountains.

Var. apricus Gray, l. c. Stems clustered, ascending from tufted root-stalks, 10-18 inches high, bearing solitary or 2-3 broad heads: leaves thickish; involucre bracts all alike, somewhat spatulate-linear, obtuse or acutish: rays deep blue-violet. On dry ridges, of Mount Adams, Washington, at 6000 feet.

A. Burkei *A. foliaceus* var. *Burkei*, Gray, l. c. A foot or two high, rather stout, simple or branched above, leafy to the top: leaves thickish, very smooth, ample; upper cauline mostly oblong, and with broadly half-clasping usually auriculate base: heads solitary or several very broad: involucre of oblong or spatulate and obtuse, loosely imbricated bracts, the outer commonly shorter, or outermost sometimes more foliaceous and equaling the disk. On Simcoe mountains, Washington, to the Rocky mountains and New Mexico.

A. Eatoni. *A. foliaceus* var. *Eatoni* Gray, l. c. Rather tall, 2-3 feet high, branching: heads numerous, rather small, paniculate or glomerate: leaves rather narrow lanceolate: involucre loosely imbricate, outer and sometimes inner bracts foliaceous, erect or squarrose-spreading. In open ground or woods and along streams of British Columbia to California, Montana and Nevada.

A. militarius Greene. Minutely tomentose, at least on the underside of the leaves and the inflorescence: stems rather slender, 1-2 feet high: leaves narrowly lanceolate, 1-6 inches long, acute, narrowed below to a broad petiole, those of the branchlets small and passing into bracts: heads numerous, in close panicles, about 6 lines high, its linear-lanceolate or almost subulate bracts in several ranks, the outer successively shorter and passing into the ordinary bracts of the branchlets, all acute, the inner with distinct white margins: Rays 6-8 lines long, purple: achenes sparsely hirsute: pappus rather copious, sordid. Along ditches and small streams, Rogue River Valley, Oregon.

A. cusickii Gray Proc. Am. Acad. xvi, 99 Soft-pubescent throughout or sometimes approaching to glabrous: stems 1-2 feet high, simple or corymbosely branched, leafy to the summit: leaves thin, nearly entire, oblong-lanceolate or oblong; upper ones moderately contracted above the deeply cordate clasping base; lower ones with more elongated narrow lower portion or winged petiole, with dilated but smaller auriculate clasping insertion: heads large and broad, terminating the stem or short leafy branches: involucre very foliose-subtended and loose, the larger and broader lanceolate outer bracts fully equalling the inner: rays numerous, narrowly linear, nearly half-inch long, pale violet: achenes glabrous. Along subalpine streams of Eastern Oregon and Idaho.

Var. Lyallii Gray Syn. Fl. 195. Villous with soft pubescence: stems

over 2 feet high, rather stout: cauline leaves mostly narrowed below and with more or less auriculate half-clasping base: the lower 5 inches long by an inch broad, not petiolar-contracted: heads terminating, simple leafy branches: rays 8-9 lines long. Between Kootenay and Pend Orielle, Washington.

A. Hendersoni Fernald. Stems rather slender, loosely tomentose above, branching near the top, leafy: upper leaves lanceolate, more or less acuminate, entire, one-nerved, glabrous except the midrib, auriculate. clasping by a broad base, 2-4 inches long: heads numerous, in an ample panicle: bracts of the involucre linear, acute, green or the inner with whitish base, all of nearly equal length, equalling or surpassing the disk, 4-5 lines long: rays numerous, 8-10 lines long by a line broad, bright purple. Eastern Washington to Idaho.

18 EUCEPHALUS Nutt. trans. Am. Phil. Soc. vii, 298.

Perennial leafy-stemmed herbs without radical leaves and solitary or paniced heads of purple, blue or white ray-flowers in a single series, not very numerous, pistillate: disk flowers tubular and perfect. Bracts of the turbinate campanulate involucre regularly imbricated in 3-4 series, dry and chartaceous, ovate, concave, somewhat carinate, the innermost about the length of the disk, the outer successively shorter but similar. Alveola of the receptacle lacerate. Appendages of the style lanceolate, acute. Achenes oblong, compressed. Pappus copious, rather longer than the corolla: the bristles unequal; the longest ones sometimes thickened upwards. Stems very leafy, the lower leaves being reduced to bract-like scales, or bristles.

E. elegans Nutt. Trans. Am. Phil. Soc. vii, 298. *Aster elegans* T. & G. Stems slender, 1-3 feet high, mostly scabro puberulent, leaves thickish, lanceolate, 1-2 inches long, erect, closely sessile, the upper apiculate-mucronate: heads several at the summit of simple stems or branches, 4-5 lines high: bracts of the involucre all close and conspicuously woolly-ciliate, barely acute, outer ovate, none with pointed tips: rays rather few, about 4 lines long: style appendages linear-subulate, hardly acute, equaling the stigmatic portion: achenes flat, hirsute, becoming glabrate at maturity. On mountains of Eastern Oregon and Washington to Montana, Wyoming and Nevada.

E. Engelmannii Greene Pitt. iii, 54. *Aster Engelmannii* Gray Commonly, rather tall and robust, green, slightly puberulent to glabrous: leaves thin, ovate-oblong to broadly lanceolate, 2-4 inches long, loosely veined, the larger sometimes with a few small acute teeth, the upper commonly tapering at apex into a slender or cuspidate acumination: heads fully half inch high, hemispherical, either racemosely disposed on slender axillary peduncles or somewhat thyrsoid-cymose: bracts of the involucre mostly acute or acuminate: some outer ones loose, narrow and partly herbaceous, or with loose pointed tips; inner ones purp'ish rays about 6 lines long: style, appendages attenuate-subulate: achenes obovate-oblong with narrowish summit. In the higher mountains of Oregon and Washington to the Rocky mountains.

E. serrulatus Greene l. c. 55. "Stoutish and rather tall, vivid green and scabrous, the leaf margins even serrulate-scabrous under a lens: leaves linear-lanceolate, 2 inches long, acute, marked by a very strong and conspicuous white mid-vein and some reticulation of the surface: heads few, large as in the preceeding, but bracts very different, being narrow

and almost woolly herbaceous and taper pointed the margins serrulate-scabrous, not woolly or ciliate. Mt. Adams, Washington. *Suksdorf No. 1563.*"

E. ledophyllus Greene l. c. *Aster Engelmannii* var. *ledophyllus* Gray. Stems 1-2 feet high, rather strict: leaves lanceolate, mucronate-apiculate, entire or lower, with a few apiculate teeth toward the apex 1-2 inches long, cottony tomentulose beneath, at least when young, the lower often obtuse: heads solitary, or few in a simple paniculate cyme: bracts of the involucre lanceolate to linear, very acute or acuminate, the outer successively shorter but similar: rays purple, 10-12 lines long: achenes hirsute at the summit. On the highest parts of the Cascade mountains.

E. tomentellus Greene l. c. *Sericocarpus tomentellus* Greene Pitt. i, 283. Strict, erect 2-3 feet high, paniculately branched above, leaves ovate-lanceolate, acute or acutish barely apiculate, entire, 1-2 inches long, tomentulose beneath, smooth above: heads small and narrow: involucre bracts, strict with loose tomentose tips, in several ranks, the outer successively shorter and passing into ordinary leaves: rays usually wanting rarely 1 or 2: achenes minutely appressed-hirsute. On dry ridges eastern base of the Coast mountains near Waldo, Oregon.

E. glabratus Greene, Pitt. iii, 56. Stems strict, 1-2 feet high: glabrate throughout: leaves ovate-lanceolate to lanceolate, acute 8-18 lines long, entire, conspicuously reticulate veiny: heads rather few, small and narrow: bracts of the involucre linear, abruptly acute, in several ranks, the outer successively shorter and more lanceolate: rays none: achenes hirsutulous. On dry ridges of the Siskiyou mountains.

E. glaucescens Greene l. c. *Aster Engelmannii* var. *glaucescens* Gray Herbage, pale green and smooth throughout: stems mostly slender, 1-3 feet high: leaves somewhat glaucous, lanceolate, often acuminate, 2-3 inches long, 2-7 lines broad, entire: heads large, one to several in an open terminal cyme: bracts of the involucre lanceolate, often acuminate in few ranks, the outer successively shorter: rays 15-20, 8-12 lines long: achenes appressed-pubescent. On Mt. Adams, Washington and vicinity.

E. paucicapitatus "Greene l. c. *Aster paucicapitatus* Robinson. Simple, monacephalous: stems decumbent at base, 6-18 inches high: herbage glandular-puberulent even somewhat scabrously so, only the margins of the oblong-lanceolate obtuse thinnish leaves minutely woolly-ciliate: bracts of the broad involucre not very unequal or much imbricated, lanceolate and herbaceous though with a distinct carinate mid-vein: rays few, their color doubtful: pappus rather copious and fine, the bristle in no degree dilated upwards: achenes sparsely appressed-pubescent. Olympic mountains, Washington. *Piper.*"

E. Covillei Greene Pitt. iii, 162. "Tufted stems more than a foot high, somewhat flexuous, racemous-corymbose from near the middle, these and the lower face of the leaves sparingly tomentulose: leaves oblong-lanceolate, acute, entire: bracts of the narrowly campanulate involucre granular-puberulent, well imbricated, herbaceous and scarcely carinate, lanceolate and oblong-lanceolate: rays few (5-7), long and narrow, deep violet. Near Crater Lake, Oregon. *Coville.*"

19 OREASTRUM Greene Pitt. iii, 146.

Acaulescent perennials with narrow sub-coriaceous entire leaves and scapiform monacephalous branches from a stout somewhat fusiform and not freely branching taproot. Bracts of the involucre narrow, sub-equal in about 2 series. Rays rather numerous, elongated, purple. Disk corollas tubular-funnel form,

5 toothed and the teeth erect. Style-branches filiform to subulate-linear. strongly hirsutulous. Achenes subterete, distinctly 5-8 costate. Pappus a single series of brownish barbellate-scabrous and rather fragile or deciduous bristles.

O. alpigenum Greene l. c. 147. *Aster alpigenuus* Gray *Aster pulchellus* Eaton? Scapiform stems spreading and as-urgent, 2-4 inches long tomentose at the summit: radical leaves from lingulate-spatulate to narrowly linear, glabrous, obtuse, nerveless, 1-3 inches long, 3-4 lines wide near the apex: heads broad, fully 6 lines high and broad: bracts of the involucre not very unequal, usually pubescent, linear, acute: rays purple, 6-8 lines long, style-appendages linear-subulate: achenes linear, striate glabrate below, hirsute near the top. On the highest peaks of the Cascade mountains,

O. Andersoni Greene l. c. *Aster Andersoni* Gray. Scapiform stems erect, 8-14 inches high: radical leaves lingulate-linear or slightly broader upward, grass-like, mostly acute, 2-10 inches long, 2-3 lines broad, nervose when dry glabrous; upper cauline reduced to scattered subulate bracts: heads broad, fully half inch high and wide: bracts of the involucre linear, acutish, rather loose, often tomentulose when young: style appendages filiform: rays rather numerous, purple or violet: achenes oblong-linear, soft villous. In wet mountain meadows. Coast mountains, near Waldo, Oregon, and along the whole length of the Sierra Nevada.

19 a IONACTIS Greene Pitt. iii, 245.

Low tufted perennials, often lignescent at base, never stoloniferous, or with radical leaves. Stems clothed equally with narrow, rigid, one nerved and veinless leaves and terminating in one or more showy heads with violet rays. Involucre of well imbricated bracts of coriaceous texture without herbaceous tips, appressed even to the tips. Achenes narrow, villous. Pappus double the more copious inner series bristly, the outer short and setulose.

I. alpina Greene l. c. *Aster Scopulorum* Gray. Stems several from a suffrutescent base, simple tomentose-pubescent, naked at the summit 3-4 inches high: leaves crowded, erect, linear-oblong, mucronulate, rather rigid scabrous, 1-nerved, flat, with cartilaginous minutely serrulate-scabrous margins, about 5 lines long, by 1-2 lines broad: heads solitary, 4-6 lines high; bracts of the hemispherical involucre linear, acute, 1-nerved, with scabrous margins, pubescent, imbricated in about 3 series: rays violet, 12-15: exterior pappus of rather numerous setaceous bristles. Style appendages subulate-linear as long as the stigmatic portion: achenes compressed, silky-villous. On high rocky ridges of Southeastern Oregon to the Rocky mountains.

I. stenomeris Greene l. c. *Aster stenomeris* Gray. "More slender, 6-10 inches high, green, minutely scabrous: solitary, naked pedunculate head larger: leaves all linear, (half to full inch long, a line wide), acutely mucronate, hardly margined: involucre broad; its bracts barely in two moderately unequal series, linear, acute or acuminate, thinnish, often pubescent: rays pale violet, over half inch long; outer pappus setulose. style-appendages elongated, subulate-linear or narrower: achenes flat, with strong marginal nerves. On Rocky mountains of Montana and Idaho"

20 MACHÆRANTHRA Nees. Ast. 224.

Annual biennial, or perennial divaricately branched herbs with

pinnatifid or rarely entire leaves and solitary or corymbosely or racemously disposed heads of purple-rayed flowers. Heads many flowered, the rays numerous, in a single series, pistillate; those of the disk tubular and perfect, with 5 short erect teeth. Bracts or the obovoid or turbinate involucre closely imbricated for the most part in several series, linear rigid, somewhat carinate, unequal, with herbaceous squarrose-spreading or recurved tips: receptacle flat, somewhat alveolate; the alveoli toothed or lacerate. Style-appendages filiform subulate or linear-lanceolate, minutely hirsute. Achenes turbinate or cuneiform, often compressed, pubescent or silky. Pappus of numerous scabrous and rather rigid very unequal bristles.

M. Shastensis Gray Proc. Am. Acad. vi, 539. *Aster Shastensis* Gray. Canescent with a close scurfy tomentum: stems slender, 4-8 inches high from a perennial root, paniculately branched: leaves linear-spatulate to linear, 1-2 inches long with a few teeth near the middle: heads rather numerous, scattered, 5-6 lines high: bracts of the involucre linear, acute: the outer ones shorter and often with spreading tips: rays 12-20, violet 3-6 lines long: style appendages slender-subulate: pappus simple and soft: achenes narrow, hardly at all compressed, silky-pubescent. Southeastern Oregon (Camp Polk) to Northeastern California.

M. eradiata *Aster Shastensis* var. *eradiatus* Gray. Whole plant somewhat glaucous and canescently puberulent: stems stoutish, 6-10 inches high from a stout perennial root: leaves oblanceolate 1-2 inches long, 2-6 lines broad, attenuate below to a margined petiole, obtuse or acutish minutely apiculate, entire or sparsely serrate: heads rather numerous, 4-5 lines high: bracts of the involucre linear, acute, in 3-4 ranks, the outer successively shorter and more subulate: rays wanting: achenes sparsely pubescent. On high rocky ridge of the Siskiyou and Scott's mountains.

M. attenuata. Whole plant cinereous: stems stoutish, 1-2 feet high from a large perennial root: cauline leaves linear, reduced above to subulate bracts, all acute and apiculate: heads numerous terminating in the branchlets: involucre hemispherical, its linear bracts well imbricated in several series, the outer successively shorter and passing into the ordinary bracts of the branchlets, the inner ones attenuate above to a slender bristle: rays dark purple, numerous 5-6 lines long: style appendages slender-subulate: pappus simple, of soft capillary bristles: young achenes silky-canescens. On sandy plains and banks near The Dalles, Oregon.

20 d BRACHYACTIS Ledeb. Fl. Ross, ii, 495.

Annual or perennial low herbs with mostly entire leaves and solitary or racemose-paniculate heads of inconspicuous flowers. Heads many-flowered heterogamous; the rays very numerous and occupying more than one series, fertile. Involucre loosely imbricated, in few series of herbaceous bracts or the innermost somewhat scabrous. Receptacle flat, naked. Style appendages lanceolate. Achenes more or less compressed. Pappus simple of copious fine and soft capillary bristles.

B. frondosa Gray Proc. Am. Acad. viii, 647. *Aster frondosus* G. & T. Glabrous or nearly so: stems 1-12 inches high or more from an annual root branching from the base: leaves spatulate linear, 1-2 inches long, the uppermost passing into the involucre bracts, the lower attenuate below

into winged petioles, often ciliate: heads numerous, hemispherical, 4 lines high: bracts of the involucre oblong, obtuse, herbaceous: rays a line long, pinkish-purple exceeding the involucre but shorter than the pappus; achenes narrow, appressed-pubescent. Muddy saline flats and margins of ponds, Washington to California, New Mexico and the Rocky mountains.

21 ERIGERON L. Gen. n, 951.

Herbs or rarely suffrutescent plants with entire, toothed or lobed leaves and solitary, corymbose or paniculate heads of various colored ray-flowers. Heads mostly hemispherical, many flowered: the ray flowers very numerous and usually in more than one series (sometimes wanting), pistillate those of the disk tubular, perfect, or some of the exterior filiform-tubular and truncate, pistillate. Bracts of the involucre mostly equal, narrow, in a single or somewhat double series. Receptacle flat, naked, punctate or scrobiculate. Appendages of the style very short and obtuse. Achenes compressed, usually pubescent, commonly with 2 lateral nerves. Pappus a single series of capillary scabrous bristles, rather few in number, often with minute setæ intermixed or forming an indistinct outer series, or sometimes with a distinct and short squamellate-subulate or setaceous exterior pappus, the inner rarely wanting in the ray.

§ 1 EUERIGERON DC. Gray Syn. Fl. Pt. 2, 207. Rays elongated and conspicuous, or in a few species uniformly wanting, in one or two occasionally abortive: no rayless pistillate flowers between the proper ray and disk.

* Perennials, commonly dwarf, from a multicapital caudex, alpine or alpestrine with comparatively large and mostly solitary heads: involucre loose or spreading, and copiously lanate with long multiseptate hairs.

E. uniflorus L. Fl. Lapp. t. 9, f. 3. Stems 1-2 inches high or more strictly monocephalous, few-leaved, often naked and pedunculiform at summit: radical leaves spatulate or oblanceolate, 1-2 inches long: cauline lanceolate to linear: involucre usually hirsute as well as lanate occasionally becoming naked, the linear acute bracts rather close, or merely the short tips spreading: rays purple or sometimes white, 2-4 lines long. In Labrador to the Arctic coast and Unalaska, south to the Sierra Nevadas, California and the Rocky mountains.

E. lanatus Hook. Fl. ii, 17, t. 121. Stems 8-10 inches high from a multicapital caudex, scapiform or few-leaved, monocephalous: radical leaves spatulate to obovate, about half-inch long tapering into a narrowed base or into a slender margined petiole; some primary ones occasionally palmately 3-lobed; cauline one or two small and lanate, or hardly any: involucre densely soft-lanate: the linear acute bracts rather close or merely the short tips spreading: rays 3 lines long, white. In the Cascade mountains of Washington to the northern Rocky mountains.

E. grandiflorus Hook. Fl. ii, 18, t. 123. Stems 8-20 inches high, rather stout, usually several-leaved and monocephalous: radical leaves obovate-spatulate 1-3 inches long; cauline oblong to lanceolate, 4-6 lines long: involucre half inch high, very woolly, its linear and attenuate-acuminate bracts squarroses-spreading or the tips recurved: rays violet or purple, 4-6 lines long. Rocky mountains from British Columbia to Colorado.

* * Submaritime perennial: heads full one inch in diameter: involucre rather loose, villous with long multiseptate hairs: rays about 100, rather broad, aster-like: pappus simple: leaves obovate or spatulate, ample, mostly entire.

E. glaucus Ker. Bot. Reg. t. 10. A span to a foot high, viscidulous and more or less pubescent, producing a tuft of radical leaves from a rather fleshy crown and some ascending monocephalous or occasionally branching stems; leaves glaucescent or pale green but hardly glaucous, somewhat succulent; larger radical 3-4 inches long by an inch wide, rarely 2-3-toothed; upper cauline few, spatulate-oblong, obtuse, sessile, 10-18 lines long: rays half-inch long, bright violet: achenes 4-nerved. On banks or bluffs of the Pacific coast within the influence of salt water, Oregon to southern California.

* * * True perennials from rootstocks or a caudex, neither stoloniferous surculose nor flagelliferous: involucre from hispid or villous to glabrous but not lanate, in the first species loose and spreading.

+ Comparatively tall and large, a foot or more high, except in alpine or depauperate forms, leafy-stemmed, glabrous to soft-hirsute: leaves rather ample, entire or sometimes few-toothed: heads pretty large with usually very numerous rays.

++ Aster-like; the rays comparatively broad: heads solitary or on larger plants few and corymbosely disposed: pappus simple.

E. salsuginosus Gray Proc. Am. Acad. xvi, 93. Rootstocks short and thickish: stems 7-20 inches high, the summit or peduncles lanate-pubescent or puberulent: no bristly or hirsute hairs: leaves very smooth and glabrous or glabrate, thickish; radical and lower cauline leaves spatulate to nearly obovate, with base attenuate into a margined petiole, 1-3 inches long; upper cauline ovate-oblong to lanceolate, sessile, mucronate or apiculate-acuminate; uppermost small and bract-like: bracts of the involucre loose or even spreading, linear-subulate, or attenuate, viscidulous or puberulous (or at some northern stations sometimes pubescent): disk over half-inch in diameter: rays 50-70, purple or violet, half-inch or more long. Wet ground, Kotzebue Sound and Unalaska and along the higher mountains to California and the Rocky mountains.

E. peregrinus Greene Pitt. iii, 166 *Aster peregrinus* Pursh. Tomentose-pubescent and glabrate: stems slender, erect, usually solitary, 1-2 feet high, leafy: rootstock slender, creeping: lower cauline and radical leaves oblong-lanceolate, attenuate below to a margined petiole, 2-3 inches long, upper cauline lanceolate to ovate-lanceolate, entire or shapely denticulate: head solitary, or rarely 2, half-inch or more high, terminating the simple stem: bracts of the involucre linear, acuminate, 5-7 lines long, tomentose-pubescent or villous, not at all viscid or glandular: rays 20-30, 6-8 lines long, pale to dark purple or violet. Wet meadows, Arctic coast and Alaskan Islands to the mountains of Northern Washington and Idaho.

E. Howellii Gray Syn. Fl. Pt. 2, 209. Rootstocks slender: stem 12-20 inches high, leafy: leaves membranaceous, glabrous and smooth; radical, slender, petioled, with oval or obovate blade; cauline mostly ovate with broad half clasping base, 1-2 inches long by an inch broad; mucronate-acuminate: peduncle puberulent: heads solitary, 8-10 lines broad: bracts of the involucre subulate, the inner ones acuminate: rays only 30-35, 8-10 lines long, often 2 lines wide, white. Moist rocky banks along the Columbia river near the Cascades.

E. cervinus Greene Pitt. iii, 163. Stems slender, 8-12 inches high, from stout ascending rootstocks, leafy at base, the whole herbage glabrous, only the peduncles and involucre glandular and slightly puberulent:

leaves thin, the lowest with obovate to oblanceolate blade, less than an inch long and slender petiole 2 inches or more long; cauline leaves oblanceolate to spatulate, 1-2 inches long, sessile: Heads solitary or 2-3, slender-peduncled: involucre about 3 lines high and 3-4 broad, the bracts equal, broad-subulate, attenuate-acuminate: rays 25-30, 5-6 lines long, white to pale purple. Wet banks, at the head of Cheney Creek, Josephine Co., Oregon.

E. spatulifolius. Stems numerous from a thick multiseptal caudex, slender, leafy, somewhat hirsute toward the top, monocephalous, 4-8 inches long, erect or ascending: radical leaves spatulate, attenuate below to a broad-winged petiole, rounded at the summit, entire, or sparingly dentate toward the apex, 1-3 inches long, glabrous both sides; cauline leaves several, rather crowded, oblong to ovate, sessile by a broad somewhat clasping base: heads half-inch high and broad: bracts of the involucre linear, acute: rays 30-40, purple: pappus nearly simple of rather few bristles: achenes smooth. On rocky banks Pansy Camp, Cascade mountains, Oregon.

E. Aliceæ Rootstock slender, stem 18-30 inches high, erect, sparingly branched near the top: whole herbage pubescent with soft spreading hairs: radical and lower cauline leaves lanceolate, entire, the blade 2-3 inches long, 4-8 lines broad, on slender petioles as long or longer than the blade: upper cauline lanceolate, sessile, often attenuate-acuminate: heads solitary, terminating the slender branches, 6-7 lines broad: bracts of the involucre subulate acuminate, nearly equal, tomentose with rather long white wool: rays 50-60, purple or violet. In open damp woods, Siskiyou mountains near the Oregon line. Distributed in 1887 as *E. Coulteri*.

E. amplifolius. Stems erect, 20-30 inches high from a somewhat surculose rootstock, leafy, glabrous or sparingly pubescent toward the top: lower leaves ovate-lanceolate 8-15 lines broad, attenuate below to a long slender petiole: upper ones lanceolate or oblong and sessile: heads one to several, large, hemispherical: bracts of the involucre linear, acute or acuminate, rather numerous, imbricated in 2 or 3 ranks: rays 50-60, rather broad, blue or violet, 10-12 lines long: pappus simple or nearly so: achenes obovate, 2-nerved, sparingly pubescent. On open hillsides near Table Rock, Clackamas County, Oregon.

++ ++ Less Aster-like: rays 100 or more and narrow: involucre closer: pappus more or less double, but the exterior minute, setulose or subulate-squamellate: stems chiefly erect, tufted, generally leafy to the summit and bearing few or several heads: leaves entire.

E. speciosus DC. Prodr. v, 284. Sparingly and loosely hirsute or with a few scattering hair: stems 20-30 inches high, very leafy to the top; leaves lanceolate, acute 3-8 lines wide, sparsely ciliate; lowest more or less spatulate: involucre hirsute-pubescent, or sometimes almost glabrous: rays half-inch to almost an inch long, violet. Dry ridges and edges of prairies. British Columbia to western Oregon.

+ + Low, rarely a foot high, conspicuously hispid or hirsute with spreading bristly hairs: leaves entire, narrow, involucre close: rays numerous occasionally wanting: pappus conspicuously double.

++ Sparingly branched, stems several or numerous from the crown of a tap root, more or less leafy: heads middle-sized: disk a third to half inch in diameter: involucre hispid: rays 50-80 long and narrow, soon deflexed occasionally wanting.

E. concinnus T. & G. Fl. ii, 174. Very hirsute throughout with long spreading white hairs: stems several from the same root or caudex, 6-10 inches high, slender, leafy, branching, above, the branches terminated by

single heads: leaves narrowly linear, elongated, entire, attenuate at the base, the lowermost tapering into a slender petiole: heads 5-6 lines in diameter: bracts of the involucre linear, very acute, densely hirsute: rays numerous, 6 lines long, white to purple. Arid plains between the Cascade and Rocky mountains, British Columbia to California and New Mexico.

** ** Tufted, stems very short and densely leafy, bearing simple and monocephalous scapiform or few-leaved flowering stems: leaves narrowly spatulate-linear: heads large: rays 25-50 not very narrow, 3-4 lines long.

E. Poliospermus Gray Syn. Fl. i, Pt. 2, 210. Soft-hispid throughout with white hairs: stems numerous, from a branched rootstock, an inch or less long, very leafy: leaves spatulate to lanceolate, 2-6 lines long, on slender petioles 1-2 inches long: scapose peduncle 2-4 inches long: heads half-inch or more in diameter: bracts of the involucre setaceous, densely hispidulous: rays 20-30, blue-violet to almost white: achenes densely white-vil'ous: outer pappus slender-squammellate, fully as long as the breadth of the achene covered by the copious white silky hairs of the achene. On dry rocky ridges along the Columbia river from The Dalles eastward.

E. Chrysopsidis Gray l. c. *Chrysopsis hirtella* DC. Hirsute with white spreading hairs, stems scape-like, leafy at the base, 2-4 inches high: leaves spatulate, mostly obtuse, including the petiole 1-3 inches long, usually about a line wide at the summit: heads solitary, terminal: involucre open-companulate, its bracts narrow, numerous 3-5 lines long, hirsute: rays, 40-50, golden yellow, 6-8 lines long: achenes barely pubescent or hirsutulous: outer pappus merely setulose. On high stony ridges, Eastern Oregon in the John Day country.

+ + + Dwarf, caespitose from a multicapital caudex, with monocephalous flowering stems, often scapose: radical leaves dissected: pappus simple.

E. compositus Pursh Fl. ii, 535. Herbage hirsute to glabrate and more or less viscidulous: stems very short, from a somewhat woody creeping base, densely leafy: leaves fan-shaped in outline, usually 1-3-ternately parted into linear or short and narrow spatulate lobes, 2-6 lines long, on long slender hispid-ciliate petioles; the few on the erect flowering stems 3-lobed, or entire and linear: involucre 3-4 lines high, sparsely hirsute: rays 40-60 not very narrow, white purple or violet mostly 3-4 lines long. On cliffs, Artic seacoast, Greenland, and Spitzbergen to the higher mountains of Washington, Oregon and California and the Rocky mountains.

Var. discoideus Gray, Am. Jour Sci. Ser. 2, xxxii, 237. Rays wanting or abortive: heads commonly smaller. Some range as the radiate form, often growing with it.

+ + + + Dwarf or low species, alpine or alpestine, entire-leaved, caespitose from multicapital caudex, no fine or cinereous pubescence, monocephalous: leaves few on the simple stem at least the radical broader than linear: rays rather numerous and not very narrow: pappus simple or nearly so.

** Involucre hirsute or pubescent, greenish: herbage not strigulose nor cinereous.

E. radicatus Hook. Fl. ii, 17. "A span high or less, densely tufted: leaves all spatulate-linear or somewhat wider (broadest only a line or two wide), hirsute or hirsutely ciliate, or sometimes almost naked, then glabrous; no glandular roughness: involucre more or less villous-pubescent (barely 3 lines high): rays white or purplish, 2 or 3 lines long." Al-

pine or subalpine in the Blue mountains of Oregon to the Rocky mountains and northward.

E. pacificus Hirsute with white hairs, stems several from a simple or more or less multicapital somewhat woody perennial root, ascending, 2-4 inches long, leafy monocephalous: lower leaves narrowly lanceolate to almost linear, 1-2 inches long; cauline leaves similar but smaller: heads 4-5 lines high; bracts of the involucre linear-lanceolate, acute or acuminate, hirsute: rays 30-40, blue to purple, 6 lines long: pappus of ray-flowers manifestly double, the outer very short or a mere crown, the inner about equalling the disk-flowers, soon deciduous: achenes minutely pubescent. On grassy slopes of the Cascade mountains near Table Rock, Clackamas County, Oregon.

+ + + + + Various species with entire leaves, none truly alpine, none hispidly hirsute except very rarely some spreading bristly hairs fringing the base of the leaves: involucre close, disposed to be somewhat imbricated and rigid: rays not very numerous, in several species uniformly wanting.

++ Either low or comparatively tall, leafy stemmed or subscapose: achenes compressed, 2-nerved, rarely 3-nerved.

= Heads radiate: leaves all narrowly linear to filiform, the broadest not over a line wide: pubescence either cinereous or obscure.

a. Involucre only 2-3 lines high of unequal and somewhat imbricated bracts.

E. filifolius Nutt. Trans. Am. Phil. Soc. vii, 328. Canescent or cinereous throughout with very fine close pubescence, no loose hairs: stems slender, 10-20 inches high from a lignescent slender base or branched rootstock leafy, usually paniculately branched and bearing several or rather numerous heads: leaves linear-filiform or quite filiform, some lower ones sometimes dilated upward and flat: involucre canescent: rays 30-50, rarely over 80, purple, violet or white, 3-4 lines long: achenes slightly pubescent or glabrate: pappus simple, of fragile and indistinctly scabrous bristles. Rocky or dry sandy ground, Eastern Oregon to British Columbia and Idaho.

E. peucephyllus Gray Syn. Fl. i, Pt. 2, 213. Hoary with a minute appressed pubescence: stems slender, 4-12 inches high, usually sparingly branched: leaves narrowly linear, 1-2 inches long by half of a line wide, flat: involucre 3-4 lines high; its narrowly lanceolate bracts unequal, hirsute: rays 20-30, 4-6 lines long, bright yellow: pappus double, the outer squamellate: achenes smooth or nearly so: Dry hills Eastern Oregon and Washington near the Cascade mountains. Dr. Gray evidently had two or three species mixed in his description of *E. peucephyllus*, the above description is for the yellow-flowered one only.

b. Involucre 3-4 lines high, of equal bracts: rays of equal length.

E. ochroleucus Nutt. Trans. Am. Phil. Soc. vii, 309. Cinereous-pubescent to glabrate: stems 10-18 inches high, somewhat caespitose, usually simple, naked above and monocephalous, occasionally with one or two additional heads: leaves rather rigid, narrowly linear, the radical 2-3 inches long, often a line wide at the upper part, not rarely sparsely hirsute-ciliate below: involucre tomentose or hirsute pubescent: rays 40-60, ochroleucous, white or purplish: outer pappus setulose. Gravelly hills and plains, Idaho to Montana and Wyoming.

= = Heads rayless: leaves filiform to narrowly spatulate-linear, chiefly from the multicapital caudex: stems more or less scapiform and monocephalous.

E. Bloomeri Gray Proc. Am. Acad. vi, 40. Densely caespitose, cinereous-

puberulent to glabrate: stems 2-6 inches high: radical leaves 1-3 inches long, the larger dilated upward, sometimes to a line or more wide; cauline few and nearly filiform: heads almost half inch high: bracts of the involucre linear-lanceolate, equal, soft-villous or canescent: rays wanting: achenes glabrate, oblong-linear, flat: pappus whitish, simple. Stony ground Idaho to Eastern Oregon and California.

E. nudatus Gray Proc. Am. Acad. xx, 297. Glabrous throughout or the involucre bracts sparingly puberulent, cespitose: stems scapiform, 2-6 inches high, monocephalous: leaves linear-spatulate to almost filiform, 1-2 inches long, rarely a line wide: involucre nearly half-inch high, of thickish and green lanceolate bracts: achenes obovate-oblong, sparsely pubescent: pappus whitish, simple. Rocky hillsides about Waldo, Josephine Co., Oregon.

= = = Heads radiate: leaves from narrowly linear to oblong: stems leafy and disposed to branch but sometimes monocephalous: pubescence cinereous: outer pappus setulose, sometimes rather manifest, sometimes obscure or none.

E. corymbosus Nutt. l. c. Stems erect from a creeping rootstock often a foot or two high, soft-cinereous or sometimes hispidulous with mostly spreading short pubescence: radical leaves narrow-lanceolate or spatulate-lanceolate, largest 3-4 inches long, 3-4 lines wide, 3 nerved; cauline linear and narrow: heads sometimes solitary, usually several and corymbosely disposed on short slender peduncles: involucre 3 lines high, canescently pubescent: rays 30-50, mostly narrow and 3-5 lines long, blue or violet, apparently sometimes white. Mountains of eastern Oregon and Washington to Montana.

E. confusus Howell Eryth. iii, 35. Stems simple, one to several from a woody perennial root, 4-8 inches high, very leafy: leaves narrowly spatulate-linear, an inch long or more: heads usually solitary at the ends of the stem, but often several together: involucre hemispherical, its linear acuminate bracts in few ranks nearly equal, 3-4 lines long: rays numerous, rather broad, 6-10 lines long, purplish; pappus a single series of barbellate-scabrous bristles: achenes sparingly pubescent. On high rocky ridges of the Siskiyou mountains.

E. decumbens Nutt. l. c., 309. Strigulose-pubescent or puberulent or glabrate: stems slender, commonly low or spreading, 6-18 inches high, leafy, branched above: leaves linear or sometimes linear-spatulate; radical 2-6 inches long by 1-3 lines broad: involucre minutely hirsute or pubescent: rays 20-40, white purplish or violet-tinged. From the Willamette Valley, Oregon, to Montana and Utah.

= = = = Heads wholly rayless: stems leafy to the summit: pappus simple.

E. inornatus Gray. Proc. Am. Acad. xvi, 88. Commonly glabrous throughout and smooth, or with some sparse hirsute pubescence: stem 10-20 inches high, erect: leaves from broadly to narrowly linear, 1-2 inches long by 1-2 lines wide: heads usually several and crymosely disposed at the summit of the stem, short-peduncled, 3 lines high: involucre campanulate, its bracts somewhat imbricated, very glabrous unequal. Common in dry open woods from Mount Adams Washington to California.

* * * * Perennials with membranaceous commonly serrate or dentate leaves and middle-sized or small heads with glabrate involucre: rays numerous: pappus quite simple.

+ Rays not very narrow, not more than 60 or 70.

E. Oreganus Gray. Proc. Am. Acad. xix, 2. Pubescent throughout:

stems numerous in a rosulate tuft, from a thick perennial root, prostrate, 9-12 inches long, leafy to the top, bearing solitary or few rather small heads: leaves spatulate or the radical cuneate-obovate, these 1-3 inches long, 6-8 lines wide, coarsely 3-5-toothed or incised; cauline more entire, 1-2 inches long: involucre 4-6 lines high its bracts somewhat unequal, attenuate-acuminate, the outer often passing into leaves: rays 60-70, pale purplish or pink, 4-6 lines long: pappus rather scanty, shorter than the corolla: achenes terete or nearly so, sparsely pubescent. Under overhanging cliffs along the Columbia river near the Cascades.

+ + Rays very narrow, 100 or more, disk only 3-4 lines broad: stems erect, either from a biennial root or from a biennial or winter annual offset.

E. Philadelphicus L. Sp. ii, 863. Soft-pubescent, or sometimes nearly glabrous: stems rather slender, strict, mostly branched above, 1-3 feet high: lower leaves spatulate or obovate, obtuse, dentate, 1-3 inches long, narrowed into short petioles; upper cauline leaves clasping and often cordate at base, obtuse or acute, dentate or entire: heads several or numerous corymbose-paniculate, 5-12 lines broad, slender-peduncled: peduncles thickened at the summit: involucre depressed-hemispheric, its bracts linear, usually scarious margined: rays 100-150, 2-6 lines long, rose-purple or pink: achenes puberulent. Along streams and moist meadows throughout North America.

* * * * * Annuals or sometimes biennials, leafy-stemmed and branching: heads conspicuously radiate.

+ Rays of the small or barely middle-sized heads very numerous, narrow, with pappus like the disk-flowers; the inner of rather scanty bristles; the outer of short subulate squamellæ: leaves from entire to sparingly lobed.

E. divergens T. & G. Fl. ii, 175. Cinereous-pubescent or hirsute: stems diffusely branched and spreading, 10-20 inches high: leaves linear-spatulate, or the upper linear and the lowest broader, 1-2 inches long: heads slender-peduncled, 6-8 lines broad, usually numerous: involucre hemispheric, its bracts linear, acute, hirsute or canescent: rays about 100, purplish or violet, to nearly white, 2-6 lines long, pappus double, the short outer row of bristles subulate; achenes narrow, little compressed, with a broad and whitish truncate apex. Low plains and river-banks, British Columbia to California, Texas and Nebraska.

+ + Rays of the small heads not very numerous nor very narrow; the bristles of their pappus commonly wanting or very few; outer pappus a short crown of distinct or partly united slender squamellæ, persistent after the fragile inner pappus has fallen: leafy-stemmed annuals or biennials.

E. annuus Pers. Syn. ii, 431. Annual; sparingly pubescent with spreading hairs: stems erect, corymbosely branched, 1-4 feet high: leaves thin, the radical and lower cauline ovate to ovate-lanceolate, mostly obtuse, petioled, usually coarsely dentate, 2-6 inches long by 1-2 inches wide; upper cauline lanceolate, oblong or linear-lanceolate, acute or acuminate, mostly dentate in the middle, sessile or short-petioled; those of the branches narrower and often entire: Heads rather numerous, 5-7 lines broad, mostly short peduncled: bracts of the hemispheric involucre somewhat hispid: rays 40-70 white, or commonly tinged with purple, 2-4 lines long. In fields and open ridges, Oregon to the Atlantic states.

E. ramosus. B. S. P. Prel. Cat. N. Y. 27. *E. Strigosus* Muhl. Pubescence appressed, either sparse and strigose or close and minute: stem 1-2 feet high: leaves lanceolate, the upper entire; the lower from

spatulate-lanceolate to oblong, often sparingly serrate: heads rather numerous, small, involucre with few or no bristly hairs. Dry open grounds, British Columbia to California and across the continent.

§ 2 TRIMORPHÆA, Gray Sy. Fl. i, Pt. 2, 219. Rays inconspicuous or slender, numerous, sometimes not exceeding the disk: within them a series of rayless filiform pistillate flowers: leaves entire or nearly so.

E. acris L. Sp. ii, 863. More or less hirsute-pubescent: stems 10-14 inches high from a biennial or perennial root, the larger plants branching and bearing several or numerous somewhat paniculately disposed heads: leaves pubescent or glabrate, entire the radical and lower cauline spatulate, mostly obtuse, 1-3 inches long, petioled: upper cauline, mostly oblong or oblanceolate, obtuse or acutish, sessile: involucre hemispheric, its bracts linear, hirsute; rays numerous, purple equalling or exceeding the brownish pappus: tubular pistillate flowers filiform, numerous: pappus simple or nearly so, copious. Alaska to Oregon, the Rocky mountains and Labrador.

Var. Drøbachensis Blytt. Norg. Fl. 561. Somewhat glabrous or even quite so, involucre green, at most hirsute only at base, often minutely viscidulous: rays slender somewhat slightly exerted sometimes minute and filiform and shorter than the pappus. Katzebue Sound to Oregon and New Brunswick.

Var. debilis Gray Syn. Fl. 1, Pt. 2, 220. Sparsely pilose: stems 3-12 inches high from an apparently perennial root, slender: leaves bright green; radical obovate or oblong; cauline spatulate to lanceolate, short: heads 1-3 in a terminal cluster, 4-5 lines high: bracts of the involucre sparsely hirsute below, the smooth attenuate tips spreading: rays in flower rather conspicuously surpassing the disk. On moist cliffs, higher parts of the Cascade mountains to Hudson's Bay and Labrador.

§ 3. CÆNOTUS, Nutt. Gen. ii, 148. Rays of the small and narrow seemingly discoid heads inconspicuous, little if at all surpassing the disk or pappus; the narrow ligule always shorter than its tube: disk-flowers sometimes few, with usually 4-toothed corollas: pappus simple.

E. canadensis L. Sp. ii, 863. From sparsely hispid to almost glabrous: stems strict, 1-10 feet high, with numerous narrowly paniculate heads, or in depauperate plants only a few inches high and with few scattered heads: leaves linear, entire or the lower spatulate and incised or few-toothed, commonly more or less hispid-ciliate: heads usually very numerous about 2 lines wide: rays white usually a little exerted and surpassing the style branches. Common in waste places and fields throughout North America.

22 BACCHARIS L. Gen. n. 949.

Diœcious shrubs with alternate leaves and small paniculate or corymbose heads of tubular flowers. Involucre regularly imbricated, of squamaceous bracts. Receptacle mostly flat and naked, rarely chaffy. Flowers of the staminate heads with tubular-funnelform 5-cleft corollas, subulate style-branches with the stigmatic portion obsolete and every abortive; corolla of the pistillate flowers reduced to a slender truncate or minutely toothed tube, shorter than the filiform style. Achenes 5-10-striate. Pappus of the staminate flowers of a series of scabrous

and often tortuose and more or less clavellate bristles: of the pistillate of usually more numerous and fine bristles.

Trib. iii, Inuloideæ Cass. An. Sci. Nat. 1829, 20. Heads heterogamous, radiate or discoid with fertile flowers filiform or ligulate; or sometimes homogamous and tubuliflorous. Anthers sagittate, and the base of the lobes produced into more or less of a tail (caudate) or other appendage. Style-branches of the hermaphrodite flowers filiform or flattish not appendaged: the stigmatic lines running to or vanishing near the roundish or truncate tip, which is at most papillose or somewhat penicillate. Style of staminate-sterile flowers commonly entire. Pappus usually capillary or none. Involucre commonly dry or scarious, rarely foliaceous.

SUBTRIBE I FILAGINÆ. Bracts of the involucre mostly thin and scarious. Receptacle with scales of various texture, enclosing or subtending the fertile flowers or achenes: pistillate flowers with filiform truncate or 2-3-toothed corollas.

* Achenes gibbous and compressed: corolla and style lateral; pappus none.

25 Micropus Fertile flowers few and in a single series on the short receptacle, included in the laterally compressed very gibbous scale of the receptacle which strictly encloses the achene.

** Achenes straight or slightly oblique: corolla and style terminal.

+ Chaff loosely enclosing the achene: central flowers sterile

26 Stylocline Fertile flowers 5-10 or more, in two or more series on a cylindrical or columnar receptacle, their chaff thin, saccate or boat-shaped: pappus of few caducous bristles to the sterile flowers or none.

27 Psilocarphus Fertile flowers numerous, in several series, on a globular receptacle, each in an obovate turgid membranaceous and reticulated chaff: pappus none.

+ + Chaff more open, hardly enclosing the achenes: fertile flowers in more than one series; central flowers sometimes fertile.

28 Hesperevax Receptacle villous, its centre elongated into a narrow column: achenes pear-shaped, flattened parallel to the subtending chaff: pappus none.

SUBTRIBE II GNAPHALIÆ. Bracts of the involucre all thin and scarious, often pearly, persistent. Receptacle naked. Floccose-woolly herbs.

29 Antennaria Heads completely dioecious, the staminate with undivided style, and bristles of the pappus thickened or barbellate at the apex: pappus of the pistillate flowers slender and united at the base.

30 Anaphalis Heads incompletely dioecious: staminate heads with a few hermaphrodite but sterile flowers in the centre: bristles of the pappus all separate, those of the sterile flowers little thickened upward.

31 Gnaphalium Heads all heterogamous: pistillate flowers very numerous, in more than one series; hermaphrodite fertile ones fewer, in the centre: bristles of the pappus slender, not thickened upward.

SUBTRIBE III EUNULEÆ Outer bracts of the involucre herba-

ceous. Receptacle naked. Tall herbs.

32 INULA Heads heterogamous, radiate, with all the flowers fertile: pappus of capillary bristles.

SUBTRIBE IV ADENOCAULEÆ Bracts of the involucre herbaceous, few, in a single series. Receptacle not chaffy. Heads few-flowered: both pistillate and hermaphrodite sterile flowers with similar dilated tubular corollas, the former rather fewer and with enlarged exerted achenes

33 Adenocaulon Achenes club-shaped and several times longer than the involucre, beset with some stipitate glands: pappus none.

SUBTRIBE V DIMERESEÆ Bracts of the involucre herbaceous, few, in a single series. Receptacle not chaffy. Flowers few, hermaphrodite, fertile. Pappus of rather few bristles.

34 Dimeresia Heads 2-flowered: involucre of 2 slightly united bracts, each almost enclosing a flower: pappus of 20 slightly united bristles that are early deciduous.

Subtribe 1 Filagineæ Fenzl Fl. ii 729. Heads heterogamous, mostly androgynous, discoid. Involucre of few scarious or firmer bracts Receptacle chaffy, a chaff or involucral bract enclosing or subtending each pistillate flower or achene. Corolla of the pistillate flowers a filiform tube, shorter than the style; of the hermaphrodite commonly sterile flowers regularly 4-toothed; their anthers sometimes only acutely sagittate or auriculate at base, and the short style-branches or undivided style not truncate. Achenes mostly smooth and even, small and seed-like, the very thin pericarp destitute of nerves or other markings.

25 MICRÖPUS Gaertn. Fr. t. 164.

Low floccose-woolly annuals with entire leaves and small heads of inconspicuous flowers in sessile clusters. Heads discoid, several-flowered; the pistillate flowers with filiform corolla forming a single series, each wholly enclosed in a conduplicate infolded and laterally compressed very gibbous chaff or scale, which becomes firm-coriaceous or cartilaginous in fruit, and falls at maturity with the completely enclosed achene, inclined at length to dehisce into two valves; the hermaphrodite but sterile flowers with 4-5-toothed tubular corolla few and naked in the centre. Involucre of few scarious bracts. Receptacle small and short. Achenes obovate and gibbous laterally compressed, smooth, its apex lateral. Pappus wanting.

M. Californicus F. & M. Ind. sem. Petrop 1835, 42. Stems slender, 4-16 inches high, loosely white-woolly, simple or sparingly branched above, leafy to the top: leaves linear-oblong to oblong-lanceolate, entire, 6-8 lines long, densely tomentose with a fine somewhat silky white wool, the largest near the centre of the stem: heads in lateral and terminal clusters which are inclined to be spicate: fructiferous scales very woolly, under the wool smooth, half-obcordate, with a suberect beak terminating in a somewhat dilated scarious apex. Common on dry open hillsides, southwestern Ore-

gon and California.

23 STYLOCLINE Nutt. Trans. Am. Phil. Soc. viii, 338.

Low floccose-woolly annuals with entire alternate leaves and small heads of inconspicuous flowers in glomerate clusters. Heads many-flowered; the pistillate flowers with filiform corolla, several or many, in two or many series on the columnar receptacle, each with the ovary and achene loosely enclosed in the base or body of an ovate broadly boat-shaped chaff or scale of the receptacle, of scarious or firmer membranaceous texture: the hermaphrodite but sterile flowers few in the centre, on the narrow summit of the receptacle, involucrate but not enclosed by the 4 or 5 merely concave scales of the receptacle, their tubular corollas 4-5-toothed. Bracts of the involucre hyaline and inconspicuous or hardly any. Achenes obovate or oblong with a narrow base, slightly oblique or straight, the areola terminal. Pappus none to the achenes, commonly a few caducous scabrous bristles around the sterile flowers.

Ours of § ANCISTROCARPHUS Gray. Fertile flowers 5-10, their chaffy scales in not more than two series, boat-shaped and involving the achene, of firm-membranaceous texture, and with a hyaline tip; the 5 uppermost scales sterile and larger, forming an involucre around the sterile flowers, open, tapering into a rigid incurved hooked cusp, persistent, and at length stellately spreading.

S. flaginea Gray Proc. Am. Acad. viii, 652 Canescent with a fine and appressed wool: stems slender, 1-10 inches high, erect, or diffuse and branching from the base: leaves narrowly linear or somewhat dilated upward, 6-8 lines long: involucre outside of the woolly fructiferous scales obscure or none: pappus to sterile flowers none. On dry stony hillsides, southwestern Oregon and California.

27 PSILOCARPHUS Nutt. l. c.

Low floccose-woolly annuals with entire mostly opposite leaves and small heads of inconspicuous flowers in terminal capitate clusters and in the forks of the branching stems, involucrate by the upper leaves. Heads discoid, many-flowered; the pistillate flowers with filiform corolla, numerous, in several series on the depressed-globose receptacle, each loosely enclosed in an obovate or semicordate hooded-saccate visiccular or inflated chaff or scale of membranaceous texture clothed with soft wool, its apex introrse and more or less beaked with a hyaline scale; the hermaphrodite but sterile flowers few and naked in the centre, with tubular 4-5-toothed corolla. Bracts of the involucre few, small, scarious. Achenes oblong or cylindraceous and moderately compressed, straight, small and loose in the sack of the scale, which is more or less open down the inner face. Pappus none.

* Leaves all tapering below; the midrib not prominent: canescent with close wool throughout: fructiferous bracts not over a line long.

P. tenellus Nutt. l. c. Canescently tomentose throughout with fine appressed wool which soon detaches from the stem: stems at length much depressed and branched, 1-3 inches long: leaves spatulate, 3-6 lines long: heads very numerous, 2-3 lines in diameter: achenes half-line long, obovate-oblong. In low grounds, Washington to California.

P. Oreganus Nutt. l. c. Silky-lanate: stems erect, 2-6 inches high, branching from near the ground: leaves nearly linear, attenuate below, 4-6 lines long: heads numerous, 4-6 lines in diameter; achenes oblong-cylindrical. Low grounds and roadsides, Oregon and Washington.

** Leaves little, and those subtending the heads seldom at all narrowed at base: herbage and especially the heads loosely floccose-woolly

P. elatior Gray Syn. Fl. i, pt. 2, Supp. 448. *P. Oreganus* var. *elatior* Gray. Erect and caulescent, or at length with spreading branches, 3-6 inches high, robust: leaves lanceolate or subspatulate-linear, 6-12 lines long: heads 4-6 lines broad, very leafy-subtended, loosely arachnoid-woolly, the wool of the fructiferous bracts shorter and mostly close: achenes cylindrical. Low places, Willamette and Columbia river valleys.

P. brevissimus Nutt. l. c. Stems very short, mostly simple: leaves oblong or lanceolate, 2-5 lines long, seldom surpassing the leaves: heads solitary or very few, very woolly: achenes cylindrical or slightly clavate. "Plains of the Oregon" Nuttall, to California.

28 HESPEREVAX Gray Pac. R. Rep. iv 101, t. ii.

Low annuals with mostly opposite leaves and small heads of inconspicuous flowers. Heads discoid, many-flowered; the pistillate flowers with filiform corolla in several series on a convex villous and centrally elevated columnar receptacle, each subtended by an ovate barely concave chartaceous chaffy scale: hermaphrodite but sterile flowers several on the apex of the columnar receptacle, involucre by a whorl of 3-7 coriaceous open bracts. Bracts of the involucre resembling the chaff of the receptacle. Pappus none.

H. brevifolia Greene Fl. Fr. 102? *Evax caulescens* Gray in part. Floccose-woolly: stems 4-12 lines high, simple, or branching from the base, often depressed: leaves lanceolate, 4-6 lines long, tapering into a slender petiole: heads inconspicuous, in sessile terminal or axillary clusters, or solitary, a line or two long: chaffy scales of the receptacle, becoming rigid, those subtending the sterile flowers thicker and woolly inside: achenes obovate-oblong with a narrowed base, straight, more or less compressed parallel to the subtending chaff, very smooth. Dry barren spots in prairies, southwestern Oregon and California.

Subtribe ii *Gnaphalæx* Less. Syn. 269. Heads discoid, heterogamous or androgynous or dioeciously homogamous; the hermaphrodite or staminate flowers when in the same head much fewer than the pistillate ones; pistillate flowers with filiform tubular corolla shorter than the style; the staminate flowers with style or style-branches mostly truncate, all usually with capillary pappus. Receptacle without bracts or chaff. Bracts of the involucre numerous, more or less scarious or with scarious and often colored or petaloid summits. Anthers with slender tails.

29 ANTENNARIA Gært. Fruct. & Sem. ii, 410, t. 167.

Diœcious or polygamo-diœcious perennial herbs with alternate leaves and many-flowered heads of inconspicuous flowers. Heads discoid; the pistillate flowers with filiform truncate corolla shorter than the 2-cleft style; staminate with tubular 5-lobed corolla and style with undivided truncate apex. Involucre of imbricated, scarious, persistent bracts, at least their tips white or colored. Receptacle flat or convex, naked. Achenes small, nearly terete or flattish, mostly glabrous. Pappus a single series of capillary bristles, those of the fertile flowers very slender, connate at base, and so falling from the achene in a body; those of the sterile often crisp, mostly thickened at the apex.

§ 1 Bristles of the pappus of the staminate flowers hardly at all thickened, but minutely barbellate near the apex: achenes obscurely 2-3-nerved, pubescent, the short hairs with 2-lobed and at length biuncinate tips. Bracts of the campanulate or somewhat turbinate involucre brownish.

A. dimorpha T. & G. Fl. ii, 431. Depressed, caespitose, forming dense matted tufts from a few inches to a foot or more in diameter and only an inch or two high: the thickish rootstocks creeping: stems 1-2 inches high, very leafy: leaves spatulate, attenuate below to a petiole, 6-12 lines long whitish-tomentose both sides: heads solitary, 3-4 lines high: bracts of the involucre well imbricated, the outer successively shorter and obtuse, the inner acute or acuminate; of the fertile heads narrow with hyaline acuminate tips: achenes oblong, pubescent: pappus of the fertile flowers copious, of soft and very slender bristles that are not at all thickened upward. Common on dry plains east of the Cascade mountains, Brit. Columbia to California and the Rocky Mountains.

A. flagellaris Gray Proc. Am. Acad. xvii, 212 Silky-lanate: stem solitary, 6-20 lines high, from a slender rootstock: lower leaves subulate from a very broad and somewhat clasping base, producing from their axils slender wiry stolons 2-6 inches long, with a tuft of leaves and a bud at their apices which root and form new plants: cauline leaves linear, 10-14 lines long, not at all narrowed at base: heads solitary, 3-4 lines high: bracts of the involucre in few ranks, but little unequal, acute or the inner ones shortly acuminate. On barren rocky ridges in the mountains of eastern Oregon and Washington.

A. stenophylla Gray l. c. "Stems erect from a subterranean caudex, slender, 4-6 inches high, without stolons, leafy, terminated by a capitulum-form glomerule of 2-4 heads: leaves very narrowly linear or almost filiform, attenuate to both ends (the larger 3 inches long), silvery-woolly: heads barely 3 lines long: involucre bracts in both sexes broadish and obtuse, dark brown, or in the male the inner ones with white tips: achenes (two thirds of a line long), minutely hirtellous-scarious: female pappus scanty, only a line long: * *. High hills Union Co. eastern Oregon *Cusick*."

§ 2 Bristles of the staminate pappus stout, with clavate or scarious-dilated tips.

* Not surculose by stolons, 6-12 inches high: pistillate heads narrow, cylindraceous or clavate: achenes glandular.

A. Geyeri Gray Pl. Fendl. 107. Pubescence appressed silky-canescens: stems numerous from a lignescent branched base, 3-8 inches high: leaves

spatulate or oblanceolate, 3-12 lines long, mostly acute: heads numerous, 3-4 lines high, cylindraceous, or the staminate campanulate, in terminal spicately or cymosely disposed glomerules: involucre very woolly at base; of the pistillate heads commonly 4 lines long, of the staminate shorter, the inner in both with conspicuous rose-purple or ivory-white tips which in the latter are obtuse, in the former narrower and acute. In dry open woods, eastern Washington to California, not common.

* * Not surculose-stoloniferous: stems simple from the subterranean branching caudex, rather strict, leafy, naked at the summit, and bearing a mostly cymose-compound cluster of heads: inner bracts of the staminate involucre all with conspicuous ivory-white obtuse tips; those of the pistillate hwit hardly any tips: herbage silvery-lanate: larger lower leaves 3-nerved.

A. luzuloides T. & G. Fl. ii, 430. "Closely silky-woolly: stems slender 8-12 inches high: leaves all narrowly linear or some of the lowest narrowly lanceolate-spatulate, small, uppermost linear-subulate: heads small (2 lines or the pistillate barely 3 lines long), several or numerous: involucre glabrous nearly or quite to the base; its inner bracts in the pistillate heads obtuse: achenes glandular; the spatulate and as it were petaloid tips of the staminate pappus obtuse." Brit. Columbia to Oregon and Wyoming, east of the Cascade mountains.

A. argentea Benth. Pl. Hartw. 319. Silvery lanate with a very fine and somewhat strigose pubescence: stems slender, 10-20 inches high, leafy, leaves linear-lanceolate or broader to linear, 1-4 inches long, attenuate below to a margined petiole with a dilated and somewhat clasping base, more or less prominently 3-nerved: heads small numerous, panicled: involucre glabrous, 1-2 lines high, its bracts obtuse or acutish: tips of the staminate pappus dilated. Dry grounds, Washington to California.

A. lanata Greene Pitt. iii 288. *A. Carpathica* R. Br. as to the American plant. Densely white-woolly: stems simple, 8-12 inches high: lower leaves spatulate-lanceolate, 1-3 inches long, attenuate below to a slender petiole, the upper linear, with conspicuous scarious tips: heads several to many, in a close capitate terminal cluster: involucre 2-3 lines high, densely woolly at base, the inner bracts with conspicuous white tips; of the staminate flowers broad and obtuse, of the pistillate linear and acute: achenes glabrous: pappus of the staminate flower of moderately dilated bristles. On high mountains, Brit. Columbia to eastern Oregon.

* * * Surculose-proliferous by either subterranean or humifuse and leafy shoots or stolons.

+ Involucre woolly at base.

A. media Greene l. c. 286. *A. alpina* of authors as to the American plant. Somewhat cespitose: radical shoots not very numerous, short: densely silky-woolly: flowering stems 1-6 inches high: radical leaves broadly spatulate to obovate, 4-10 lines long; cauline linear-spatulate to linear: heads few to several; the pistillate sessile in a close capitate cluster, with brown narrow lanceolate acute involucre bracts; the staminate heads often somewhat panicled, with oblong mostly obtuse bracts with scarious white tips: pappus but little if at all thickened upward. On the highest mountains, Brit. Columbia to California and the Rocky Mountains.

A. rosea Greene l. c. 281; *A. dioica* var. *rosea* Eaton. Loosely surculose: silvery-canescens and floccose: stems stoutish, 2-12 inches high, leafy: leaves of the sterile shoots oblanceolate to spatulate, an inch or more long; of the flowering stems linear-lanceolate to linear, 1-1½ inches long: heads usually numerous, in a close panicle: bracts of the involucre rose-color to red, about 2 lines long, lanceolate, mostly obtuse: staminate plant not seen. On the highest mountains, from Brit. Columbia to California.

A. pedicellata Greene l. c. 175 "Slender, more than a foot high, the stems with scattered spreading and rather conspicuous leaves instead of upright bracts: lowest leaves on short ascending branches hardly to be called stolons or surculi, small, oblanceolate, acute, nerveless, prominently tomentose on both face and thin: heads on slender pedicels of $\frac{1}{2}$ -1 inch in length, thus forming a lax subcorymbose cyme: involucre short and subcampanulate, their bracts in only about 3 series, the tips of the inner narrow, acutish or obtuse: achenes obscurely 5 angled as well as very minutely and sparingly glandular. Blue mountains of Oregon, *Cusick*."

A. umbrinella Rydberg. Canescent with a very short silky wool which becomes floccose upon the stem and upper leaves: flowering stems slender, 4-10 inches high from a shrubby branching base: leaves of the short sterile branches cuneate to spatulate, without any distinction of blade and petiole, 4-6 lines long 1-3 lines broad at the summit, permanently canescent on both sides, persistent for several years; leaves of the flowering stems oblong or narrower, erect, 3-8 lines long: heads few, sessile in a small capitate cluster: involucre campanulate, 2-3 lines high, its bracts broad and obtuse, the inner with conspicuous white tips: staminate plant not seen. On dry foothills of the Cascade mountains on the east side. Distributed by the author as *A. dioica* in 1881.

A. suffrutescens Greene l. c. 277. Low evergreen undershrub, the rigid procumbent branches leafy throughout, 1-3 inches long: leaves of the branchlets cuneate to spatulate, 2-6 lines long, obtuse and often emarginate, densely white-tomentose beneath, green and glabrate above; flowering stems slender, 3-6 inches long, with linear to subulate leaves and 1-5 comparatively large heads at the summit: involucre campanulate, 4-5 lines high: bracts of the pistillate involucre narrowly lanceolate, the inner with white acuminate hyaline tips those of the staminate more ample, with obtuse or emarginate to acute white tips: bristles of the pappus in the staminate flowers with evident though narrow and serrulate dilated tips. On rocky slopes of the Coast mountains in Josephine Co. Oregon.

A. Howellii Greene l. c. 174. *A. plantaginifolia* of authors as to the Pacific Coast plant. Freely surculose by slender stolons, the offsets biennial: flowering stems slender, 6-18 inches high, loosely woolly, bearing linear or lanceolate leaves and a cluster of several heads: radical leaves broadly spatulate to oblanceolate, acute or acutish and apiculate, attenuate below to a short petiole, 1-2 inches long, somewhat fleshy, canescent beneath, green and glabrate above: involucre campanulate, about 4 lines long, its bracts linear-lanceolate, the inner with very acute almost hyaline white tips: achenes oblong, pappillose-granular. Common in dry open grounds, western Oregon to Brit. Columbia.

+ + Heads loosely paniculate: involucre almost glabrous.

A. racemosa Hook. Fl. i, 329. Freely surculose by long and slender, sparsely leafy stolons, lightly woolly, becoming glabrate: flowering stems 6-20 inches high, slender sparsely leafy, bearing few or numerous, racemously or paniculately disposed heads, nearly all slender-peduncled: leaves thin, the radical broadly oval, acute at each end, slender-petioled, including the petiole 1-3 inches long, obscurely 3-nerved at base, rather veiny, densely tomentose beneath, green and glabrate above: cauline leaves similar but smaller and sessile, lanceolate: involucre campanulate, about 3 lines high; its bracts green or brownish; of the staminate heads obtuse, the inner obscurely white-tipped; of the pistillate heads narrow and mostly acute, with scarious white tips: Moist woods and rocky banks, Oregon to Brit. Columbia and the Rocky mountains.

30 ANAPHALIS DC. Prodr. vi, 241.

White-tomentose woolly perennial herbs with leafy erect stems entire leaves and numerous small discoid heads of yellow disk flowers. Heads dioecious but usually with a few hermaphrodite flowers in the centre of the pistillate heads. Bristles of the pappus of the staminate flowers but little if at all thickened at the apex; of the pistillate flowers not united at base but falling separately.

A. margaritacea B. & H. Gen. ii, 303. Stems stout, 1-2 feet high, tufted, very leafy, the white floccose wool rarely becoming tawny: leaves from rather broadly to linear lanceolate, 2-6 inches long, white-woolly beneath, soon glabrate and green above, the broader ones indistinctly 3-nerved: heads numerous, corymbosely cymose: involucre globular, its numerous bracts almost wholly pearly-white: achenes oblong. Common on dry ridges in forests, Alaska to California and across the continent.

30 GNAPHALIUM L. Gen. n. 943. CUDWEED.

Floccose-woolly herbs with sessile, and sometimes decurrent leaves and commonly numerous heads of small flowers in cymose clusters or glomerules. Heads heterogamous, discoid, fertile throughout, of few or many series of pistillate flowers surrounding a smaller number of hermaphrodite ones. Involucre pluriserial, imbricated, the scarious and commonly partly woolly bracts with or without colored papery tips or appendages. Style of hermaphrodite flowers 2-cleft. Pappus of numerous merely scabrous capillary bristles in a single series. Achenes terete or flattish, mostly nearly nerveless.

§ 1 **EUGNAPHALIUM** DC. Prodr. vi, 122. Bristles of the pappus not at all united at base, falling separately.

* Involucre woolly only at base, mainly scarious: heads paniculately or corymbosely cymose, or glomerate at the summit of the leafy stem and branches.

G. microcephalum Nutt. Trans. Am. Phil. Soc. vii, 404. Densely white-woolly throughout: stems slender, 1-2 feet high, from a biennial or more enduring root: leaves linear or the lower spatulate-lanceolate, with slenderly decurrent base, persistently white-woolly, 1-2 inches long: heads small, in small paniculate glomerules: involucre from turbinate to campanulate, 1-2 lines high, woolly at base, its ovate-lanceolate bracts mostly unequal, acute, pearly-white. On dry bars and bluffs along water-courses, Brit. Columbia to California.

G. Sprengelii H. & A. Bot. Beech. 150. Stems stout and strict, 1-3 feet high from a biennial root: leaves lanceolate or linear or the lowest narrowly spatulate, densely white-woolly or sometimes more thinly floccose, the short decurrent base or adnate auricles rather broad: heads numerous, in single to numerous glomerules, terminating the stem or few branches: involucre hemispherical, 3 lines high, white or yellowish, becoming slightly rusty in age, its bracts thin, oval and oblong, obtuse. Common on moist river-banks, Brit Columbia to California.

G. decurrens Ives Am. Journ. Sci. i, 380, t. 1. Stems strict, 2-3 feet high, corymbosely branched at the top and bearing cymulosely disposed

glomerules of rather broad heads: leaves very numerous, lanceolate or the upper linear, white-woolly beneath or rarely glabrate: involucre broadly campanulate, white, usually becoming rusty tinged, the thin scarious bracts ovate and oblong, acutish, only the innermost linear-lanceolate and acute. Rather open and dry grounds, Brit. Columbia to Washington.

** Involucre less imbricated, more woolly, the scarious tips of the nearly equal bracts not very conspicuous, dull-colored: heads glomerate and leafy-bracteate, only a line or so high: low branching annuals.

G. palustre Nutt. l. c. 403. Loosely floccose with long wool: stems erect or diffusely branching from the base, 2-8 inches high: leaves spatulate to lanceolate or linear, 6-12 lines long: heads very numerous, in small glomerules terminating the stem or branches: involucre campanulate, its bracts linear with glabrous white acute tips. Edges of ponds and damp places, Brit. Columbia to California and the Rocky mountains.

G. ULIGINOSUM L. Fl. Dan. 859. Appressed-woolly: stems 2-6 inches high, soon diffusely branched, leafy: leaves spatulate-linear or the lower spatulate-oblong, 6-12 lines long: heads numerous, in racemosely disposed glomerules: involucre narrow, 1-2 lines long, its linear-lanceolate or subulate bracts brown or soon becoming so. On moist banks and flats, Brit. Columbia to California and the eastern States: introduced from Eu.

§ 2 **GAMOCHÆTA** Webb Chlor. And. i, 151, as genus Bristles of the pappus united at base into a ring and deciduous together from the achene. Heads spicately or capitately glomerate, the lower glomerules leafy-bracteate. Involucre brownish, purple or sordid.

G. purpureum L. Sp. ii, 854. Canescent with close and dense silvery wool: stems simple, stoutish, 5-12 inches high, from a perennial root: leaves spatulate, 1-2 inches long, often becoming green and glabrate above; heads numerous, in an oblong or cylindraceous or spiciform inflorescence: involucre campanulate, about 2 lines long, its ovate or lanceolate bracts brownish or purplish. Common in fields and open places, throughout North America.

Subtribe iii, Euinula DC. Prodr v, 463. Heads heterogamous, with the pistillate flowers all ligulate and radiate, and the disk-flowers all hermaphrodite and fertile. Receptacle naked. Style-branches of the hermaphrodite flowers linear, rounded at the apex. Achenes mostly coriaceous.

32 INULA L. Gen. n. 956.

Tomentose or woolly perennial herbs with alternate leaves and large heads of yellow flowers. Heads radiate, many-flowered. Involucre imbricated, the outer bracts herbaceous. Receptacle flat or nearly so, not chaffy. Achenes more or less 4-costate. Pappus of scabrous capillary bristles.

I. HELENIUM L. Sp. 881. (ELECAMPANE.) Stems tufted from large thick roots, simple, or rarely somewhat branched, 2-6 feet high, densely pubescent above: leaves large, broadly oblong, rough above, densely pubescent beneath, denticulate, the radical ones acute at each end long-petioled, 10-20 inches long by 4-8 broad; cauline sessile or cordate-clasping at the base, acute at the apex, smaller: heads solitary or few, terminal, stout-peduncled, 2-4 inches broad: involucre hemispherical, nearly 1 inch high, its stout bracts ovate, foliaceous, pubescent: rays numerous, linear: achenes

glabrous, 4-sided. Roadsides and wast places: introduced from Europe.

Subtribe iv Adenocaulæ Gray Syn. Fl. i, pt. 2, 59. Heads heterogamous, discoid; both pistillate and hermaphrodite flowers with tubular more or less ampliate 4-5-toothed or -lobed corolla: involucre not scarious: receptacle naked: achenes elongated, striate or nerved: pappus none.

33 ADENOCAULON Hook. Bot. Misc. i, 119, t. 15.

Perennial herbs with slender stems alternate and dilated leaves on long margined petioles, and very small heads of whitish flowers. Heads several to many-flowered; the marginal ones pistillate only; the more numerous central ones hermaphrodite-sterile. Involucre of few thin herbaceous bracts. Receptacle flat, naked. Corollas all somewhat alike; of the sterile flowers broadly funnelform and deeply 4-5-cleft; of the fertile ones less ampliate, either regularly 4-lobed, or bilabiate with the outer lip 3-lobed. Style of the sterile flowers undivided; of the fertile ones with short and broad stigmatic branches. Anthers sagittate, the auricles minutely but evidently caudate, connate. Achenes obovate-oblong or clavate, very obtuse, very much exceeding the involucre, the upper part beset with stout stipitate glands.

A. bicolor Hook. l. c. Stems 1-3 feet high, leafy below: leaves dilated-cordate, 1-3 inches long by nearly as broad, coarsely sinuate-dentate or repand or slightly lobed, early glabrate and green above, white with thin cottony wool beneath: bracts of the involucre 4-5, in a single series, ovate, reflexed in fruit: fertile corollas regularly 4-lobed: achenes club-shaped, 2-3 lines long. Common in forests and woods, Alaska to California and east to Lake Superior.

Subtribe v. Dimeresæ. Heads homogamous, flowers all hermaphrodite and fertile. Corollas tubular and regular, 5-toothed.

34 DIMERESIA Gray Syn. Fl. i, pt. 2, Supp. 448.

Low annuals with opposite leaves and 2-flowered heads in dense terminal glomerules. Heads discoid, homogamous, the flowers hermaphrodite and fertile. Involucre of 2 herbaceous oblong concave bracts, a little united at base, each subtending and almost enclosing a flower. Corolla tubular, regular, 5-toothed. Anthers sagittate at base, the narrow auricles but little extended. Style-branches narrowly linear, obtuse, not appendaged, the bordering stigmatic lines extending to and around the naked apex. Achenes clavate-pyriform, glabrous, many-striate, with small epigynous areola, bearing a pappus of stout plumose bristles in a single series which are united at base in a ring and early deciduous together.

D. Howellii Gray l. c. 449. Stems stoutish, minutely floccose-wooly, simple or branched, 6-18 lines long, from a long annual taproot: leaves obovate or oval, including the broad petiole 10-14 lines long, thinly white-wooly beneath, soon glabrate and green above: heads numerous, subsessile, in dense terminal glomerules: corollas purplish or flesh-color: pappus

of 20 long-plumose bristles. On high stony hills, near Stein mountain southeastern Oregon.

Tribe iv Helianthoidæ B. & H. Gen. ii, 166. Heads heterogamous and the pistillate flowers ligulate and radiate, or rarely with corolla wanting, and then sometimes monœcious: or sometimes homogamous by the absence of the ray-flowers: disk-flowers all with regular 4-5-toothed tubular corolla. Receptacle usually with paleæ or chaff subtending either all the flowers or the marginal ones only. Anthers at most sagittate, not caudate at base. Style-branches of the hermaphrodite or sterile flowers truncate or continued into a hairy conical to subulate appendage. Pappus various or none: never of truly capillary bristles.

SUBTRIBE I IVEÆ. Heads androgynous, having few fertile flowers at the margin.

35 *Iva* Fertile flowers 1-5, with or without the tube or cup representing a corolla

SUBTRIBE II, AMBROSIEÆ. Heads homogamous, monœcious: the fertile ones with 1-4 apetalous flowers in a closed bur-like or achene-like pointed involucre; the sterile with numerous flowers in an open involucre.

* Involucre to the staminate flowers 5-12 lobed or almost truncate

36 *Ambrosia* Fertile involucre 1-flowered, achene-like, bearing no more than one row of tubercles or short spines.

37 *Gærtneria* Fertile involucre 1-4-flowered, 1-4-celled, armed with more than one row of tubercles or prickles.

** Involucre of the staminate heads of a few distinct scales

38 *Xanthium* Fertile involucre bur-like, 2-celled, 2-flowered, beset with numerous hooked prickles.

SUBTRIBE III VERBESINEÆ Heads radiate with either neutral or pistillate ray flowers or rayless: the disk-flowers perfect and fertile. Receptacle chaffy. Achenes thick and 3-4-angled or those of the disk laterally compressed.

* Receptacle elongated, becoming columnar.

39 *Rudbeckia* Rays neutral or rarely wanting: achenes quadrangular and compressed.

** Receptacle flat, concave or rarely conical;

+ Rays pistillate and fertile.

40 *Balsamorhiza* Pappus none: achenes of the ray obcompressed; of the disk prismatic-quadrangular or somewhat compressed.

41 *Wyethia* Pappus a chaffy-coriaceous crown or cup, continuous with the broad summit of the achene.

+ + Rays neutral, rarely wanting.

42 *Helianthella* Achenes flat, the thin edges more or less wing-like: pappus a pair of persistent awns or chaffy teeth and a crown of intermediate chaffy scales.

- 43 Helianthus** Achenes thick, quadrangular-compressed or with the sides convex and the angles obtuse: pappus a pair of caducous chaffy scales or awns.

SUBTRIBE IV, BIDENTIÆ Heads radiate, the rays neutral or pistillate. Receptacle chaffy with flat or barely concave deciduous chaff. Achenes all obcompressed Pappus of 2-4 teeth or awns from the angles, or none.

- 44 Coreopsis** Achenes never rostrate-attenuate nor with retrorsely barbed awns.

- 45 Bidens** Achenes neither winged nor beaked, 2-5-awned with retrorsely barbed persistent awns.

SUBTRIBE V, GALINSOGÆ Heads heterogamous with the ray-flowers when present, fertile; disk-flowers either perfect and fertile or sterile. Achenes neither compressed nor obcompressed. Pappus in both ray- and disk-flowers few to numerous chaffy scales.

- 46 Blepharipappus** Heads radiate; the rays pistillate: pappus of 12-20 thin scales with a stout midrib.

SUBTRIBE VI, MADIÆ Heads heterogamous; ray-flowers when present, fertile; disk-flowers either perfect and fertile, or sterile. Involucre a series of bracts, each subtending and more or less enclosing a ray-achene. Receptacle chaffy only at the margin, the chaff forming a sort of inner involucre or else subtending some or all of the disk flowers

* Achenes all laterally compressed; those of the ray wholly enclosed in the carinate strongly infolded bracts of the involucre.

- 47 Anisocarpus** Rays conspicuous and mostly numerous, fertile; disk-flowers numerous, sterile or the exterior ones fertile; with pubescent corolla and a pappus composed of fimbriate or plumose-lacerate scales.
- 48 Madaria** Rays numerous and conspicuous: disk-flowers without pappus, either all or only the central ones sterile.
- 49 Madia** Rays 1-12 or none, short and more or less inconspicuous: disk-flowers numerous or few, all fertile, destitute of pappus.
- 50 Harpæcarpus** Rays 4-8, very short and inconspicuous; disk-flower solitary, fertile, enclosed in a 3-5-toothed herbaeous cup: pappus none.

* * Achenes of the ray-flowers turgid, more or less oblique or incurved, never laterally compressed but mostly somewhat obcompressed: bracts of the involucre each investing an achene, rounded on the back.

- 51 Hemizonella** Involucre strongly 4-5-sulcate by the complete enveloping of the 4 or 5 achenes: disk-flower solitary in a sort of inner involucre: pappus none.
- 52 Hemizonia** Achenes of the ray-flowers obovate-triangular, with depressed terminal areola; disk-flowers numerous, with abortive achenes: pappus none.
- 53 Calycadenia** Achenes of the ray-flowers obovoid, the terminal areola little if at all oblique, triangular; of the numerous disk-flowers well formed, and sometimes truly fertile, surrounded by a circle of herbaeous bracts; pappus of conspicuous chaffy scales.

54 Centromadia Achenes of thera-flowers very oblique, the small terminal areola from the summit of the inner angle or face, on a narrow beak: receptacle convex or concave, chaffy throughout, the chaff distinct.

* * * Ray-achenes obcompressed or clavate, completely enclosed in the involucre bracts which are flattish on the back at base and their thin margins abruptly infolded.

55 Lagophylla Heads few-flowered: ray achenes about 5, obovate, much obcompressed, smooth: disk-flowers sterile: pappus none.

56 Layia Heads many-flowered: rays 8-20, with obovate or somewhat clavate smooth achenes; disk-flowers mostly fertile, their similar or narrower achenes often pubescent: pappus composed of bristles or subulate pointed scales or none.

57 Achyrachena Heads many-flowered; the flowers all fertile: achenes linear-cuneate or clavate, 10-ribbed, some or all of the ribs tuberculate-scabrous; those of the disk with a pappus of blunt, silvery-scarious scales in 2 series.

Subtribe i Ivaæ Heads androgynous, bearing few pistillate flowers at the margin; the more numerous staminate ones all or most of them subtended by slender chaffy bracts. Anther-tips short and obtuse, rarely pointed. Involucre open. Achenes usually large for the size of the head, free.

35 IVA L. Gen. n. 1059.

Herbs or shrubs with entire or dentate or dissected leaves, at least the lowest ones opposite, and small spicately or racemously or paniculately disposed or scattered and commonly nodding heads of inconspicuous flowers. Fertile and sterile flowers in the same heads: the former 1-5, marginal, with a small tubular corolla; the latter 7-20 (rarely only 2 or 3), with tubular-campanulate or funnel-form 5-toothed corolla. Bracts of the campanulate or hemispherical involucre 3-5, in a single series and more or less united into a cup. Receptacle chaffy with linear or spatulate scales subtending the sterile flowers. Anthers nearly distinct. Style in the fertile flowers deeply 2-cleft: of the sterile ones undivided. Achenes obovate, thick, often granulate without a disk at the apex. Pappus wanting.

I. axillaris Pursh Fl. 743. Herbaceous from somewhat woody creeping rootstocks; the stems or branches nearly simple, ascending, 10-20 inches high: leaves obovate or oblong to nearly linear, obtuse, entire, sessile, rarely over an inch long, even the uppermost usually much surpassing the mostly solitary heads in their axils: bracts of the hemispherical involucre connate into a 4-5-lobed or sometimes parted and sometimes merely crenate cup: bracts of the receptacle reduced to filiform chaff. In saline or sandy places, Brit. Columbia to California New Mex. and the Saskatchewan.

I. xanthifolia Nutt. Gen. ii, 185 "Tall and coarse (3-5 feet high), pubescent, at least when young: leaves mainly opposite, long-petioled, broadly ovate, ample coarsely or incisely serrate, acuminate, 3-ribbed at base, pubescently scabrous above and when young canescent beneath: heads nearly sessile, crowded in narrow spiciform clusters which are aggregated in axillary and terminal panicles: involucre depressed-hemispheric, biserial, the outer of 5 broadly ovate herbaceous bracts; inner of as many mem-

branceous dilated-obovate or truncate ones which are strongly concave at maturity and half embrace the obovate-pyriform and glabrate akenes." Idaho and eastward.

Subtribe ii, Ambrosiæ DC. Prodr. v, 522. Heads unisexual, monœcious; the fertile with solitary or 2-4 completely apetalous or nearly apetalous pistillate flowers in a closed nut-like or bur-like involucre, only the style-branches ever exerted: the sterile of numerous staminate greenish or yellowish flowers with obconical corollas in an open involucre, the heads in a raceme or spike of centripetal evolution. Achenes turgid-obovoid or ovoid. Pappus wholly wanting.

* *Involucral bracts of the staminate head united. Receptacle low.*

36 AMBROSIA Tourn. L. Gen. n. 1057.

Coarse branching monœcious or rarely diœcious herbs with mostly lobed or dissected opposite and alternate leaves and small heads of greenish flowers the staminate heads racemose or spicate without subtending bracts, the pistillate below, commonly in small clusters in the axils of leaves or bracts. Involucre of the pistillate heads globose-ovoid or top-shaped, closed, 1-flowered, usually armed with 4-8 tubercles or spines: corolla none. Stamens none: style-branches filiform: of the staminate heads mostly hemispheric or saucer-shaped, 5-12-lobed, open, many-flowered. Receptacle nearly flat, naked or with filiform chaff. Corolla funnellform, 5-toothed. Style undivided, penicillate at the apex.

A. artemisiæfolia L. Sp. 987. Pubescent, puberulent or hirsute paniculately branched annual, 1-6 feet high: leaves thin, bipinnatifid or pinnately parted with the divisions irregularly pinnatifid, or sometimes nearly entire, on the flowering branches often undivided; racemes of sterile heads very numerous, 1-6 inches long, the involucre hemispheric, crenate, the receptacle chaffy: fertile heads obovoid or subglobose, mostly clustered, 1-2 lines long, short-beaked, 4-6-spined near the summit, sparingly pubescent, Dry plains and fields, eastern Washington to Brit. Columbia and the eastern States.

37 GÆRTNERIA Medicus Act. Pal. iii, 244.

FRANSERIA Cav.

Herbs or woody plants with chiefly alternate, lobed or divided leaves and small monœcious rayless heads of greenish flowers: the staminate numerous, in terminal spikes or racemes: the pistillate solitary or clustered in the axils of the upper leaves. Involucre of the pistillate heads ovoid or globose, closed, 1-4-celled, 1-4-beaked, armed with several rows of spines and forming a bur in fruit: corolla none or rudimentary; style deeply bifid, its branches exerted; stamens none; achenes obovoid, thick, solitary in the cells: pappus none. Staminate heads sessile or short-peduncled, their involucre broadly hemispheric, open, 5-12-lobed; receptacle chaffy: corolla regular, the tube short, the limb 5-lobed: style undivided: anthers scarcely coherent, mucronate tipped.

G. acanthocarpa Brit. Mem. Torr. Club v, 332. *Franseria Hookeriana*

Nutt. Stems 1-3 feet high, from an annual or biennial root, diffusely branched from the base, hirsute-pubescent or hispid, sometimes canescent with strigose-sericeous pubescence when young: leaves of ovate or roundish outline, 1-3 inches broad bipinnatifid or the upper oblong and only pinnatifid: staminate racemes solitary or paniculate: pistillate involucre armed with flat and thin lanceolate-subulate smooth and glabrous long and straight spines, 3-4 lines long, commonly 1-flowered. On sandy plains and river-banks, Brit. Columbia to California and Nevada.

G. bipinnatifida O. Kt'z. *Rev. Gen.* i, 339. *Franseria bipinnatifida* *Nutt.* Herbaceous perennial with stout procumbent stems 2-3 feet long, somewhat hirsute: leaves ovate in outline, 1-2 inches long, 2-3-pinnately parted into oblong-linear divisions and small oblong lobes, canescent with soft tomentum or fine hirsute-sericeous pubescence: staminate heads rather large, in dense spikes or racemes: pistillate heads ovate-fusiform, armed with rather short and thick but flattish tubercle-like spines, their acute tips sometimes incurving. On sandy beaches along the coast, Brit. Columbia to California.

G. Chamissonis O. Kt'z. l. c. *Franseria Chamissonis* *Less.* Stems procumbent, 2-3 feet long, from a perennial root: leaves cuneate-obovate or oblong-ovate with a cuneate base, 3-5-nerved at base, obtusely serrate, the lower often lacinate-incised: staminate spikes or racemes dense, of rather large heads; pistillate heads ovate, armed with rather short and thick but flattish canaliculate tubercle-like spines. Sandy sea-beaches, Brit. Columbia to California. Not common.

* * *Involucre of the staminate heads of few distinct bracts Receptacle cylindrical.*

XANTHIUM *Tourn. L. Gen.* n. 1056- (COCKLE-BUR)

Coarse annuals with branching stems, alternate and usually lobed or toothed leaves, and mostly clustered heads of greenish or yellowish flowers, in terminal or larger axillary clusters of both sexes, the staminate uppermost. Involucre of the globular sterile heads 1-2 series of small narrow bracts. Receptacle distinctly paleaceous, a cuneate or linear-spatulate chaffy bract partly enclosing each sterile flower. Filaments monadelphous. Anthers distinct but connivent, the inflexed apical appendage mucronate. Sterile style unappendaged. Fertile head a closed and ovoid bur-like 2-celled and 2-flowered involucre, 1-2-beaked at the apex, the surface clothed with uncinat-tipped prickles: each flower a single pistil, maturing a thick ovoid achene, the two permanently enclosed in the indurated prickly involucre.

* Leaves cordate or ovate, 3-ribbed from the base, with dentate margins, and often incised or lobed, on long petioles: axiles unarmed: fruiting involucre with 2 prominent beaks.

X. STRUMARIUM *L. Sp.* 987. Rough: stems 1-6 feet high: leaves slender-petioled, broadly ovate to orbicular, 3-ribbed and more or less cordate at base, the lower often 10 inches broad, irregularly dentate and more or less 2-5-lobed: fruiting involucre 6-9 lines long, glabrous or pubescent; the beaks straight and rarely at all hooked at maturity. In waste places. Naturalized from Europe.

X. Canadense *Mill. Dict. ed. 8, No. 2.* Stems stout, 1-2 feet high, often punctate with brown spots: leaves ample, broadly ovate, coarsely and irreg-

ularly serrate: fruiting involucre about an inch long, densely beset with rather long prickles, the stout beaks at maturity usually hooked at the tip or incurved, the surface and base of the prickles more or less hispid, sometimes glabrate. Sandy shores and waste places Brit. Columbia to California and the eastern States.

* * Leaves attenuate at both ends, short-petioled; their axils triply spinescent.

X. SPINOSUM L sp. 987. Stems stout, 1-2 feet high, much branched: leaves ovate-lanceolate with cuneate base, the larger 3-lobed or incisedly pinnatifid, green and glabrate above, white-tomentose beneath, with long and slender 3-parted yellow spines in the axils: fruiting involucre solitary or few, in upper axils, cylindraceous, half-inch long, obtuse, armed with short weak prickles, inconspicuously 1-2 beaked or pointless

Subtribe iii, Verbesineæ Less. Rays ligulate and either fertile or neutral, not rarely wanting, the ligule not becoming papery and persistent on the fruit, but sometimes marcescent. Disk-flowers hermaphrodite and fertile or often some of the inner ones sterile, subtended and sometimes enwrapped by the chaff of the receptacle. Anthers often blackish. Achenes various but those of the disk never obcompressed. Pappus cupulate or coroniform, or of teeth or awns from the principal angles, or of some squamellæ, or of a few stout bristles, or none.

39 RUDBECKIA L. Gen. n. 980.

Mostly perennial herbs with alternate leaves and rather large and showy heads terminating the stem or branches. Heads many-flowered; the ray-flowers neutral, in a single series, those of the disk tubular and perfect. Bracts of the involucre foliaceous, in about two series, spreading. Receptacle conical or often more or less elongated and spiciform. Disk-corollas with a short but usually manifest proper tube and erect or spreading teeth. Style-branches tipped with an acute or obtuse hispid appendage. Achenes 4-angled, prismatic, in some species quadrangular-compressed. Pappus a coriaceous or firm-scarious and often 4-toothed crown, sometimes deep and cupuliform. sometimes obsolete, or none.

R. California Gray Proc. Am. Acad. vii. 357. Stem simple, 2-6 feet high 3-5-leaved, the long and naked peduncle-like summit bearing a single large head: leaves finely soft-pubescent, 3-10 inches long, ovate to oblong-lanceolate, acuminate, pinnately veined somewhat toothed; the middle ones sometimes with a pair of lateral lanceolate lobes at base, uppermost sessile, lower tapering into a slender petiole: bracts of the involucre linear: rays 2-3 inches long, narrowyl oblong, yellow: disk columnar 1-2 inches long, dusky brown: achenes compressed-prismatic, 2 lines long, crowned with a pappus of 4 irregular thickish chaffy teeth, more or less united at base into a cup. Wet meadows and cold spring runs, southwestern Oregon to California.

R. occidentalis Nutt. Trans. Am. Phil. soc. vii, 355. Nearly glabrous and smooth, or somewhat scabrous-puberulent: stems stout, 2-8 feet high, nearly simple: leaves ovate or ovate-lanceolate, acuminate, entire or irregularly and sparingly dentate, 4-8 inches long, upper ones sessile by a rounded or subcordate base, lower ones abruptly contracted into a short

winged petiole: heads few, on long peduncles; rays wholly wanting; disk brownish, ovoid to oblong, becoming 1-2 inches long; its chaffy bracts puberulent at tip: achenes 2 lines long, with conspicuous coroniform scarious pappus. Woods along streams, Oregon to California and the Rocky Mountains.

40 BALSAMORRHIZA Hook. Fl. i, 310 (under *Heliopsis*).

Low perennial herbs with scape-like stems from thick terbinthine roots, mostly radical leaves and rather large mostly solitary heads of yellow flowers. Heads many-flowered, heterogamous, with fertile ray- and perfect disk-flowers. Involucre hemispherical or broader, of more or less imbricated bracts, the outer loose and herbaceous, or often foliaceous. Receptacle flat or barely convex, with linear-lanceolate chaff subtending and partly embracing the achenes. Rays oblong or lanceolate, with short tube; disk-corollas cylindrical. Style-branches of perfect flowers slender, hispid, at least on the filiform appendages. Achenes of the ray flattened parallel with the bracts, oblong; of the disk prismatic-quadrangular or more or less compressed. Pappus none.

§ KALLIACTIS Gray Pl. Fendl. 81. Ligules becoming thin-papery, and persistent on or very tardily deciduous from the canescently pubescent achenes.

B. Careyana Gray l. c. "Cinereous-pubescent, slightly scabrous: flowering stems a foot high, bearing 3 or 4 small lanceolate leaves and 2 to 7 racemously disposed heads: leaves subcoriaceous, entire, reticulated; the radical cordate-lanceolate, a span or more in length; involucre half-inch or more high: ligules oval, hardly inch long, abruptly contracted into a very short but distinct tube: style-branches of the disk-flowers subulate and very hispid throughout. Sandy plains on the Clearwater Idaho, and on the Wallawalla Washington.

§ 2 ARTORHIZA Nutt. l. c. 350 Ligules deciduous. Achenes glabrous. Heads 1-3. Leaves entire or merely serrate, the principal ones cordate or with cordate base and long petioled.

B. sagittata Nutt. Proc. Am. Phil. Soc. vii, 350. Silvery-tomentulose or canescent, and the involucre white-woolly: stems numerous from the crown of the thick root, 6-20 inches high, erect or ascending, with a pair of small linear to spatulate leaves near the middle: radical leaves from cordate-oblong to hastate, entire or nearly so, 4-10 inches long, the base 2-6 inches wide, on longer petioles: rays 1 to nearly 2 inches long. British Columbia to California and the Rocky Mountains;

B. deltoidea Nutt. l. c. More or less pubescent or glabrate: stems numerous from the crown of the thick root, erect or ascending, 5-20 inches high, with a pair of small lanceolate leaves near the centre: radical leaves broadly cordate to cordately ovate-lanceolate, sometimes nearly deltoid, from irregularly serrate to entire, 5-10 inches long acute or shortly acuminate, very long-petioled: involucre woolly or tomentose at base; the bracts in 2 series, longer than the disk, linear-lanceolate, the outer largest, foliaceous, spreading: rays 12-20, 1-2 inches long. Open ridges, Willamette Valley to California.

§ 3 EUBALSAMORRHIZA Nutt. l. c. Ligules deciduous. Achenes glabrous. Stems monocephalous. Leaves varying from laciniately dentate to pinnately or bipinnately divided.

B. terebinthacea Nutt. l. c. 349. Slightly and minutely if at all canescent: stems several from the crown of the rather small thick root, at length 10-12 inches long and prostrate, usually with a pair of small opposite linear leaves below the middle: leaves from green and glabrate to minutely hispidulous-scabrous, at length rigid and reticulate-veiny, oblong-lanceolate with cuneate or truncate base, 4-8 inches long, spinulose-dentate or sometimes crenate-dentate or laciniately-incised or even pinnatifid: involucre lanate-tomentose, about an inch high, of numerous narrow linear-lanceolate and attenuate loose and nearly equal herbaceous bracts. On high stony ridges, eastern Washington and Oregon to Idaho.

B. Hookeri Nutt. l. c. Canescent with fine sericeous or more tomentose pubescence, but not at all hirsute: stems 4 inches to at length a foot long: leaves lanceolate or elongated-oblong in outline, pinnately or bipinnately parted into lanceolate or linear divisions, or lobes, or some of them only pinnatifid or incised, nearly equalling the stems: involucre from canescently puberulent to lanate; its bracts from linear- to oblong-lanceolate, either unequal and well imbricated or some of the outermost ones foliaceous and loose. On stony ridges, Washington to California and Nevada.

B. incana Nutt. l. c. 350. Densely white-tomentose throughout: stems 4-8 inches high: leaves oblong- or deltoid-lanceolate in outline, pinnately or bipinnately parted or lobed, the divisions oval or oblong: bracts of the involucre lanceolate to linear, 8-10 lines long, imbricated in 2 or 3 series: rays 12-14, more than an inch long: chaff of the receptacle much shorter than the flowers. On high rocky ridges, eastern Washington to California and the Rocky Mountains.

B. hirsuta Nutt. l. c. Roughish-hirsute or hispidulous, not tomentose nor canescent: stems 10-16 inches high, with a pair of opposite leaves below the middle: leaves lanceolate in outline, 4-8 inches long, short-petioled, pinnately parted or divided, the divisions incisely toothed or again pinnatifid, soon rigid: involucre 8-12 lines high, its bracts with ovate base and long attenuate tip or linear-lanceolate, hirsute-ciliate. Dry plains British Columbia to California, east of the Cascade Mountains.

41 WYETHIA Nutt. Journ. Acad. Philad. vii, 30.

Coarse perennial herbs with usually simple stems, alternate mostly entire leaves and large heads of yellow flowers. Heads many-flowered. Bracts of the campanulate involucre loosely imbricated in two or three series, nearly equal, foliaceous, the innermost smaller and resembling the chaff. Receptacle slightly convex; the chaff lanceolate, carinate, acute, as long as the flowers and embracing them. Rays large, pistillate, sometimes with sterile filaments. Disk-corollas cylindrical, elongated, with a short proper tube, 5-toothed. Style-branches in the ray-flowers glabrous: in the disk elongated, filiform, revolute, strongly hispid on the inner faces. Achenes stout, elongated, 4-5-angled, terminated with a coroniform 5-10-toothed or laciniately pappus, one or more of the teeth usually prolonged into a rigid persistent awn.

W. helianthoides Nutt. l. c. Stems leafy, 6-18 inches high, simple and

bearing a single large head or rarely 3 or 4: leaves from oval to broadly lanceolate, denticulate or entire, mostly narrowed at base to a short margined petiole, 4-8 inches long: bracts of the involucre numerous, narrowly lanceolate, hispid-ciliate, usually with more or less colored tips: rays pale yellow to white, nearly 2 inches long: achenes 4 lines long, either prismatic-quadrangular or flattish, 12-nerved: pappus shorter than the width of the achene, sometimes minute, chaffy-coroniform and cleft into few or several teeth.

W. amplexicaulis Nutt. l. c. Glabrous and smooth throughout, balsamic-viscid: stems stout, 1-2 feet high, simple: leaves mostly lanceolate-oblong, entire or denticulate; radical 7-15 inches long by 3-4 broad, contracted below to a short winged petiole; upper cauline 2-6 inches long, partly clasping by a rounded or subcordate base: heads solitary or several, short-peduncled: involucre campanulate, about an inch high: its bracts broadly lanceolate, acute or obtuse often some of the outer ones larger and foliaceous: rays 5-20, 1-2 inches long, dark yellow; achenes 3-5 lines long: pappus unequally 3-8-toothed, one or two of the teeth often prolonged into awns. Common in wet places, British Columbia to Nevada and the Rocky Mountains.

W. lanceolata. Smooth and glabrous throughout: stems assurgent, 6-12 inches long, bearing a single large head: leaves lanceolate, 2-6 inches long, entire or obscurely dentate, all on short petioles or the uppermost barely sessile: bracts of the involucre lanceolate, 10-12 lines long, acute, or the innermost acuminate: rays bright yellow, 1½-2 inches long, pappus a cup or crown with very irregular laciniately cut teeth. In damp ground, Blue Mountains of Oregon.

W. robusta Nutt. l. c. *W. angustifolia* of authors as to the Oregon plant. More or less villous hirsute: stems stoutish, 1-3 feet high mostly erect, leafy, bearing a single large head: radical leaves narrow-lanceolate, 6-20 inches long, petioled, often sparingly sinuate-toothed; cauline lanceolate, acute, entire, tapering to the base, the lowest petioled: bracts of the involucre lanceolate, very hirsute, especially on the margins: pappus of 5-10 irregular stout teeth and mostly 1-4 stout awns. Common in damp soil, western Oregon and Washington.

42 HELIANTHELLA T. & G. Fl. ii, 333.

Perennial herbs with mostly simple stems, entire scattered and sessile leaves and solitary heads with yellow ray and yellow or purplish-brown disk-flowers. Heads many-flowered, the ray-flowers neutral: those of the disk perfect. Bracts of the involucre in about two series, loose, somewhat foliaceous. Chaff of the receptacle persistent, embracing the achenes. Corolla of the disk cylindrical, elongated, 5-toothed, with a very short proper tube. Branches of the style very hispid, more or less obtuse. Ovaries compressed, with one or both margins slightly winged and produced at the summit into a short auriculate and lacerate persistent appendages or into an awn, sometimes with intermediate squamellæ.

H. uniflora T. & G. l. c. "Minutely pubescent or somewhat scabrous or glabrate, 1-2 feet high: leaves more commonly opposite, sometimes all alternate, oblong-ob lanceolate, 2-6 inches long; lower short-petioled: involucre pubescent or slightly hirsute: rays a full inch long: achenes more or less ciliate: pappus a pair of long awns and rather conspicuous squamellæ. Eastern Oregon to the Rocky Mountains."

H. Douglasii T. & G. 1 c. Stems hirsute with spreading hairs, at least above, 1-4 feet high, striate-angled, leafy: leaves oblong-lanceolate, acutish, nearly sessile, triple-nerved, rough-pubescent, 2-4 inches long; bracts of the involucre linear-lanceolate to subulate, 6-9 lines long: rays an inch long: disk nearly an inch broad: achenes obovate, more or less ciliate, fringed: pappus a pair of elongated awns with more or less chaffy dilated base, or sometimes reduced to this base, and with mostly conspicuous squamellæ. Dry grounds eastern Oregon to British Columbia.

43 HELIANTHUS L. Gen. n. 979. (SUNFLOWER.)

Erect annual or perennial herbs with simple leaves and large heads of yellow flowers, or those of the disk sometimes brown or purple. Involucre hemispherical or depressed; its bracts imbricated in several series. Receptacle flat to conic, chaffy: the chaff subtending and more or less embracing the achenes. Ray-flowers neutral: those of the disk perfect and fertile, with short proper tube and 5-toothed limb. Anthers entire or minutely 2-toothed at the base. Style-branches tipped with hirsute appendages. Achenes thick, oblong or obovate, compress- or somewhat 4-angled. Pappus of 2 scales or awns, or sometimes with 2-4 additional ones, deciduous.

§ 1 Annuals. Involucre spreading, its bracts attenuate to a point. Disk-flowers brownish or dark purple. Receptacle flat or nearly so. Leaves petioled, 3-ribbed from or near the base, all but the lower usually alternate.

H. annuus L. Sp. ii, 904. Stems hispid or scabrous, stout, branched above, 2-6 feet high, or in cultivated forms sometimes 15 feet high: leaves all but the lowest alternate, broadly ovate, petioled, 3-nerved, dentate or denticulate, acute at the apex, rough on both sides, sometimes pubescent beneath cordate at base, 2-12 inches long: bracts of the involucre hispid and hispid-ciliate, the outer ovate and abruptly attenuate to a stout bristle; the inner lanceolate and attenuate: rays lanceolate, 1-2 inches long: disk an inch or more or in cultivated plants 4-10 inches in diameter: chaff of the receptacle 3-cleft: achenes obovate-oblong, appressed-pubescent to nearly glabrous. On sandy banks and plains, Brit. Columbia to California and Minnesota.

H. petiolaris Nutt. Journ. Acad. Philad. ii, 115. Stem strigose-hispid or hirsute, 1-3 feet high, simple or branched: leaves all but the lowest alternate, petioled, oblong or ovate to lanceolate, rough on both sides, usually paler beneath, 1-3 inches long, entire or denticulate, mostly narrowed at the base to a long and slender petiole: bracts of the involucre lanceolate or oblong-lanceolate, with acute and mucronate or sometimes more attenuate tips, seldom at all ciliate: rays oblong, 12-18 lines long: disk 6-10 lines in diameter: chaff of the receptacle 3-toothed, not longer than the corollas: achenes villous-pubescent. On dry prairies, Washington to Arizona Minnesota and the Northwest Territory.

H. exilis Gray Proc. Am. Acad. vi, 545. More or less hirsute: stems slender, 1-2 feet high, branching: leaves linear-oblong or lanceolate, nearly entire, obscurely 3-nerved at base, tapering into a short petiole: heads small, on slender sometimes leafy-bracted peduncles: involucre loosely hirsute, its bracts linear-lanceolate, attenuate-acuminate: rays 5-8: chaff of the receptacle produced into an awn-like cusp which equals or surpasses the dark-purple corollas: achenes nearly glabrous: pappus of 2 ovate-lanceolate chaffy scales.

In moist meadows, southern Oregon and northern California.

§ 2 Perennials. Receptacle convex to low-conical. Lower leaves almost always opposite. Disk-flowers yellow with dark anthers.

H. Nuttallii T. & G. Fl, ii, 324. Stems slender, 1-4 feet high, commonly simple: leaves lanceolate or the upper linear, broader toward the base and tapering to an acute or acuminate apex, serrulate or entire, 3-6 inches long by 3-9 lines broad, short-petioled or sessile, scabrous both sides, in small plants not rarely all opposite: heads half-inch high or more: bracts of the involucre naked, or somewhat hirsute at base, lanceolate-subulate, attenuate, fully equalling the disk, herbaceous, loose or soon squarrose-spreading: rays about an inch long: paleæ of the pappus long and narrow. In damp places, eastern Oregon to Brit. Columbia and the Rocky Mountains.

H. Cusickii Gray Proc. Am. Acad. xxi, 413. Stems numerous from a thick perpendicular resiniferous root, forming clumps, at length resting on the ground in an entangled mass, about a foot long: leaves mostly alternate, linear-lanceolate, entire, obtusish, attenuate at base but sessile: involucre about half-inch high, its linear-lanceolate bracts hairy-ciliate, acuminate, lax: rays 1-1½ inches long: achenes glabrous: paleæ of the pappus oblong-lanceolate. On dry hills and sage-brush plains, eastern Oregon and Washington.

H. TUBEROSA L. Sp. ii, 906. (JERUSALEM ARTICHOKE). Stems usually pubescent or hirsute, 5-10 feet high, branching at the top: leaves mostly alternate on the branches and on the upper part of the stem, ovate or subcordate, sometimes oblong, acuminate, thickish-membranaceous, dull green minutely pubescent and occasionally cinereous beneath, soon scabrous above: bracts of the involucre lanceolate, attenuate-acuminate, hirsute, at least the margins toward the base: rays 12-20, often 1½ inches long: chaff of the receptacle hirsute-pubescent on the back: achenes more or less pubescent: horizontal rootstocks enlarging at the apex into tubers which are sweet and edible. Escaped from cultivation and becoming common along Rail Roads.

Subtribe iv, Bidentidæ Less. Syn. 229. Achenes obcompressed or sometimes terete and the subtending chaffy bracts flat or barely concave. Ray-flowers ligulate, neutral, or wanting; disk-flowers hermaphrodite and fertile. Style-tips of the disk flowers produced into a cusp or cone or sometimes truncate.

44 COREOPSIS L. Gen. n. 981.

Annual biennial or perennial herbs with mostly opposite leaves and long-peduncled heads of yellow pink or brown ray-flowers. Involucre usually hemispheric, its bracts in 2 distinct series, all united at base, those of the outer series commonly narrower and shorter than the inner. Receptacle flat or slightly convex, chaffy, the chaff flat or concave. Ray-flowers neutral; those of the disk perfect, fertile, their corollas with slender tube and broader 5-toothed limb. Anthers mostly entire at base. Style-tips truncate or subulate. Achenes flat, orbicular to oblong, winged or wingless,

C. Atkinsoniana Dougl. Lindl. Bot. Reg. t. 1379. Glabrous throughout: biennial: stems stoutish, 1-4 feet high, with numerous opposite branches:

leaves usually all opposite, the lower bipinnately parted or divided, with linear lobes; the upper trifoliolate, with entire linear leaflets, or the uppermost linear and entire: heads numerous, in open cymes: bracts of the involucre more or less scarious-margined, the outer lanceolate to subulate, about a line long; the inner broad-ovate and 3-4 lines long: rays 8-10 lines long by half as broad, yellow with brown base, obtusely 3-lobed at the summit; disk-flowers dark purplish-brown: achenes elliptical, distinctly winged, crowned with 2 short subulate often deciduous teeth. Damp meadows along rivers, Oregon to Brit. Columbia.

45 *BIDENS* Tourn. L. Gen. n. 932.

Annual or perennial herbs with opposite lower leaves and mostly large heads of yellow flowers, Involucre campanulate or hemispheric, its bracts in 2 series, distinct or united at base, the outer often foliaceous and much larger than the inner. Receptacle flat or nearly so, chaffy, the chaff subtending the disk-flowers. Rays when present, neutral, mostly entire. Disk-flowers perfect, fertile, with tubular 5-toothed corollas. Anthers entire or minutely sagittate at base. Style-branches with short or subulate tips. Achenes flat, quadrangular or nearly terete, cuneate, oblong or linear. Pappus of 2-6 teeth or subulate barbed or hispid awns.

B. frondosa L. Sp. 852. Glabrous or somewhat hairy annual: stems erect, 2-8 feet high, branching: leaves pinnately 3-5-divided into lanceolate or broader sharply serrate and pinnately veiny commonly petiolulate leaflets, or the uppermost undivided: heads usually numerous, peduncled, about 6 lines high: involucre campanulate becoming hemispheric, its outer bracts more or less foliaceous, often much exceeding the ovate-lanceolate scarious-margined inner ones: rays none, or rudimentary and inconspicuous: achenes flat, oval or obovate, ciliate, with 2 slender downwardly barbed awns. Moist places mostly along streams, Oregon to Brit. Columbia and across the Continent.

B. cernua L. Sp. 832. Annual: stems glabrous or setulose-hispid, 1-3 feet high: leaves oblong-lanceolate, coarsely and irregularly sharply serrate, 3-6 inches long, sessile and commonly somewhat connate-perfoliate at base: heads numerous, 6-8 lines broad, nodding after or during flowering: rays 6-12, 3-8 lines long, or more: involucre depressed-hemispheric, its outer bracts commonly ciliate, often large and foliaceous and much exceeding the broad yellowish-margined membranaceous inner ones: achenes flat, cuneiform, usually 4-awned the margins and awns retrorsely barbed. In wet places, California to Brit. Columbia and across the Con't.

B. Beckii Torr. in Spreng. Neue Entdeck. ii, 135. Aquatic perennial; submersed stems much elongated in deep water, simple or little branched: submersed leaves sessile, 1-2 inches long, repeatedly divided into numerous capillary segments; emersed ones few, sessile, opposite or sometimes in 3's, lanceolate or oblong, acute, serrate or lacinate, 6-18 lines long: heads solitary or few, short-peduncled: involucre hemispheric, its bracts oval or oblong, obtusish, glabrous, the outer somewhat shorter than the inner: rays 6-10, obovate or oblong, obtuse, golden yellow: achenes nearly terete, truncate at both ends, half-inch long: pappus of 3-6 rigid persistent awns which are smooth below, the upper part downwardly barbed. In ponds and slow flowing streames, Canada to New Jersey and Missouri: reported from Green Lake King Co. Washington by Mr. C. V. Piper, perhaps introduced.

Subtribe v, Madieæ DC, Ray-flowers ligulate and fertile (rarely

wanting), each subtended by a bract of the usually uniserial involucre which partly or completely encloses its achene. Disk-flowers hermaphrodite, but mostly some or all of them sterile. Receptacle chaffy throughout or of only a more or less united ring between the ray- and disk-flowers.

* Scales of the receptacle distinct, chaffy-membranaceous or scarios, mostly deciduous with the fruit. Bracts of the involucre merely concave.

46 BLEPHARIPAPPUS Hook. Fl. i, 316 in Part.

Low corymbosely or paniculately branched annuals with narrow alternate leaves and rather small heads of white or purplish flowers. Heads heterogamous, with 3-6 pistillate broad-cuneiform 3-lobed ray- and 6-12 perfect 5-toothed disk-flowers, or some of the central ones sterile. Bracts of the involucre nearly in a single series, nearly flat and almost equal. Receptacle convex, chaffy throughout, the chaff thin and membranaceous, deciduous with the fruit. Style in the disk-flowers long, thickened upward, hairy, 2-cleft (only at the apex; the branches obtuse and not appendaged, or in the central sterile ones nearly entire. Achenes turbinate, silky-villous. Pappus of 10-12 linear or aristiform paleæ with hyaline margins which are mostly lacerate-fimbriate so as to appear plumose.

B. scaber Hook. l. c. Puberulent and scabrous, and with some hispid hairs above: stems stoutish, 4-12 inches high, loosely branched: leaves linear, sessile. $\frac{1}{3}$ -2 inches long with entire revolute or involute margins: heads short-peduncled, terminating the paniculate branches: bracts of the involucre lanceolate, acute, 4-5 lines long, more or less hirsute: rays much exceeding the involucre, deeply 3-lobed, always inrolling and becoming inconspicuous when the sun shines on them: anthers brownish-purple. Dry plains and mountains, Brit. Columbia to California and Idaho, east of the Cascade Mountains.

B. lævis Gray Bot. Gaz. xiii, 73. Stems slender, 6-12 inches high, smooth, branched: leaves linear, 2-10 lines long, sessile, the lower ones spreading, those of the branches closely appressed: heads small, terminating the filiform branchlets: bracts of the involucre linear-lanceolate, 2-3 lines long, scabrous: rays 3-4 lines long, not closing in sunshine, deeply 3-lobed, often with dark-purple veins. On dry plains and hill-sides, southern Oregon to California.

* * Scales of the receptacle always present between the ray- and disk-flowers, usually more or less united into a cup. Bracts of the involucre conduplicate-infolded and embracing the laterally compressed achenes.

47 ANISOCARPHUS Nutt. Trans. Am. Phil. Soc. vii, 388.

Villous-hirsute perennial herbs with linear to lanceolate entire or denticulate sessile leaves and numerous paniculate or corymbose heads of flowers with yellow rays that do not close in sunshine. Heads many-flowered; the ray-flowers about 12, ligulate, pistillate, those of the disk tubular, staminate and pistillate but

sterile. Bracts of the subglobose involucre as many as the rays, carinate-complicate and enclosing the achenes. Receptacle somewhat convex, naked and smooth except the margin which is furnished with a single series of more or less united chaffy scales between the ray- and disk-flowers. Branches of the style in the disk-flowers subulate, very acute, minutely hispid. Achenes of the ray oblong, obcompressed, somewhat incurved, glabrous, without lateral nerves or angles, crowned with a small sessile disk, destitute of pappus; of the disk obovate, with a pappus of 5-8 small fimbriate-lacerate membranaceous scales.

A. madioides Nutt l. c. *Madia Nuttallii* Gray. Stems slender, 1-3 feet high, pubescent with white spreading hairs, glandular and paniculately branched above: leaves linear-lanceolate, 2-8 inches long, remotely serrate, all but the lowest opposite: heads not very numerous, slender-peduncled, about 4 lines high: bracts of the involucre 8-12, with short inconspicuous tips, densely glandular and hispid: rays 8-12, fan-shaped, deeply 3-lobed, 4-6 lines long: achenes obovate-falcate, much compressed, with their sides many-striate. Common on dry ridges in forests, Brit Columbia to California.

45 MADARIA DC. Mem. Soc. Genev. vii, 280.

Erect annuals with mostly opposite leaves and rather large heads of showy yellow-rayed vespertine flowers. Heads many-flowered: the ray-flowers 10-20, ligulate, pistillate, in a single series: those of the disk tubular, perfect but sterile by the abortion of the ovary. Bracts of the subglobose involucre as many as the rays, complicate and enclosing their achenes, flattish on the back and with long somewhat spreading tips. Receptacle somewhat convex, fimbriate-hirsute except the margin which is furnished with 1 or 2 series of chaffy scales between the ray- and disk-flowers. Corollas pubescent or hairy at base, the rays very conspicuous but closing in sunshine. Achenes of the rays oblong-obovate, nearly straight, compressed, glabrous, without pappus.

M. elegans DC. l. c. *Madia elegans* Don. Stems stout, 1-6 feet high, pubescent with almost pilose spreading hairs, glandular above: leaves linear-lanceolate 2-4 inches long, usually more or less serrate, sessile, by a broad base, the lower crowded in a somewhat rosulate tuft, the others opposite or scattered and becoming smaller upward: heads numerous, in an open cyme: bracts of the involucre hirsute, the linear tips nearly as long as the body: rays 12-20, 8-10 lines long, sharply 3-lobed, yellow, often with a red or brown spot near the base: achenes rather thin and flat. On dry hillsides, western Oregon to California.

M. corymbosa DC. l. c. Stems slender, 6-18 inches high, simple up to the inflorescence, pubescent with soft spreading hairs, glandular above: leaves linear, mostly opposite, remotely serrate, 1-4 inches long: heads rather few, in an open corymb; bracts of the involucre somewhat pilose and glandular, the linear tips not as long as the body. On dry hills and plains, southern Oregon to California. Blooming early.

49 MADIA Molina Chil.; Cav. Ic. iii, 50, t. 298.

Medium-sized viscid and heavy-scented annuals with oblong or linear entire or denticulate sessile leaves and sessile or short-pe

duncled heads of yellow vespertine flowers. Heads few- to many-flowered; the ray-flowers 1-12, rarely none, ligulate, pistillate, in a single series; disk-flowers tubular and perfect. Bracts of the involucre in a single series, carinate and conduplicate, each enclosing an achene, their free herbaceous tips erect or involute. Receptacle flat, with a single series of scales between the ray- and disk-flowers, which are usually more or less united into a cup, otherwise naked. Achenes linear-oblong or clavate, compressed, nearly straight, glabrous. Pappus none.

M. sativa Molina Chili ed. i, 136. Commonly robust, 1-3 feet high, pubescent with slender somewhat viscid hairs and beset with pedicellate glands: leaves from broadly lanceolate to linear: heads commonly short-peduncled, 5-6 lines high: rays 5-12, 2-4 lines long: disk-achenes cuneate-oblong, quadrangular, prominently 1-nerved on the faces, about 2 lines long; those of the ray somewhat falcate, obovate, 1-nerved on the sides. Oregon and California to Chili.

M. racemosa T. & G. Fl ii, 405. Stems rather slender, 1-4 feet high, pubescent but not glandular, except toward the top, paniculately branched above: leaves lanceolate to linear, 1-6 inches long: heads short-peduncled or sessile, somewhat racemously disposed, 3-5 lines high: rays 2-10, 2-3 lines long: disk-achenes flattish, not prominently nerved on the sides; those of the ray somewhat falcate, not at all nerved on the sides. Common on plains and hillsides, Brit. Columbia to California and Idaho.

M. capitata Nutt. Trans. Am. Phil. Soc. vii, 387. *M. sativa* var. *congesta* T. & G. Stems stout, 2-4 feet high, simple, or branched above, pubescent with soft-hispid spreading hairs and glands: leaves linear-lanceolate to linear, 1-6 inches long, pubescent and hispid-ciliate: inflorescence very viscid-glandular: heads sessile, in close capitata clusters, 6-8 lines high: rays 6-12, 2-3 lines long: achenes of the disk almost linear, somewhat quadrangular; of the rays oblique-pyriform. In fields and waste places western Oregon to California.

M. dissitiflora T. & G. Fl. 405. "A slender twiggy plant 6-15 inches high: stems as well as the lanceolate-linear leaves hirsute-pubescent; the branches glandular: heads scattered few-flowered, scarcely 3 lines in diameter, with inconspicuous rays: bracts of the involucre 5-8, very glandular: disk-flowers 3-6: achenes all flat and scarcely or not at all angled on the sides. Blue Mountains and plains of Oregon."

M. glomerata Hook. Fl. ii, 24. Stems rather slender, 1-2 feet high, simple, or branched near the top, pubescent with coarse somewhat spreading hairs, glandular only near the top: leaves linear-lanceolate to linear, 1-3 inches long, often sparingly denticulate, ciliate near the base, pubescent both sides with fine appressed hairs: heads small, in close glomerules, very viscid-glandular; rays 1-5 or sometimes none, not surpassing the 3-5 disk-flowers: achenes narrow, 2 lines long or more; those of the disk 4-5-angled; of the ray flat somewhat curved and 1-nerved on each face. Common from Brit. Columbia to California and the Rocky Mountains.

M. citriodora Greene Bull. Torr. Club ix, 63. *Hemizonia citriodora* Gray, Stems simple, with short-pedunculate corymbosely paniced heads or loosely branched and the heads more scattered, cinereously villous-hirsute and above with small glands interspersed: leaves narrow, mostly entire: rays 8-9 exserted, greenish-yellow: scales of the receptacle lightly united into a cup: achenes rounded on the back and with a ventral angle. From Hood River Oregon to northern California.

50 HARPÆCARPUS Nutt. l. c.

Small annuals with entire narrow leaves and numerous small heads of inconspicuous flowers. Heads few-flowered; ray-flowers 3-8., pistillate, in a single series, each enclosed in one of the carinate-complicate and lunate bracts of the involucre; disk-flower solitary, tubular, perfect and fertile, surrounded by a 5-angled and 5-toothed cup formed of the united scales of the receptacle. Corollas glabrous; of the ray scarcely exceeding the involucre, tubular below, cleft anteriorly; of the disk funnellform, 5-toothed. Branches of the style in the disk-flower short, lanceolate-oblong with barbellate-hispid margins. Achenes glabrous much compressed, without pappus; of the rays obovate-lunate, gibbous, the incurved summit produced into a short ascending beak, when mature falling with the bracts of the involucre that enclose them; that of the disk semiobovate, straight, with a truncate terminal areola, enclosed by the united chaff.

H. madarioides Nutt. l. c. *Madia filipes* Gray. Stems slender, 4-12 inches high, hirsute, glandular above, paniculately branched: leaves alternate, narrowly linear, 1-2 inches long: heads numerous, 1-2 lines high, on long filiform peduncles: bracts of the involucre 4-8, lunate and strongly carinate in fruit, almost destitute of free tips, hispid and glandular: bracts of the receptacle united into a 3-5-toothed cup. Common in open woods, Brit. Columbia to California.

51 HEMIZONELLA Gray Proc. Am. Acad. ix, 189.

Little annuals with mostly opposite leaves and numerous small heads of inconspicuous flowers. Heads few-flowered, heterogamous; the rays 4-5, pistillate; the disk-flower solitary, or rarely 2 or 3, perfect and fertile. Bracts of the involucre herbaceous, as many as ray-flowers, each infolded and completely enclosing its achene but rounded on the back and usually flattish on the inner face. Chaff of the receptacle an herbaceous 3-5-toothed cup enclosing the disk-flowers. Corollas glabrous or merely glandular: rays very short. Achenes obovate or fusiform, more or less obcompressed and those of the rays incurved, the small terminal areola oblique, either sessile or raised on a short beak. Pappus wanting.

H. Durandii Gray l. c. Hirsute with white hairs and glandular above: stems 1-6 inches high, diffusely much branched: leaves linear, about 6 lines long: earliest heads usually in the forks of the branches, slender-peduncled; the later ones racemose, 2-bracted at base, short-peduncled: achenes slightly hairy; those of the ray obovate-oblong and obcompressed, tipped with a short inflexed beak. On dry hills and gravelly bars, Oregon to California and Nevada.

52 HEMIZONIA DC. Prodr. v, 692.

Low annuals with alternate often crowded leaves and middle-sized heads of yellow or white ray-flowers. Heads several to many-flowered: rays 5-20, ligulate, 2-3-lobed, pistillate: those of the disk tubular, perfect but sterile, 5-toothed, the teeth mostly

glandular-bearded. Bracts of the involucre in a single series, oblong or lanceolate, concave or convolute and partly enclosing the ray-achenes. Receptacle flat, chaffy throughout, the scales of the outer series united. Style-appendages of the disk-flowers linear or subulate, acute, very hispid. Achenes glabrous: those of the ray obovoid, gibbous or slightly obcompressed, convex on the back, slightly stipitate, the apex mostly oblique and terminated with a small often papillose exerted or beaked areola; of the disk sterile or abortive, oblong, 5-7-nerved. Pappus none.

H. luzulaefolia DC. l. c. Tomentose-canescens: stems erect, 6-18 inches high, corymbosely branched above, the branches and involucre hirsute and somewhat viscid: leaves linear-lanceolate, silky-villous, not glandular, 1-5 inches long by 2-4 lines broad, the lower elongated, tapering to the base, denticulate, 3-5-nerved, sometimes opposite: heads numerous, 3-4 lines broad, many-flowered: involucre hemispherical, its bracts rather shorter than the disk, with short and broadish herbaceous tips: rays 5-10, rather large, white to pinkish: scales of the receptacle united into a cup. Open grounds and fields, southern Oregon and California.

H. Clevelandi Greene Bull. Torr Club ix, 109. Stems stoutish, 10-20 inches high, branching from near the base, villous with long spreading hairs, glandular above: leaves narrowly linear, 1-nerved, silky beneath: heads racemosely or spicately disposed along the slender branches: rays white. In fields and open places, southern Oregon and California.

53 CALYCADENIA DC, Prodr. v, 695.

Slender annuals with rigid chiefly alternate narrowly linear or subulate 1-nerved leaves with revolute margins, the upper ones usually terminated by a large saucer-shaped gland. Heads many-flowered; the ray-flowers 3-5, pistillate, 3-lobed or 3-parted, with slender tube; disk-flowers tubular, perfect but mostly infertile. Involucre leafy-bracteate at base, its bracts in a single series, concave, partly enclosing the ray-achenes. Receptacle small, flat, with a single series of distinct or united chaff between the ray- and disk-flowers, Disk-flowers funnelform, 5-toothed, their style-branches with long filiform hirsute appendages. Achenes somewhat hairy: those of the ray obovoid-triangular, without pappus: of the disk quadrangular, tapering to the base, infertile, with a pappus of 5-10 chaffy and mostly awned scales.

C. truncata DC. l. c. *Hemizonia truncata* Gray. Very smooth and glabrous: stems 1-2 feet high, simple or sparingly branched above: leaves linear, 1-3 inches long, the lower ones opposite: heads campanulate; 4 or 5 lines high: bracts of the involucre ovate-oblong, boat-shaped: ray-flowers 5-8, 3 lobed, the middle lobe smallest: chaff of the receptacle 7-9, lightly united at the top into a truncate cup, at length separable: disk-flowers 10-20, with a pappus of 7-10 oblong and somewhat erose-fimbriate pointless paleae much shorter than the achene, sometimes obsolete. On dry plains, southern Oregon to California.

C. multiglandulosa DC. l. c. Stem simple or diffusely much branched, 1-2 feet high, strigose-hirsute: leaves mostly scattered, linear, mostly with revolute margins, hirsutely ciliate; sessile: heads numerous, terminal on short lateral branchlets, campanulate, 4 lines high: bracts of the involucre linear, bristly-ciliate, with numerous tack-shaped glands on their

backs: rays white, fan-shaped 3-lobed, their achenes glabrous or glabrate short: pappus of the disk-flowers shorter than the achenes, of 10-12 unequal paleæ, 5 of them oblong to lanceolate. On dry plains, southern Oregon to California.

54 CENTROMADIA Greene Man. 196.

Rigid branching annuals with some of the lower leaves pinnatifid and the uppermost clustered around the sessile heads. Upper leaves or their lobes pungently pointed. Heads many-flowered; ray-flowers pistillate, numerous and in more than one series; disk-flowers perfect but mostly sterile. Bracts of the involucre rounded on the back, concave and partly enclosing the ray-achenes, acuminate and pungently pointed. Receptacle conical or convex, chaffy, all the disk-flowers being subtended by narrow and mostly quite distinct chaffy scales. Ray-achenes turgid, obovate-triangular, very oblique, the terminal areola from the summit of the inner angle or face, and by gibbosity commonly intraapical, raised on a little apiculation.

C. Fitchii Greene l. c. Villous hirsute, somewhat viscid, above beset with small scattered tack-shaped glands: stems stoutish, 6-20 inches high, branching: leaves linear or subulate, 2-3 inches long, acute and pungently pointed, some of the lower ones once or twice pinnately parted: heads numerous, terminating the branches: bracts of the involucre subulate: rays yellow, narrow, their achenes obovate-triquetrous: chaff of the convex receptacle soft and pointless, villous: disk-achenes sterile, with a pappus of 8-12 linear paleæ fringed or bearded at tip, somewhat united at base. Dry plains, southern Oregon to California.

55 LAGOPHYLLA Nutt. Trans. Am. Phil. Soc. vii, 390

Slender much branched annuals with narrow leaves and middle-sized heads with yellow, white or pink ray-flowers. Heads few-flowered; rays about 5, pistillate; disk-flowers 5 or 6, perfect but sterile. Bracts of the involucre as many as ray-flowers, herbaceous the margins infolded and enclosing their achenes. Receptacle flat, fimbriate-hirsute in the centre, chaffy at the margin between the ray- and disk-flowers, the chaffy scales 5-6, in a single series, distinct. Achenes smooth, without pappus: of the rays oblong-cuneiform, obcompressed, straight, nearly flat and obscurely angled on the back.

L. ramosissima Nutt. l. c. Stem slender, paniculately much branched, 6-30 inches high: leaves entire, canescent with soft silky pubescence; radical and lowest cauline obovate-spatulate; upper lanceolate or linear, obtuse: the short ones subtending the crowded heads linear-oblong, densely ciliate with very soft villous hairs: heads 3 lines high, crowded in small and at length rather scattered irregular clusters: bracts of the involucre 3-4 lines long, comose-ciliate: rays yellow, closing in sunshine: achenes obovate-oblong, carinate down the inner face. Common on dry plains and hill-sides, Brit. Columbia to California and Idaho.

56 LAYIA H. & A. Bot. Beech. 148.

Low annual or biennial herbs with mostly opposite leaves and middle-sized heads of yellow or white flowers. Heads many-flowered: the ray-flowers 10-15, pistillate: those of the disk tubu-

lar, perfect. Bracts of the involucre equal, in a single series, the base convolute and enclosing the ray-achene, foliaceous above, Receptacle flat, pubescent, with a row of chaffy scales between the ray- and disk-flowers. Style-branches of the disk-flowers filiform, very acute, hairy above, at length exerted and recurved. Achenes of the ray glabrous, linear-oblong, more or less obcompressed, somewhat incurved, crowned with a small protuberant areola, destitute of pappus: of the disk linear-clavate, angled, appressed-pubescent or villous, with a pappus of 10-20 equal bristly or subulate awns which are naked and scabrous-serrulate above and plumose or villous with long weak hairs toward the base.

L. glandulosa H. & A. l. c. 358. Stems 4-12 inches high, diffusely branched, hispid or hirsute and with dark stipitate glands above: leaves linear-lanceolate, 1-2 inches long, the lower ones often more or less pinnatifid: heads solitary at the end of the branches, campanulate, 6 lines high; its bracts linear-oblong: rays 8-14, bright white, 6-8 lines long, 3-lobed: chaff of the receptacle lanceolate, equalling or exceeding the disk-flowers: pappus 10-20 stout bristles, copiously villous. Sandy-banks and barren grounds, Brit. Columbia to California and Idaho, east of the Cascade Mts.

L. Douglasii H. & A. l. c. "Low, sparsely hirsute or hispid, a few small stipitate glands on the upper leaves and involucre: radical leaves pinnatifid-dentate; upper linear and entire: rays rather short, broad, 3-cleft; lobes of disk-corolla hirsute outside: akenes narrow, those of the disk villous-pubescent: pappus of about 10 minutely scabrous linear-subulate flat paleæ, nearly equalling disk-corollas; their margins toward the base scantily beset with long and straight villous hairs. Gravelly banks, between the Dalles and Great Falls of the Columbia River, *Douglas*."

57 ACHYRACHÆNA Schauer. Del. Sem. Hort. Vratisl 1838.

A low annual with chiefly alternate leaves and middlesized heads of yellow flowers terminating the branches. Heads many-flowered; the ray-flowers 6-10, with 3-cleft ligule much shorter than its filiform tube, little surpassing the disk; disk-corollas slender, 5-toothed. Involucre oblong-campanulate, of lanceolate thin-herbaceous bracts: chaff of the receptacle similar but thinner, only between the disk- and ray-flowers, distinct. Achenes all clavate, with attenuate base, symmetrical, 10-costate; those of the ray slightly obcompressed, rounded at apex and with slightly protuberant areola; those of the disk mostly fertile, the truncate apex bearing a large pappus of 10 elongated-oblong obtuse silvery-scarious paleæ, the 5 inner as long as the corolla and achene, the alternate outer ones shorter.

A. mollis Shauer l. c. Villous-pubescent and slightly glandular-viscid: stems erect, 6-18 inches high branching: leaves alternate, or the lowest opposite, narrowly linear, 2-4 inches long, sessile, entire, or the lower lacinate: heads solitary, long-peduncled, terminating the stem and fastigate branches, an inch or less long: pappus 3 lines long, in fruit when dry spreading and forming a globular silvery-chaffy head. In fields and open places, southern Oregon and western California.

Tribe *v* HELENIOIDÆ B. & H. Gen. ii, 167. Heads heterogamous and the ligulate ray-flowers mostly fertile, or homogamous:

the disk-flowers hermaphrodite and fertile, rarely some infertile, with regular 4-5-toothed tubular corolla. Receptacle naked, or fimbriate. Bracts of the involucre herbaceous or membranaceous, not scarious. Style-branches of the hermaphrodite flowers with either truncate or appendiculate tips. Pappus paleaceous or aristiform, or sometimes plurisetose, but the bristles when capillary always more or less rigid.

SUBTRIBE I JAUMIÆ Involucre of broad bracts, imbricated in two or more series.

58 Jaumea Involucre campanulate: leaves opposite, connate at base, narrow, fleshy.

SUBTRIBE II HELENIÆ Involucre hardly at all imbricated: its bracts when broad nearly equal or in a single series.

* Achenes linear or linear-cuneate, 4-angled or compressed, but not with cartilaginous margins.

+ Receptacle conical or convex, rarely flat: involucre of few or several erect appressed or united herbaceous bracts.

++ Rays few, very short and included, rarely conspicuous, or none.

59 Lasthenia Receptacle conical: bracts of the involucre united into a 10-15-toothed cup: pappus none.

++ ++ Rays exerted and spreading.

60 Baeria Receptacle high-conical, minutely muricate: bracts of the involucre distinct, flat, in a single series.

61 Eriophyllum Receptacle flat to conical: involucre many-flowered, its bracts strictly erect, not membranaceous, more or less carinate-concave in fruit and partly embracing the subtending achene: pappus of nerveless and mostly pointless paleæ.

62 Bahla Receptacle small, mostly flat; involucre 12-20-flowered, its bracts not colored nor scarious-tipped, plain or merely concave, not embracing achenes: pappus of several scarious paleæ with callous-thickened opaque base.

63 Hymenopappus Receptacle flat: Involucre many-flowered; its bracts mostly appressed, with scarious-membranaceous and usually colored tips: pappus of 10-20 mostly hyaline obtuse paleæ.

+ + Receptacle flat: bracts of the involucre narrow, chiefly linear

++ Heads with regular ligulate and pistillate rays

64 Riglopappus Involucre campanulate, rather many-flowered: rays short and inconspicuous: pappus of 4-5 rigid paleaceous awns.

++ ++ Rays wanting but the marginal corollas sometimes enlarged

65 Chæactis Involucre campanulate or hemispherical: pappus of blunt hyaline scales, rarely wanting.

++ ++ ++ Ray-flowers ligulate and pistillate, mostly conspicuous.

66 Hulsea Involucre hemispherical, very many-flowered, of very numerous linear bracts: pappus of 4 short hyaline blunt and nerveless paleæ.

** Achenes turbinate or obpyramidal: disk-flowers all fertile.

+ Involucre bracts erect or appressed: achenes hirsute or villous,

67 **Actinella** Rays 8-12, pistillate: involucre of numerous bracts: receptacle conical or convex: pappus of 5-12 hyaline entire paleæ.

+ + Bracts of the involucre or their tips spreading or reflexed: rays cuneate, 3-5-lobed: pappus of hyaline usually awn-pointed paleæ,

68 **Helenium** Rays commonly fertile: receptacle wholly naked.

69 **Gaillardia** Rays neutral: receptacle with some rigid awns among the flowers: achenes involucre with villous hairs.

Subtribe i Jaumiezæ. Involucre of broad bracts imbricated in two or more series. Ligules not persistent. achenes 5-angled or terete, several-nerved. Many-flowered heads in ours radiate and the rays fertile.

58 JAUMEA Pers. Syn. Pl. ii, 367.

Herbs or suffruticose plants with opposite entire leaves and terminal pedunculate heads of yellow flowers. Involucre campanulate, its bracts fleshy or membranaceous, the outer shortest. Corollas glabrous. Receptacle naked. Style-branches pappillose or hairy, lanceolate or short-conical at tip. Achenes all alike, linear, 10-nerved, more or less angled. Pappus in exotic species narrow pointed or awned 1-nerved paleæ, in ours none.

J. carnosa Gray Bot. Wilkes 360. Glabrous perennial: stems procumbent or ascending, herbaceous, leafy 6-18 inches long: leaves spatulate-linear, almost terete, very fleshy, about an inch long, sessile and connate at base: heads erect, on short peduncles, 6 lines high: rays 6-10, linear, not surpassing the disk: receptacle conical, smooth and fleshy: achenes glabrous, destitute of pappus. In salt marshes along the coast, Brit. Columbia to California.

Subtribe ii, Heleniezæ. Cass. Involucre hardly at all imbricated; its bracts when broad nearly equal, or in a single series. Ligules not persistent. Disk-flowers numerous, with 5 or rarely 4 teeth or lobes. Achenes few-nerved or angled, or more numerously striate-angled only when turbinate or pyriform.

* Receptacle conical beset after the achenes have fallen by projecting points. Bracts of the involucre herbaceous, in one or rarely two series, commonly broad, sometimes cupulate-connate. Achenes narrow, from oblong to linear, usually tapering to the base, few-nerved and angled or nerveless, not callous-margined.

59 LASTHENIA Cass.

Glabrous and smooth annuals with opposite entire sessile leaves and rather small heads of yellow flowers terminating the branches. Heads radiate, or discoid by diminution of the ligules; disk-flowers all fertile. Involucre a single series of herbaceous bracts united by their edges into a 5-15-toothed cup. Disk-corollas 4-5-lobed, with rather slender tube and dilated throat. Achenes linear or narrowly oblong, compressed, slightly 2-3-nerved or nerveless, nearly marginless. Pappus of 5-10 subulate firm paleæ, or none.

L. glaberrima DC. Prodr. v, 664. Somewhat fleshy: stems ascending, 6-12 inches long: leaves elongated-linear: heads on long peduncles which are enlarged at the summit, nodding in flower: involucre about 15-toothed: corollas all shorter than the minutely puberulent oblong-linear achenes: pappus of 5-10 rigid paleæ, two or three of them with subulate or short-awned points, the others erose or laciniate. In salt marshes along the coast of Oregon and California.

60 BAERIA F. & M. Ind. Sem. Hort. Petrop. t. 7.

Low plants with opposite sessile leaves, and slender-peduncled heads of yellow flowers. Heads mostly many-flowered, with 5-15 conspicuous rays. Bracts of the campanulate or hemispherical involucre as many as rays, plain or becoming somewhat carinate, at least below. Receptacle subulate to conical. Tips of the style truncate-capitate, with or without a central apiculation, to ovate, sometimes with a cuspidate appendage. Disk-corollas with slender tube as long or longer than the campanulate 5-lobed limb. Achenes clavate-linear to linear-cuneate. Pappus a few paleæ or paleaceous awns or both, often wanting.

B. aristosa. *B. gracilis* var. *aristosa* Gray. Slender annual 3-10 inches high, strigose-pubescent: leaves linear, entire, mostly opposite: involucre 3-4 lines high, of 8-10 broadly lanceolate to ovate acute bracts: rays as many as bracts, ligulate, lanceolate obtuse: achenes linear-oblong, with pappus of 4-5 small paleæ with awns gradually and slightly widened downward and as long as the achene. dry open places, southern Oregon and California.

* * *Receptacle flat or convex. Achenes from linear to obpyramidal, rarely 5-angled. Flowers (with few exceptions), all fertile.*

61 ERIOPHYLLUM Lag. Nov. Gen. & Spec. 28.

Floccose-tomentose or rarely glabrate herbs (rarely suffrutescent), with alternate or partly opposite leaves, peduncled or sometimes sessile heads of mostly yellow flowers. Involucre many-flowered, from hemispherical to oblong, commonly equalling the disk, of one or sometimes two series of oblong or narrower firm-herbaceous or coriaceous permanently erect bracts, distinct or sometimes partially united into a cup: at least in fruit concave in the centre and partially enclosing the subtending achenes. Ray-flowers usually with broad ligules, very rarely none. Disk-corollas with distinct and sometimes slender proper tube. Style-tips truncate, obtuse or obscurely capitate-conical. Achenes narrow, from clavate-linear to cuneate-oblong, mostly 4-angled. Pappus of nerveless and mostly pointless paleæ.

E. stæchadifolium Lag. l. c. Canescent with close-pressed pannose tomentum, at length partly denudate, 1 to 4 feet high from a woody base: leaves once or twice pinnately parted into oblong or linear divisions, or the upper ones sometimes entire, about an inch long, soon glabrate and green above: heads 3-4 lines high, in rather loose paniculate clusters; involucre cylindraceous-campanulate, of 8-10 linear-spatulate to narrowly-oblong thinnish bracts: rays 6-8, only a line or so long, roundish-oval: receptacle

convex, alveolate-toothed : pappus of 8-12 oblong-linear paleæ much shorter than the linear smooth achene. Along the coast from Chetco Oregon to southern California.

E. cæspitosum Dougl. Lindl. Bot. Reg. t. 1167. Floccosely white-woolly herbaceous perennial; many-stemmed from spreading rootstocks, 6-24 inches high : leaves from spatulate to cuneate or roundish in outline, from incisely 3-5-lobed to pinnately parted, or the upper verging to linear and entire, upper face often glabrate in age : involucre bracts 8-12, oblong or oval, often more or less united : rays 6-12, 6-8 lines long : tube of the disk-corollas mostly hirsute-glandular and longer than the oblong scales of the pappus. Common from Alaska to California and the Rocky Mountains.

E. achillæoides Greene Man. 207. *E. cæspitosum* var *achillæoides* Gray. Stems slender, 1-2 feet high : leaves pinnately parted or cleft into 3-5 narrow laciniately incised or pinnatifid divisions : heads somewhat corymbose-ly collected and rather short-peduncled : involucre hemispherical, 3-4 lines high, of 9-13 narrow bracts : rays 9-13, 6-8 lines long, usually narrow : achenes sparsely pubescent or glabrate. Southern Oregon to California.

E. leucophyllum *Bahia leucophyllum* DC. Lanuginose-tomentose throughout : stems 6-12 inches high, branching from the base, naked above : leaves oblanceolate or oblong-spatulate, 3-cleft or lobed at the apex, or somewhat pinnately incised or the upper linear and entire : heads solitary, long-peduncled ; involucre campanulate, 4-5 lines high, of about 8 oblong bracts ; rays oblong : achenes glabrous : pappus of 4 oblong or lanceolate acutish scales and as many alternate smaller ones. Dry plains, Alaska to California.

E. lanceolatum. Sarculose-stoloniferous : stems slender, 8-12 inches high, simple, bearing a single large head or few-flowered cyme, floccose-woolly : leaves lanceolate and entire, or the lower ones spatulate and sparingly dentate toward the apex, 6-12 lines long, densely white-tomentose when young : involucre 5-6 lines high, very densely white-tomentose, of 10-15 lanceolate bracts : paleæ of the pappus acute, fimbriate-laciniate. In marshy places, Siskiyou Mountains near Ashland Oregon.

E. integrifolium Greene Fl. Fr. 444 *Bahia integrifolia* DC. Low, often dwarf, caespitose, 3-10 inches high : leaves from narrowly spatulate and entire to more dilated and 3-lobed, floccosely hoary ; heads rather long-peduncled ; involucre cylindrical, of 6-8 narrowly oblong bracts : achenes glabrous, rarely somewhat glandular-atomiferous near the summit : paleæ of the pappus mostly of the same length, about equalling the very glandular but not hirsute corolla-tube. Brit. Columbia to California and the Rocky Mountains : usually only on the highest mountains.

E. gracile Gray Proc. Am. Acad. xix, 25. Loosely floccose-woolly : stems slener, 9-15 inches high : leaves narrowly linear and entire : heads on long slender peduncles : involucre nearly 4 lines high, campanulate, of about 10 oblong bracts : rays about 8 : receptacle nearly flat, alveolate-dentate : achenes slender, glandular, 2 lines long : paleæ of the pappus oblong or quadrate. Southern Idaho on Snake river.

62 BAHIA Lag. Nov. Gen & Spec. 30.

Suffruticose or herbaceous plants with opposite or alternate, and small or middlesized heads of yellow flowers terminating the branches. Involucre hemispherical or obovate, lax or open in fruit, many flowered : the plain wholly herbaceous bracts distinct, in a single, or rarely double series. Receptacle small, mostly flat. Lobes or teeth of the corolla short. Style-tips truncate or obtuse.

Achenes narrow, quadrangular. Pappus of several scarios scales with callous-thickened opaque base, rarely wanting.

B. oppositifolia Nutt. T. & G. Fl ii, 376. Herbaceous perennial; stems densely cinereous, much branched, 4-12 inches high, very leafy: leaves opposite, or the uppermost alternate, 6-18 lines long, palmately 2-5-parted into linear obtuse or obtusish, entire segments, finely cinereous on both sides: heads short-peduncled: involucre campanulate, or becoming hemispheric, its bracts oblong, obtuse, densely tomentose: rays 5-7, short: achenes linear-oblong, glandular-pubescent: pappus of 4-8 spatulate to lanceolate paleæ with thickened bases. Dry plains, eastern Oregon to Nebraska and New Mexico.

B. nudicaulis Gray Proc. Am. Acad. xix, 27. "Cinereous-puberulent and glabrate, upper part of the scapiform stem and involucre minutely glandular, a span or two high: leaves nearly all radical, oval or spatulate-oblong, (an inch or more long), tapering into a slender petiole: heads solitary, or few and somewhat corymbosely paniculate, nearly half-inch high: involucre hemispherical, of about 10 oblong bracts: rays 6-9, oblong: pappus fully half the length of the cuneate-linear sparsely hairy achene; the thin margins of the paleæ of the pappus erose and the short-excurrent awn barbellate-hispidulous. Wind River Mountains N. W. Wyoming., To be looked for in Idaho.

63 HYMENOPAPPUS L'Her. Michx. Fl. ii, 103.

Perennial or biennial herbs with sulcate-angled erect stems, alternate mostly once or twice pinnatifid or parted leaves, and corymbosely cymose or solitary pedunculate heads of yellow or white flowers. Involucre campanulate, many-flowered, of 6-12 mostly appressed bracts with scarios-membranaceous usually colored tips. Rays none. Disk-corollas numerous, all alike, with narrow tube, abruptly dilated throat and reflexed or widely spreading lobes. Style-branches with short and thick conical appendages Achenes obpyramidal, 4-5-angled, with attenuate base, the faces 1-3-nerved. Pappus of 10-20 thin-scarios and mostly hyaline obtuse scales; sometimes very short or obsolete.

H. filifolius Hook. Fl. i, 317. Perennial from a deep woody root: stems usually tufted, 10-24 inches high, woolly when young, densely leafy toward the base, usually naked and sparingly branched above; leaves rather rigid once or twice or the radical thrice pinnatifid into very narrowly linear or filiform divisions their margins soon revolute: heads few or solitary, 4-6 lines high; bracts of the involucre oblong, usually densely woolly, with whitish or purplish tips: corollas white to yellow, its reflexed lobes very much shorter than the throat: achenes densely villous: paleæ of the pappus short. Brit. Columbia to California New Mexico and Nebraska, east of the Cascade Mountains.

64 RIGIOPAPPUS Gray Proc. Am. Acad. vi, 548.

Small slender annual with opposite leaves and small heads of yellow flowers terminating the branches. Heads inconspicuously radiate. Involucre turbinate-campanulate, of numerous narrowly linear rather rigid herbaceous bracts which are somewhat involute at maturity; many-flowered, Receptacle flat. Ray-flowers 5-15, the corolla with slender tube and oblong entire or 2-tooth-

ligule, not surpassing the disk. Disk-flowers more numerous, their corollas small, with short proper tube, elongated narrow throat and 3-5 short erect teeth. Anthers included. Style-branches with short and linear glabrous stigmatic portion, and larger slender-subulate hispidulous appendage. Pappus nearly similar in ray and disk, of 3-5 rigid and wholly opaque paleaceous naked awns, rarely obsolete

R. leptocladus Gray l. c. Stem slender, 6-12 inches high, paniculately or subcorymbosely branched: branches commonly filiform, elongated and leafless below, smooth, bearing solitary heads: leaves all alternate very narrowly linear, sessile, erect, entire, those of the branches near the heads, small and subulate: involucre 3 lines high: flowers yellow but often changing to purple or whitish: paleæ of the pappus two-thirds the length of the achene, 3-5, rarely only 2 or 1 or none. Dry plains east of the Cascade Mountains, Brit. Columbia to California.

65 CHÆNACTIS DC. Prodr. v, 659.

Herbaceous or rarely suffrutescent plants with alternate mostly pinnately dissected leaves and pedunculate solitary or sometimes cymosely disposed heads of yellow white or flesh-colored flowers. Head discoid, but the marginal flowers commonly with enlarged limb to the corolla. Involucre many-flowered, campanulate or hemispherical, its bracts linear, erect, equal, herbaceous to the tip. Receptacle flat. Corollas with short tube, long and narrow throat, and short teeth; or in the marginal ones of some species with larger lobes or even imperfect palmate ligules forming a kind of ray. Anthers mostly partly exerted. Style-branches pubescent nearly throughout, filiform or with attenuate-subulate tips. Pappus of hyaline nerveless paleæ or none.

C. Nevii Gray Proc. Am. Acad. xix, 30. Slender winter annual 4-10 inches high, puberulent throughout: leaves 6-12 lines long, once or twice pinnately parted into linear-oblong divisions: heads rather short-peduncled: involucre campanulate, 4-6 lines high, of 12-20 lanceolate acute or acuminate herbaceous bracts: corollas yellow, the marginal ones but little larger than the others: achenes terete, clavate, surmounted by a short and thick obscurely denticulate crown, which is an epigynous disk rather than pappus. Near Muddy Station, John Day valley Oregon.

C. Cusickii Gray Syn. Fl. i, pt. 2, Supp. 452. Very low, diffusely branched, floccose-tomentose, soon glabrate: leaves rather fleshy, all entire, spatulate-linear: peduncles short: bracts of the involucre broadly linear, midrib obscure: flowers white, the marginal ones enlarged: pappus of 10 linear-oblong nearly equal paleæ about the length of the tube of the corolla. Sandy hills of the Malheur valley, Baker Co, Oregon.

C. stevioides H. & A. Bot. Beech. 353, Floccose-tomentose. glabrate in age, seldom a foot high, freely and loosely branched, bearing numerous somewhat cymosely disposed heads of white flowers on short slender peduncles: leaves once or twice pinnately parted into short linear lobes, the uppermost rarely entire; bracts of the involucre narrowly linear, obtuse, with obscure midrib: marginal corollas with moderately enlarged unequal 5-lobed limb, not surpassing the disk: paleæ of the pappus scarcely thickened at base, those of the inner flowers oblong-lanceolate and shorter than the corolla, of the outer ones ovate or oblong, often unequal, sometimes much shorter. Southern Idaho to Nevada and Utah.

C. Douglasii H. & A. l. c. 354. Pubescent with a fine somewhat floccose or pannose tomentum, or sometimes early glabrate: stems stout, 6-18 inches high, paniculately branched: leaves mostly of broad outline, and bipinnately parted into crowded short obtuse divisions and lobes: heads 6-9 lines high, in large plants numerous and corymbosely cymose, : bracts of the involucre linear or spatulate, obtuse: marginal corollas not distinctly larger nor different from the others: paleæ of the pappus from linear-ligulate to narrowly oblong, 4-6 lines long. Rocky hillsides and dry plains, Brit. Columbia to California Montana and New Mexico.

Var. alpina Gray Syn. Fl. i, pt. 2, 341. " Dwarf, 3-5 inches high, consisting of a rosette or thick tuft of leaves with very close divisions, and naked or scapiform stems, bearing mostly solitary heads surmounting the subterranean branches of a multicipital perennial caudex or rootstock. Alpine region of the Rocky and Cascade Mountains. "

66 HULSEA T. & G. Bot. Mex. Bound. 98.

Viscid-pubescent and balsamic-scented herbs with alternate mostly sessile leaves and solitary or scattered large heads of yellow flowers, or the rays sometimes purple. Involucre many-flowered, hemispherical, its thin herbaceous bracts in 2-3 series. Receptacle flat. Rays numerous, ligulate but sometimes short and inconspicuous; disk-corollas with proper tube slender, but shorter than the cylindraceous throat. Style-branches short and with thickened obtuse tips. Achenes linear-cuneate, compressed or somewhat tetragonal, soft-villous. Pappus of mostly 4 truncate wholly hyaline scales.

H. nana Gray Pacif. R. Rep. vi, 76, t. 13. Villous-hirsute when young: stems stoutish, bearing a single large head, 2-8 inches high, from a long branching rootstock: leaves mostly radical, 1-2 inches long, oblong-spatulate, pinnatifid or incised, mostly tapering below to a margined petiole: involucre 6-8 lines high. of lanceolate acute bracts: rays about 30, broadly linear, 6-8 lines long: scales of the pappus usually longer than the breadth of the achene, incisely or fimbriately lacerate. In volcanic ashes and scorïæ, Mount Adams Washington to Mount Shasta California.

67 ACTINELLA Pers. Syn. ii, 469.

Mostly low herbs with alternate narrow or narrowly lobed leaves and slender-peduncled heads of yellow flowers. Heads (in ours), radiate. Involucre many-flowered, campanulate or hemispherical, its bracts in two or more series, somewhat herbaceous or coriaceous, often rigid, the outer ones sometimes united. Receptacle from conical to convex, naked. Rays fertile. Style-branches of disk-flowers dilated, truncate and somewhat penicillate at tip. Pappus of 5-12 thin and mostly hyaline scales with more or less manifest costa, or none.

A. Richardsoni Nutt. Trans. Am. Phil. Soc. vii. 379. Stems tufted from a multicipital perennial caudex, 8-12 inches high, obscurely puberulent or nearly glabrous, woolly in the axils of the radical leaves: upper leaves mostly once and the lower twice ternately parted into long and simple filiform-linear rather rigid lobes: involucre campanulate, 2-3 lines high, 6-9-angled, the 6-9 outer bracts strongly carinate, united below: rays cuneate, 2-4 lines long: scales of the pappus attenuate-acuminate. Plains of eastern Oregon to Nevada Utah and the Saskatchewan.

68 HELENIUM L. Sp. 886.

Erect herbs with alternate simple leaves and pedunculate heads of usually yellow, flowers. Heads many-flowered. Bracts of the involucre subulate or linear, herbaceous, spreading or soon reflexed, usually some inconspicuous short scarious interior ones. Receptacle more or less elevated, naked. Disk-corollas usually with short or almost obsolete proper tube and 4-5-toothed limb; the teeth obtuse, glandular-pubescent. Achenes turbinate, 8-10-costate. Pappus of usually 4-6 thin scarious scales.

§ 1. *OXYLEPIS* Gray Proc. Am. Acad ix, 205. Rays fertile, numerous, long and narrow. Disk-corollas with moderately long proper tube. Bracts of the involucre numerous, in 2 series.

H. Hoopsii Gray Proc. Acad. Philad. 1863, 95. Slightly tomentose or pubescent when young, soon glabrate: stem stout, 1-3 feet high, from a strong perennial root, leafy bearing several or sometimes solitary large heads: leaves thickish, entire, oblong-lanceolate. or the lower spatulate with long tapering base, somewhat nervose: rays becoming inch long, tardily reflexed: disk half to three-fourths inch high, hemispherical: receptacle in fruit ovoid-hemispherical: scales of the pappus ovate-lanceolate, long attenuate acuminate, a little shorter than the corolla. Eastern Oregon to California and the Rocky Mountains.

§ 2 *EUHELENIUM* Gray Proc. Am. Acad. ix, 205. Involucre comparatively simple and small, of slender linear or subulate often unequal bracts, soon reflexed. Rays fertile, rarely sterile or wanting, soon drooping. Disk-corollas with proper tube very short or reduced to a mere ring.

H. autumnale L. Sp. ii, 866. Nearly glabrous or minutely pubescent: stems rather stout, 2-6 feet high, corymbosely branched above, narrowly winged by the decurrent bases of the leaves: leaves lanceolate to ovate-oblong, acute or acuminate, 2-5 inches long, dentate, narrowed below to the sessile base: heads numerous, on long peduncles: bracts of the involucre densely canescent: rays 10-18, drooping, as long or longer than the globose yellow disk, fertile, 3-cleft: achenes pubescent on the angles: pappus-scales ovate, acuminate or aristate, often lacerate or toothed. Wet grounds and meadows, Oregon to Brit. Columbia and the eastern States.

Var. grandiflorum Heads larger: rays 8-12 lines long: scales of the pappus narrower and longer awned. Common in wet meadows, Washington to California, west of the Cascade Mountains.

H. Bigelovii Gray Pacif. R. Rep. iv, 107. Almost glabrous: stems simple or loosely branched, 2-3 feet high, conspicuously winged: leaves from narrowly- to oblong-lanceolate, entire, 2-6 inches long; the radical oblong-spatulate, long-petioled: heads solitary, on very long peduncles; rays 10-15, 8-10 lines long, spreading, longer than the depressed globose yellow disk: scales of the pappus ovate-lanceolate or subulate, awn-pointed, shorter than the corolla. In marshes, southwestern Oregon to California.

69 GAILLARDIA Fougeroux Mem. Acad. Sci. Par. 1786, 5, t. 1.

Erect herbs with alternate leaves and long-peduncled heads of showy flowers. Involucre broad, the bracts in 2 or 3 series, all but the inner series largely foliaceous or herbaceous and lax. Rays neutral, rarely styliiferous and fertile or none. Disk-corollas

with short narrow tube, enlarged cylindraceous throat and 5 ovate-triangular to subulate teeth or lobes which are beset with jointed hairs. Style-branches with a penicillate tuft at the summit of the stigmatic portion, thence produced into a filiform or shorter appendage. Receptacle convex to globose, beset with setiform or subulate or rarely small dentiform fimbriæ among the flowers. Achenes turbinate, 5-costate, covered with long villous hairs which usually rise only from its base. Pappus conspicuous, longer than the achene, of 5-10 hyaline-scarious scales, with a costa mostly excurrent into an awn.

G. aristata Pursh Fl. ii, 573. Pubescent with jointed hairs: stems 1-2 feet high, few to many from the crown of a thick perennial root: leaves of firm texture, lanceolate or broader, or the lower spatulate, from entire to laciniate-dentate or sinuate-pinnatifid mostly obtuse, 2-5 inches long: bracts of the involucre lanceolate or narrower, callous at base, more or less hirsute; rays all yellow, in the larger heads 18 lines long, neutral; disk-corollas brown, the subulate acute lobes tipped with a seta or cusp, externally beset with long hairs; scales of the pappus slender-awned: fimbriæ of the receptacle setiform, surpassing the villous achenes. Stream-banks and plains, Brit. Columbia to California and Minnesota.

Tribe vi. ANTHEMIDEÆ Cass. *Opusc. iii, 161.* Heads homogamous with the flowers all tubular and hermaphrodite or more commonly heterogamous with the pistillate flowers ligulate and radiate or sometimes with corolla reduced to a tube, or obsolete. Receptacle either naked or with some chaffy bracts. Bracts of the involucre imbricated, wholly or partly dry and scarious or scale-like, not foliaceous, seldom herbaceous. Anthers without tails at base. Style-branches of the hermaphrodite flowers truncate, and sometimes with obscure conical tips. Achenes usually small and short, with no pappus, or a paleaceous crown, or a circle of squamellæ.

* Receptacle with chaffy bracts subtending some or all of the disk-flowers: heads radiate or the rays wanting in certain species: involucre of comparatively small imbricated bracts, the outer successively shorter: receptacle convex to oblong: style-branches truncate-penicillate

70 ANTHEMIS Involucre broad: rays large: achenes 4-5-angled or 8-10-ribbed,

71 Achillea Involucre narrow: rays small: achenes obcompressed.

* * Receptacle without chaff or bracts among the flowers.

+ Heads comparatively large, radiate, or rarely discoid, pedunculate and solitary at the summit of the branches.

72 Matricaria Flowers in our species all alike and perfect: receptacle high-conical: achenes angled, truncate at the apex.

73 CHRYSANTHEMUM Rays numerous and conspicuous: receptacle flat or convex: achenes several-ribbed or angled.

+ + Heads sessile, discoid, heterogamous; pistillate flowers most numerous, apetalous, their achenes pointed with an indurated persistent style.

74 SOLIVA Rays none: receptacle flat: achenes obcompressed, with

rigid wings or callous margins, sessile.

+ + + Heads slender-peduncled, discoid, heterogamous: pistillate flowers apetalous: style deciduous.

75 *COTULA* Rays wanting: receptacle flat or convex: achenes raised on pedicels.

+ + + + Heads discoid, heterogamous, the few pistillate flowers with tubular 2-3-toothed or lobed corolla, or sometimes homogamous: style deciduous.

76 *Tanacetum* Heads corymbosely cymose or glomerate, many-flowered: achenes 5-ribbed or 3-5 angled, with broad truncate summit: anther-tips broad and mostly obtuse.

77 *Artemisia* Heads paniculately disposed, small: achenes obovate or oblong, mostly with a small epigynous disk: anther-tips pointed.

70 ANTHEMIS L. Sp. 893.

Annual or perennial herbs with pinnatifid or dissected alternate leaves and usually large heads of both tubular and ligulate flowers on peducles terminating the branches. Involucre hemispherical, many-flowered, of comparatively small imbricated bracts the outer successively shorter. Receptacle convex to oblong, chaffy at least toward the summit. Rays pistillate and fertile or neutral. Disk-flowers perfect, fertile, yellow, their corollas with 5-cleft limb. Anthers obtuse and entire at base. Achenes terete, 4-10-angled or ribbed, glabrous, the truncate summit naked, or with a very short coroniform or dentiform pappus.

A. *COTULA* L. Sp. 894. Unpleasant-scented annual, 1-2 feet high, diffusely branched: leaves finely tri-pinnately dissected: receptacle conical, with bristly bracts only near the centre: rays mostly neutral, white: achenes 10-ribbed, rugose or tuberculate. Common along roadsides and waste places. Naturalized from Europe.

A. *ARVENSI* L. Sp. 894. Annual or sometimes biennial, not fetid: stems usually much branched, about a foot high, the branches decumbent at base: leaves once or twice pinnately parted into linear-lanceolate acute lobes: heads rather long-peduncled: bracts of the involucre obtuse, whitish-scarios: receptacle conical, its bracts acuminate-lanceolate: rays white: achenes oblong, obtusely 4-angled: pappus a mere crown. In fields and waste places. Naturalized from Europe.

71 ACHILLEA L. Sp. 898,

Perennial herbs with erect leafy stems, alternate leaves and small radiate heads corymbose at the ends of the stem and branches. Involucre campanulate or obovoid, of small imbricated bracts, the outer shortest. Receptacle conical to oblong; chaffy. Ray-flowers pistillate, fertile, short and broad. Style-branches truncate. Anthers obtuse and entire at base. Achenes oblong or obovate, obcompressed, callous-margined, glabrous. Pappus none.

A. *Millefolium* L. Sp. 899. From villous-lanate to glabrate: stems simple or corymbosely branched above, 1-2 feet high: leaves narrowly

oblong or lanceolate in outline, 2-10 inches long, bipinnately dissected into numerous small linear to setaceous-subulate divisions: heads numerous, crowded in a fastigiate cyme; involucre oblong, its bracts pale or sometimes fuscous-margined or wholly brownish: rays 4-6, 2-3 lines long and broad, white to rose-color: receptacle at length elevated. Very variable, perhaps as here defined includes several species. Common from Alaska to California and across the Continent.

72 MATRICARIA L. Sp. 890.

Herbs with finely once to thrice dissected alternate leaves and pedunculate heads of yellow flowers with white rays when present. Heads small to rather large, radiate, or discoid and homogamous by the absence of ligulate pistillate flowers. Receptacle conical or ovoid, rarely lower when young, without bracts among the flowers. Achenes glabrous. 3-5-ribbed or nerved on the face or sides, rounded on the back. Pappus none, or a mere coroniform border.

M. discoidea DC. Prodr. vi, 50, Glabrous annual: stems 4-18 inches high diffusely branched, very leafy: leaves 2-3-pinnately dissected into short linear acute lobes: heads numerous, all short-peduncled: bracts of the involucre oval, with broad white scarious margins and green centre, much shorter than the disk: receptacle high-conical: achenes oblong, somewhat angled, with an obscure coroniform margin at the summit. In yards and waste places Alaska to California and the Eastern States.

73 CHRYSANTHEMUM L. Sp. 888.

Perennial or annual herbs, with alternate dentate incised or dissected leaves and large heads of both tubular and ligulate flowers. Involucre hemispheric or depressed, its bracts appressed, imbricated in several series, the outer shorter. Receptacle flat, convex or hemispheric, naked. Rays pistillate, fertile. Disk-flowers perfect, their corollas with terete or 2-winged tubes and 4-5-cleft limb. Achenes 5-10-ribbed, or nerved, terete, or of the ray 3-angled. Pappus none or a scaly cup.

C. LEUCANTHEMUM L. Sp. 888. Glabrous or sparingly puberulent: stems 1-3 feet high, from a creeping perennial rootstock, simple or sparingly branched: radical leaves ovate to spatulate, coarsely dentate or incised, narrowed below to long slender petioles; cauline spatulate, the upper gradually narrower, becoming small and linear, pinnately dentate or incised, partly clasping at base: heads long-peduncled, broad and flat: rays white, an inch long: pappus none. Becoming common in meadows and waste places. Naturalized from Europe.

74 SOLIVA Ruiz. & Pav. Prodr. 113, t. 24.

Small depressed herbs with mainly alternate petioled pinnately dissected leaves and small heads of greenish flowers sessile in the axils or forks of the branches. Heads discoid, heterogamous; the apetalous pistillate flowers most numerous; a few hermaphrodite but mostly sterile ones with a short and thick 2-6-lobed corolla in the centre. Involucre of 5-12 nearly

equal bracts in not more than 2 series. Receptacle flat, naked. Achenes obcompressed, with rigid wings or callous margins which are commonly spinulose-pointed at summit and the apex armed by the spiniform persistent style. Pappus none.

S. sessilis Ruiz & Pav. l. c. Villous or the leaves glabrate: stems slender, 2-4 inches high, branched: leaves thrice divided, primary divisions 2-5, petiolate, parted into 3-5 narrow lanceolate lobes: heads depressed. achenes broadly obovate, thin-winged, spinulose-pointed at the summit, in some the wings reduced to an acute margin: style persistent, long and stout. Moist ground near the coast, Chetco Oregon to California and Chili.

75 COTULA L. Gen. n. 968.

Low herbs with alternate lobed or dissected leaves and slender-peduncled heads of yellow flowers. Heads many-flowered, discoid, heterogamous. Bracts of the involucre greenish, in about 2 ranks. Pistillate flowers in 1-2 rows, apetalous, with deciduous style; disk-flowers with 4-toothed corollas. Achenes raised on pedicels at maturity, obcompressed, commonly thick-margined or narrowly winged, in our species nearly or quite destitute of pappus.

C. CORONOPIFOLIA L. Sp. 892. Somewhat succulent, nearly glabrous: stems ascending, 4-12 inches long: leaves lingulate-linear, lacinate-pinnatifid, or the uppermost entire, with clasping or sheathing base: heads much depressed, 4-6 lines broad: pistillate flowers a single row, on flattened pedicels their achenes bordered with a thick spongy wing, notched at both ends; disk-achenes with wings reduced to a thickened border. Wet grounds near the coast, Oregon and California. Naturalized from Australia,

C. AUSTRALIS Hook. f. Fl. Nov. Zel. 128. Somewhat pubescent: stems slender, diffusely branched: leaves bipinnately dissected into linear lobes: heads small; pistillate flowers in 2-3 rows, their achenes distinctly pedicelled; those of the disk less so. Coast of California and Oregon. Naturalized from Australia.

76 TANACETUM Tourn. L. Gen. n. 944.

Herbs or suffruticose plants with alternate variously dissected leaves and solitary or corymbose heads of yellow flowers. Heads many-flowered, discoid, the flowers all tubular and perfect, with 3-5-toothed corolla, or the marginal ones pistillate with more or less oblique or imperfectly ligulate corolla. Bracts of the involucre imbricated, in few or several ranks. Styles deciduous. Achenes 5-ribbed or 3-5-angled, with broad truncate summit, bearing a coroniform pappus or none.

§ 1 Robust erect perennials, leafy to the top. Leaves 2-3-pinnately dissected into very numerous divisions and lobes often with interposed small ones on the main rhachis. Receptacle flat, quite naked. Pappus coroniform-dentate.

T. VULGARE L. Sp 844. (TANSY) Glabrous or somewhat pubescent: stems 1-3 feet high, usually simple up to the inflorescence: leaves 4-12 inches long, pinnately divided into linear-oblong pinnatifid or incised segments, the lobes acute, usually serrate: heads numerous, crowded in a

corymbiform cyme, 2-4 lines broad, depressed-hemispheric: marginal corollas inconspicuous, terete, with oblique 3-toothed limb. Roadsides and waste places. Escaped from gardens,

T. Huronense Nutt. Gen. ii, 141. Villous when young, sometimes glabrate: stems 1-2 feet high, from long running rootstocks: leaves lanceolate in outline, 2-3 inches long, twice or thrice pinnately divided into linear or oblong divisions: heads large, the disk convex, 4-6 lines broad; marginal corollas with flattish tube and 3-5-lobed limb, which often expands into a cuneate ligule. On sand banks along the coast, Alaska to California, the great Lakes and the coast of Maine to Hudson Bay.

§ 2 Low perennials. Stems, slender, more naked above, bearing rather small globular heads. Leaves less dissected, or entire. Receptacle convex or conical. Achenes usually utricular, without pappus.

T. potentilloides Gray Proc. Am. Acad. ix, 204. Silvery-sericeous: stems decumbent or ascending, 4-12 inches long, herbaceous to the ground, the naked summit bearing a few slender-peduncled heads: radical leaves numerous, petioled, 1-3 inches long, bipinnately or tripinnately parted into rather few mostly linear lobes; cauline leaves few, sessile, more simple: heads 3-4 lines in diameter, in small paniculate corymbs; bracts of the involucre roundish-ovate or obovate: receptacle densely fimbriate-hirsute. Alkaline plains southeastern Oregon to Nevada and California

T. canum Eaton Bot. King 179, t. 19 f. 8-14. Silvery with minute close tomentum: stems erect from a shrubby base, 6-12 inches high, leafy to the top: leaves sessile, 6-12 lines long, spatulate and entire, or some of them cuneate and 2-3-lobed: heads 2 lines in diameter, congested in small terminal clusters: involucre cup-shaped, of about 12 ovate scarious-margined concave bracts in 2 rows: receptacle conical, not hirsute. On cliffs and rocky hills, southeastern Oregon to Nevada and California.

77 ARTEMISIA Tourn. L. Gen. n. 945.

Bitter aromatic herbs or shrubs with alternate leaves and small paniculately disposed commonly nodding heads of yellow or whitish flowers. Heads few to many-flowered, small, wholly discoid; heterogamous the pistillate flowers with small and slender tubular corolla, and the hermaphrodite either sterile or fertile; or homogamous with the flowers all hermaphrodite and fertile. Involucre imbricated in few or several rows. Anthers commonly tipped with subulate-acuminate appendages. Achenes obovate or oblong, mostly with small epigynous disk and no pappus.

§ 1 DRACUNCULUS Besser Bull. Soc. Nat. Mosc. viii, 97. Heads heterogamous; the disk-flowers hermaphrodite but sterile, their styles mostly entire and peltate-penicillate at tip. Receptacle not hairy.

* Achenes and flowers beset with long cobweby crisp hairs; spinescent undershrub.

A. spinescens Eaton Bot. King, 180, t. 19, f. 15-21. Stems stout and densely branched, rigid 4-18 inches high, white-tomentose: leaves 2-4 lines long, pedately 3-5-parted, the divisions 3-lobed: heads globose, racemously glomerate on short and leafy branchlets which become slender persistent spines: bracts of the involucre 5-6, broadly obovate, obtuse: pistillate flow-

ers 1-4, with truncate corolla; the hermaphrodite sterile flowers 4-8, their corollas ventricose-campanulate from a narrow base, 5-toothed: achenes oblong-obovate. On alkaline plains, southeastern Oregon to California Wyoming and Idaho.

* * Perennial herbs without spines: heads many-flowered; receptacle hemispherical or ovate: achenes nearly glabrous.

A. Canadensis Michx. Fl. ii, 129. Glabrous, or mostly with at least the radical and sometimes all the leaves either sparsely or canescently silky-pubescent: stems 1-2 feet high from a perennial root: leaves mostly bipinnately divided into linear or almost filiform divisions: heads very numerous, 1-2 lines long, in a compound oblong or pyramidal virgate panicle: involucre greenish, glabrous, or rarely pubescent. On rocky banks and plains, Brit. Columbia to California and the Eastern States.

A. Grœnlandica Wormsk. Fl. Dan. t. 1585. Stems simple, 10-16 inches high from a stout perennial caudex: leaves silky-pubescent, radical and lower cauline 1-2-ternately or pinnately divided into linear lobes; uppermost linear and entire or 3-parted: heads numerous, in a somewhat loose narrow thyrus: involucre pilose or glabrate, pale fuscous or brownish. On wet banks, Washington to Alaska and Hudson Bay.

A. pedatifida Nutt Trans. Am. Phil. Soc. vii, 399. Canescent throughout with a fine and close pubescence: cespitose with stout lignescent caudex, very dwarf: leaves chiefly crowded in radical tufts and on the base of the rather naked flowering stems, once or twice 3-parted into narrowly-spatulate or nearly linear obtuse entire divisions: heads few, loosely spicate or racemously disposed, canescently pubescent, 12-15 flowered; the hermaphrodite sterile flowers with style barely 2-lobed at summit and no ovary. Arid grounds, Idaho and Wyoming to the Rocky Mountains.

A. dracunculoides Pursh Fl. ii, 742. Glabrous; stems 2-4 feet high from a perennial root, virgately or paniculately branched: leaves mostly entire, some of the lower ones 3-cleft or more divided, linear, 1-4 inches long: heads very numerous, in a compound and crowded or open and diffuse panicle: involucre nearly hemispheric, its bracts ovate or oblong, green, scarious-margined: receptacle hemispheric, naked. Dry plains, British Columbia to California Texas and Nebraska.

§ 2 EUARTEMISIA Gray Syn, Fl. i, pt. 2, 369. Heads heterogamous; the disk-flowers hermaphrodite and fertile, with 2-cleft style.

* Achenes obovoid or oblong, wholly destitute of pappus: receptacle beset with long woolly hairs.

A. frigida Willd. Sp. iii, 1838. Silky-canescant and silvery: herbaceous from a suffrutescent base, about a foot high; simple or branching, numerous racemously disposed heads in an open panicle: leaves mainly twice ternately or quinately divided or parted into linear crowded lobes, and usually a pair of simple or 3-parted stipuliform divisions at the base of the petiole: heads globular, barely 2 lines in diameter; involucre pale, canescent, its bracts narrow and herbaceous: corollas glabrous. Idaho to Nevada Texas Minnesota and the Saskatchewan.

* * Achenes obovoid or oblong, with small epigynous disk, wholly destitute of pappus: receptacle not villous.

A. biennis Willd. Phytogr. 1794, 11. Annual or biennial: wholly glabrous and inodorous: stems strict 1-4 feet high, with nearly erect branches, very leafy, bearing close glomerules of small heads in the axils from near the base of the somewhat naked and spiciform summit: leaves 1-3 inches long, 1-2-pinnately parted into lanceolate or broadly linear laciniate or incisely toothed lobes; or the uppermost small, sparingly pinnatifid and

less toothed: heads about $1\frac{1}{2}$ lines broad, not drooping, sessile and very numerous. River banks and yards, Brit. Columbia to California Texas and Hudson Bay.

A. Richardsoniana Bess. Supple. 64, & DC. Prodr. vi, 117. Stems rather slender, 8-12 inches high, from a caespitose perennial caudex: leaves silvery-canescens with fine very close-pressed pubescence: radical twice ternately or quaternately divided or parted into oblong-linear or narrower lobes of 2-3 lines in length; cauline few, mostly trifid: heads 2 lines high, several or rather numerous in a strict simple racemiform inflorescence, fuscous: corollas pilose or sometimes glabrous. On Mount Rainier Washington to the Arctic coast and the northern Rocky Mountains.

A. Ludoviciana Nutt. Gen. ii, 143. Canescently tomentose throughout, or the upper face of the leaves sometimes early glabrate and green: stems 1-4 feet high, simple or with virgate branches: leaves lanceolate to oblong, mucronate, remotely serrate or 2-3 cleft, or irregularly 3-5-parted into lanceolate or linear entire lobes; the upper entire: heads glomerately paniculate, not over 2 lines high; involucre campanulate, or in fruit ovoid, 12-20-flowered, lanate-tomentose. Common on plains and banks, Brit. Columbia to California.

A. heterophylla Nutt. Trans. Am. Phil. Soc. vii, 400. *A. vulgaris* var. *Californica* Bess. Stems erect, 3-5 feet high, leafy to the top, simple: leaves lanceolate or broader, 2-4 inches long, white beneath with cottony tomentum, entire, or often laciniately toothed or cleft: heads numerous, in a short and dense naked panicle, 2 lines high, glabrate. On moist banks along the coast, Alaska to California.

A. discolor Dougl. in Herb. Hook. Bess. DC. Prodr. vi, 109. Stems mostly slender, 9-12 inches high, from a slender lignescens caudex: leaves 1-2-pinnately parted into narrow, linear or lanceolate entire or sparingly lacinate divisions and lobes, white beneath with close cottony tomentum, glabrate above: heads glomerate in an interrupted spiciform or virgate panicle, 1-2 lines high; involucre hemispherical-campanulate, greenish and scarious, glabrous or soon becoming so, 20-30-flowered. Mountains of Brit. Columbia to Washington and Montana.

A. incompta Nutt. l. c. Stems rather slender, 1-2 feet high: leaves once or twice pinnately parted into broadly to narrowly linear lobes, green and glabrate above, pale and slightly tomentose beneath: heads about 2 lines high, in narrow spicate clusters on the upper parts of the stem and branches; bracts of the campanulate involucre ovate, scarious-margined, nearly glabrous. Mountains of Washington to California and the Rocky Mountains.

A. Lindleyana Bess. Abrot. 35. "A foot or two, rarely only a span high, slender, with thin flocculent tomentum soon deciduous, or persisting on the lower face of the mostly entire leaves (these inch or less long, a line or much less wide, the lower occasionally with 2 or 3 small lobes): heads barely 2 lines high, loosely spicate on the simple stem or paniculate branches of the inflorescence: involucre sparingly pubescent or glabrate, pale fuscous. Sandy banks of the Columbia River and its tributaries."

A. Prescottiana Bess. l. c. 72. "Much branched from the base, a foot or two high, slender, glabrous or early glabrate: lower leaves cuneate-linear and incised or cleft at apex, slightly tomentose beneath; most of the cauline pinnately parted into 5 to 7 delicate filiform divisions (of an inch or less long): involucre glabrous, hemispherical, about 15-flowered. Quick-sand River near the Grand Rapids of the Columbia Douglas."

§ 3 SERIPHIDIUM Bess. Bull. Soc. Nat. Mosc. vii, 5. Low shrubs or fruticulose plants. Canescent or silvery with very fine

and close tomentum. Heads homogamous, the flowers all hermaphrodite and fertile. Receptacle not hairy.

* Heads solitary in the axils, surpassed by the rigid leaves.

A. rigida Gray Proc. Am. Acad. xix, 49. "A span to a foot high from a thick woody base or short stem, producing a profusion of rigid and slender rather simple fastigate branches, leafy to the very top: leaves also rigid, silvery-canescens, filiform-linear, 3-5 parted or cleft, or some of the upper and fascicled ones entire (even the lower rarely inch long), most of them subtending a sessile head: involucre oblong to campanulate, 5-12-flowered, less than 2 lines long; bracts oval, hyaline-margined. On high rocky ridges, N. E. Oregon and adjacent Idaho."

** More naked-paniculate or thyrsoid, at least the upper heads or clusters exceeding the subtending leaves; heads comparatively small, and few-flowered, mostly oblong, 1-2 lines long; involucre bracts rather firm in texture, well imbricated, the outer successively shorter.

A. arbuscula Nutt. l. c. Dwarf, 8-12 inches high, with a stout base and slender flowering branches: leaves short, cuneate or fan-shaped, 3-lobed or parted with the lobes obovate to spatulate-linear, sometimes again 2-lobed; those subtending the heads usually entire and narrow: panicle strict and comparatively simple and naked, often spiciform and reduced to few rather scattered sessile heads: involucre 5-9-flowered. High mountains and plains, Idaho and Wyoming to Utah and California.

A. tridentata Nutt. l. c. A shrub or small tree 2-15 feet high, much branched: leaves cuneate, 6-18 lines long, 3-7-toothed or lobed at the truncate summit. uppermost cuneate-linear: heads very numerous, in large dense panicles; involucre 5-8-flowered, oblong, its outer or accessory bracts short, ovate, obtuse, tomentose-canescens. Common on dry plains and mountains, Brit. Columbia to California and Nebraska, east of the Cascade Mountains. Commonly called Sage Brush.

Var. angustifolia Gray Proc. Am. Acad. xix, 50. "Leaves all narrow; lower spatulate-linear, barely 3 toothed at the roundish summit; upper entire and more linear, a line or less wide: heads small: shrub 3 or 4 feet high, with foliage too like that of the following species, but involucre of *A. tridentata*. A id plains, S. Idaho and W. New Mexico to the Mohave Desert and the southern borders of San Diego Co. California."

A. trifida Nutt. l. c. Silky-canescens: Stems 6-30 inches high, much branched: leaves 3-cleft toward the apex or 3-parted, the lobes and entire upper leaves narrowly linear or slightly spatulate dilated: head numerous in the contracted leafy panicle, or spicately disposed on its branches: involucre 3-9-flowered, its outer or accessory bracts oblong to short-linear or lanceolate. Elevated plains, Washington to California.

Tribe vii, SENECTIONIDEÆ Gray Syn. Fl. i, pt. 2 79. Heads heterogamous or homogamous. Involucre mostly one or two series of equal not scarious bracts, sometimes unequal, or even imbricated, with or without short accessory ones at base. Receptacle naked. Anthers without tails at base, but not rarely sagittate. Style-branches of hermaphrodite flowers most commonly truncate or obtuse, tipped with short appendages or none. Pappus of numerous capillary bristles, sometimes caducous.

* Heads subdioecious: style in the tubular sterile flowers undivided or nearly so.

- 78 **Petasites** Flowers white or purplish, the fertile ones pistillate and more or less conspicuously radiate.
 * * Heads discoid, of wholly hermaphrodite fertile yellow flowers.
- 79 **Cacaliopsis** Heads very many-flowered: anthers entire at base.
- 80 **Luina** Heads about 10-flowered: anthers sagittate at base.
- 81 **Rainieria** Heads 4-6-flowered: achenes prismatic.
 * * * Heads heterogamous or homogamous: the tubular disk-flowers perfect and fertile, with 2-cleft style.
- 82 **Crocidium** Herbs with alternate leaves: heads radiate many-flowered: flowers yellow, all fertile, involucre hemispherical or more open.
- 83 **Tetradymia** Shrubs with alternate leaves: involucre of 4-6 firm and concave close and overlapping bracts.
- 84 **Raillardella** Herbs with alternate leaves: involucre of a single series of linear equal bracts, their edges lightly connate below the middle: pappus of comparatively few and usually stout plumose bristles.
- 85 **Arnica** Herbs with chiefly opposite leaves: involucre of several thin herbaceous equal bracts: pappus a single series of numerous capillary scabrous to barbellate bristles.
- 86 **Senecio** Herbs with alternate leaves: involucre of several erect herbaceous bracts: pappus of soft-capillary merely scabrous bristles.

* *Style-branches of hermaphrodite fertile flowers roundish-obtuse, or at least not truncate, wholly without appendages or hispidity at summit. Receptacle naked, flat. Pappus-bristles merely denticulate*

78 PETASITES Gærtn. Fr. ii, 406, t. 166.

Perennial herbs with thickish and mostly creeping rootstocks sending up scapiform foliose-bracteate simple flowering stems and ample radical leaves on long petioles in early spring. Heads racemously or corymbosely disposed, white or purplish-flowered, subdiœcious; those of the truly fertile plant wholly or mostly of pistillate flowers with slender tubular and irregularly 2-5-toothed or distinctly ligulate corolla; in the substerile with few of these in the margin and numerous hermaphrodite infertile ones with 2-cleft or 2-lobed style and sterile ovary in the centre. Involucre a series of soft herbaceous bracts. Achenes narrow, 5-10-costate. Pappus of soft and white elongated bristles.

P. sagittata Gray Bot. Cal. i, 407. Scapes very scaly, 3-10 inches high; leaves deltoid-ovate or reniform-ovate, persistently white-tomentose beneath, glabrous or nearly so above, 4-10 inches long, their margins sinuate denticulate, neither cleft nor lobed: heads short-racemose, becoming corymbose: involucre campanulate: flowers nearly white, the marginal ones of the pistillate heads ligulate but not surpassing the disk. Wet grounds, northern Washington to Alaska and across the Continent.

P. palmata Gray l. c. Stems very scaly, stout, 6-24 inches high: leaves nearly orbicular in outline, 6-18 inches in diameter, 7-11-cleft to beyond the middle or deeper; the lobes oblong-lanceolate to oblong-cuneate, laciniately dentate, white-tomentose beneath, green and glabrate above: heads rather numerous, in a fastigiate panicle, about 6 lines high.

Common along mountain streams, California to Alaska Newfoundland Massachusetts New York and Wisconsin.

P. nivalis Greene Pitt. ii, 18. "Rootstocks slender, matted, scarcely subterranean: leaves 6-10 inches high; lamina 3 to 6 inches long, of round-reniform or broadly cordate-ovate outline, 5-parted, the sinuses oblong and closed, the segments of broadly cuneate-obovate circumscription, deeply 3- to 5-lobed, the lobes with a few coarse angular mucronate spreading teeth; lower face of leaves silky-tomentose, upper glabrous, deep green: scapes about a foot high; heads a dozen or more, racemously arranged and long-peduncled." Along streamlets, Mount Rainier Washington.

79 CACALIOPSIS Gray Proc. Am. Acad. xix, 50.

Perennial herbs with palmately lobed leaves and rather large heads of yellow flowers. Heads many-flowered, discoid, of wholly hermaphrodite and fertile flowers. Involucre hardly herbaceous, simple, of carinately 1-nerved bracts. Corollas rather deeply 5-cleft, the cylindraceous throat rather longer than the slender tube. Anthers much exerted, with lanceolate tips and entire base. Style puberulent for some distance below the slightly flattish branches. Achenes linear, glabrous, 10-striate. Pappus very copious, soft and white, equalling the corolla.

C. Nardosmia Gray l. c. Floccose-woolly, at length glabrate: stems stout; 2-4 feet high, 2-3-leaved and bearing several loosely paniculate heads: leaves alternate, long-petioled, round-cordate to fan-shaped, 5-9-cleft, or rarely parted, the lobes or divisions rather broad, incisely dentate or lobed: heads an inch high, discoid; bracts of the campanulate involucre 12-30, lanceolate-linear, acuminate, a little shorter than the disk: corollas yellow. Open Pine woods, Washington to California.

80 LUINA Benth. Hook. In. Pl. t. 1139,

Low herbs with simple stems, alternate entire leaves and small heads of yellow flowers. Heads about 10-flowered, homogamous, of wholly hermaphrodite and fertile flowers. Involucre of 10-12 dry and rather rigid 1-nerved equal bracts. Corollas with slender tube and funnelform 5-lobed limb. Anthers much exerted, sagittate at base. Style glabrous, its flattened and linear branches obscurely pappillose on the back, very obtuse. Achenes obscurely 10-striate, glabrous. Pappus of numerous soft white bristles equalling the corolla.

L. hypoleuca Benth. l. c. Stems simple, few or many from a stout woody rootstock, white with appressed tomentum, 6-12 inches high, leafy up to the corymbiform cyme of several small heads: leaves ovate or oval, sessile, entire, an inch or less long, rather coriaceous, the upper face green and glabrate, the lower densely white-tomentose: involucre 4 lines high, nearly equalling the light yellow corollas. On cliffs and rocky places in the mountains, Brit. Columbia to California.

81 RAINIERIA Greene Pitt. iii, 291.

"Stoutish upright milky-juiced perennial, with the aspect and inflorescence of a *Nabalis*, but more nearly the characters of *Mesadenia*. Heads racemose, 2 or 3 in the axil of each small bract. Involucre simple, cylindric, of 4 to 6 firm erect bracts. Recepta-

cle flat, naked, bearing 4 to 6 tubular flowers; these with narrow cylindrical proper tube rather longer than the combined narrow throat and long linear segments. Achenes prismatic, glabrous, surmounted by a rather coarse pappus of firm sordid or brownish bristles which are smooth except at the slightly thickened and scabrous apex."

R. stricta Greene l. c. *Prenanthes stricta* Greene. *Luina Piperi* Robinson. "Perennial, 2 feet high from simple or branching horizontal rootstocks, glabrous, bright green, not glaucous: radical leaves 6-10 inches long, oblong-lanceolate, tapering to a winged petiole, abruptly acuminate, coarsely and repandly dentate; cauline similar but smaller, rather numerous: inflorescence a strict and dense simple raceme 6 inches long; heads erect, their short pedicels single or in pairs; scales of the cylindrical involucre about 8, purplish and with some white tomentose pubescence, calyculate bracts obscure or none: achenes equally and obtusely 15-ribbed; pappus pale-fuscous. Dry northward slopes, in rocky soil at the limit of trees on Mount Rainier Wash."

* * *Style-branches of hermaphrodite flowers either truncate or capitellate at tip, which is either naked or penicillate or hirsute and not rarely bearing a short conical or flattened appendage.*

+ *Involucre lax, usually of much overlapping or unequal bracts.*

82 CROCIDIUM Hook. Fl. i, 335, t. 118.

Small winter annual herbs with alternate leaves and yellow flowers on scape-like stems in early spring. Heads heterogamous, radiate, the flowers all fertile. Involucre hemispherical or more open, of 8-12 nearly equal thin-herbaceous bracts. Receptacle conical. Ray-flowers about 12, oblong, with short filiform tube; disk-flowers with slender tube and campanulate 5-toothed limb. Anthers with deltoid-ovate acute tips. Branches of the style short and broad, terminated by large deltoid appendages. Achenes fusiform-oblong, obscurely 3-5-costate, beset with hyaline oblong papillæ, which detaching when wetted throw out a pair of spiral threads. Pappus a single series of equal white barbellate bristles which are very deciduous, commonly wanting in the ray-flowers.

C. multicaule Hook. l. c. Flocculent woolly when young, soon mostly glabrate, producing many simple stems 2-10 inches long from the tuft of obovate or spatulate few-toothed sessile or short-petioled radical leaves; cauline leaves small, lanceolate to linear: heads solitary, slender-peduncled rather small but showy; bracts of the involucre oblong-ovate. Moist places, Brit. Columbia to California and Idaho.

+ + *Involucre of 4-6 firm and concave close and strongly overlapping bracts, 4-9 flowered. Shrubs with alternate leaves.*

83 TETRADYMIA DC. Prodr. vi. 440.

Low and rigid shrubs with alternate or fascicled narrow entire leaves and rather large cymose or clustered heads of yellow flowers. Heads homogamous, the flowers all tubular and perfect. Involucre cylindrical to oblong. Receptacle flat. Corollas with elongated tube and lanceolate or linear spreading lobes longer

than the short campanulate throat. Anthers wholly exerted, acutely and even caudately sagittate at base; the tips triangular-lanceolate. Style-branches flattish, the truncate and minutely penicillate tips terminated by a very short and low obtuse cone. Achenes terete, short, obscurely 5-nerved. Pappus of fine and soft minutely scabrous capillary white or whitish long bristles.

§ 1 EUTETRADYMIA T. & G. Fl. ii, 447. Involucre 4-flowered, of 4-5 bracts. Pappus extremely copious. Achenes either very villous, glabrate or glabrous, varying even in the same species

T. canescens DC. Prodr. vi, 540. A hoary shrub 1-2 feet high, permanently canescent with a dense and close tomentum, unarmed, fastigiately branched: leaves from narrowly linear to spatulate-lanceolate, an inch or less long: heads 6-9 lines high, most of them short-pedunculate. Dry hills and plains, Brit. Columbia to California and New Mex. east of the Cascade Mountains.

T. glabrata Gray Pacif. R. Rep. ii, 122, t. 5. Shrub 1-4 feet high with slender spreading branches; whitened with loose at length deciduous tomentum: leaves at length naked and green, primary ones slender-subulate, cuspidate, on young shoots appressed, 6 lines long; those of the fascicles in their axils spatulate-linear, fleshy, pointless: heads mostly short-pedunculate; involucre often glabrate: achenes, so far as known, very villous. Southeastern Oregon to Eastern California and Utah.

T. Nuttallii T. & G. Fl. ii, 447. Shrub 2-3 feet high, much branched, woolly when young, canescent: primary leaves mostly converted into subulate spines; the others densely fascicled in their axils thickish, linear-spatulate, obtuse, half inch long, about equalling the spines: heads fascicled and in corymbose clusters on very short peduncles. Southern Idaho and Utah.

§ 2 LAGOTHAMNUS T. & G. l. c. 448. Involucre 5-9-flowered, of 5 or 6 broader bracts. Proper pappus reduced nearly or quite to a single series of bristles which are covered by a false pappus of extremely long very soft and white woolly hairs which densely clothe the achenes.

T. spinosa H & A. Bot. Beech. 363. Shrub 2-4 feet high; at least the branches densely white-tomentose; branches divaricate, rigid, bearing rigid straight or recurved spines in place of primary leaves; secondary leaves fascicled in their axils, small, fleshy, linear-clavate, glabrous or glabrate: heads scattered, pedunculate, fully 6 lines high: pappus of comparatively rigid capillary bristles surpassing the wool of the achene. Dry plains, eastern Oregon and Idaho to Utah California and Arizona.

+ + + Involucre of several connivent-erect herbaceous equal bracts, many-flowered. Ours herbs with the flowers all fertile.

84 RAILLARDELLA Gray Proc Am. Acad. vi, 550.

Acaulescent herbs with stout creeping rootstocks, bearing tufts of entire radical leaves and a simple naked scape terminated by a single large head of yellow flowers. Head several- to many-flowered, homogamous; the flowers all fertile. Involucre naked at base; of 6-14 linear equal bracts in a single series, lightly united into a cup to or above the middle, Receptacle naked, flat

or barely convex. Ray-flowers with irregular and cuneate deeply 3-4-cleft fertile ligules: disk corollas with rather short proper tube, elongated and narrow-funnelform throat and 5-toothed limb. Style-branches elongated, hispidulous, and produced beyond the stigmatic lines into acuminate tips. Achenes linear, flattish, striate-nerved. Pappus a single series of rather stout aristiform plumose bristles.

R. argentea Gray l. c. Rootstock extensively creeping, somewhat lignescent: leaves silvery with silky tomentum, 1-2 inches long: scapes 2-4 inches high: head narrow, in depauperate specimens 7-8-flowered, but usually about 15-flowered: rays none. From Crater Lake Oregon to the San Bernardino Mountains in California.

R. Pringlei Greene Bull. Torr. Club ix, 17. Scapes 12-18 inches high from a branching rootstock or prostrate short leafy branches: leaves almost linear, some of them remotely serrate-toothed, glabrous, 3-4 inches long: involucre campanulate, about 40-flowered, its numerous bracts but slightly united near the base: flowers orange-yellow, 6-10 of them conspicuously radiate: pappus-bristles 15-18. Subalpine in the mountains of northern California, to be looked for in southern Oregon.

++ *Involucre of several connivent erect herbaceous equal bracts, many-flowered. Ours herbs with the flowers all perfect.*

85 ARNICA L. Gen. n. 958.

Perennial herbs with erect stems, mostly opposite leaves and comparatively large heads of yellow flowers. Heads many-flowered, conspicuously radiate, or the rays rarely wanting. Involucre campanulate, of several thin-herbaceous oblong-lanceolate to linear equal bracts in a single or somewhat double series. Receptacle flat, sometimes fimbriate or villous. Corollas of the disk-flowers with a commonly elongated hirsute tube and funnelform or cylindraceous 5-lobed limb. Achenes linear, more or less 5-10-costate or angled. Pappus a single series of numerous rather rigid capillary bristles, from scabrous to barbellate.

* Radical leaves mostly cordate at base, on slender sometimes winged petioles: rootstocks slender and creeping.

+ Rays wanting, or rarely some rudiments: cauline leaves sometimes by disjunction alternate, usually some of them petioled, irregularly dentate: heads several, paniculate.

A. parviflora Gray Proc. Am. Acad. vii, 363. "A foot high, slender, pubescent, even the peduncles but slightly glandular: leaves narrowly deltoid or oblong, truncate or abrupt at base, an inch or two long: involucre 4 or 5 lines high, about 20-flowered; its linear bracts sparsely pubescent: achenes not pubescent, minutely glandular." From Crater Lake Oregon to Humboldt Co. California

A. discoidea Benth. Pl. Hartw. 319. More or less villous and viscid: stems 10-18 inches high, rather stout: radical and lower cauline leaves from ovate with truncate or abruptly cuneate base to cordate, not rarely wing-petioled 2-4 inches long: involucre 6 lines high, 30-50-flowered, usually very villous and glandular; its bracts lanceolate to linear: corollas all tubular: achenes pubescent. Wooded hills in the Coast ranges, Washington to California.

A. spathulata Greene Pitt. iii. 103. "A foot high or more, stoutish, somewhat viscidly hirsute and tomentulose, very leafy below and floriferous from about midway of the stem: lowest leaves 3 to 5 inches long, broadly lanceolate-spatulate, doubly toothed, the two or more pairs of lower cauline more narrowly spatulate but dilated just above the insertion: peduncles 6 to 10, the lowest with a pair of ovate-acuminate sessile bracts in the middle: heads campanulate, $\frac{3}{4}$ inch high; involucre densely woolly-hirsute and viscidulous; rays none; disk-corollas ochroleucous, the tube hirsute, the teeth with a tuft of pilose hairs at tip: achenes glabrous, minutely resinous-dotted; pappus white, barbellulate-scabrous. Oregon."

++ ++ Rays conspicuous and elongated, rarely wanting: cauline leaves all opposite, in 1-3 pairs, broad and usually membranaceous, dentate or denticulate.

A. cordifolia Hook. Fl. i, 531. Pubescent or the stems hirsute and the peduncles villous: stems 1-2 feet high, or in alpine forms 4-8 inches high: lower cauline and radical leaves long-petioled, deeply cordate, or sometimes only ovate; upper cauline small, sessile: heads few, in smaller plants solitary: involucre 8 lines high, pubescent or villous: rays usually an inch long: achenes more or less hirsute. Woods and high mountains, Brit. Columbia to California and the Rocky Mountains.

var. eradiata Gray Syn. Fl. i, pt. 2, 381. Heads smaller, without rays: leaves oblong-ovate, at most subcordate. Eastern Oregon to Mont.

A. latifolia Bong. Veg. Sitoh. 147. Glabrous or minutely pubescent: stems rather slender, 6-18 inches high: radical leaves cordate or subcordate and petioled, cauline 2-3 pairs equal ovate, or oval, usually sharply dentate, closely sessile by a broad base, or lowest with contracted base: heads one to several, on slender peduncles in the axils of the upper leaves; bracts of the involucre oblanceolate with a broad base and long acuminate apex; achenes usually glabrate or glabrous. In mountainous districts Alaska to Oregon and the Rocky Mountains of Colorado

A. cernua Howell Glabrous or minutely pubescent; stems slender, usually solitary, 4-12 inches high, bearing a single head on a curved peduncle: leaves all more or less petioled, entire or coarsely dentate, ovate and subcordate, or the upper lanceolate with a broad cuneate base, usually not more than 15 lines long: involucre 8-10 lines long, of lanceolate but not acuminate bracts: achenes short-pubescent. On the serpentine formation of the Coast range, near Waldo, Oregon

* * No cordate leaves: radical leaves petioled tapering or sometimes abrupt at base: root-stock usually creeping and slender

+ Leafy to the top: cauline leaves very seldom less than 4 pairs and the upper not conspicuously diminished: heads several or few, in small plants solitary.

A. amplexicaulis Nutt. Trans. Am. Phil. Soc. vii, 480. Glabrous or sometimes pubescent: 1-2 feet high: many-stemmed from matted root stocks, rather stout, leaves from ovate to lanceolate-oblong, acute or acuminate, all the cauline sessile by half-clasping base, saliently and very acutely dentate; achenes hirsute-pubescent. Along small streams and on waterfalls never where it becomes dry. Oregon to Brit. Columbia.

A. Chamissonis Less. in Linn. vi, 238. Few-stemmed from short running rootstocks; from tomentulose or villous pubescent to nearly glabrous, 1-2 feet high, rather slender: leaves oblong or oblong-lanceolate, denticulate or dentate, lowest tapering into a marginal petiole, upper broad at base and somewhat clasping: achenes hirsute-pubescent. In the high mountains, Alaska to California, Utah, Colorado, Lake Superior and Washington.

A. longifolia Eaton Bot. King 186. Minutely scabrous-puberulent: stems 14-24 inches high, many from a scaly caudex: leaves in 5-6 pairs, elongated-lanceolate, acuminate, 7-10 lines broad, entire or denticulate, the very lowest reduced to ochreate scales, the upper pairs sessile and slightly connate-amplexicaul, the lower with sheathing connate petioles: heads 1-8, commonly 5, not large; involucre bracts lanceolate, acute: achenes minutely glandular but not hispid. In dense clumps among rocks, Powder River Mountains Oregon to the Clover Mountains Nevada and in the Uintas above Bear River Canyon; 10,000 feet altitude.

A. foliosa Nutt. l. c. Tomentose-pubescent, strict, leaves lanceolate, denticulate, nervose; upper partly clasping by narrowish base; lower with tapering base, connate: heads short-peduncled, rarely solitary; achenes hirsute-pubescent or glabrate. Wet meadows and mountain sides, western California to eastern Washington the Saskatchewan and the Rocky Mountains.

+ + Heads rayless stems leafy even on the flowering branches

A. viscosa Gray. Proc. Am. Acad. xiii, 374. "A foot or less high, fastigately branching, very viscid-pubescent: leaves small (inch or less long), ovate-oblong, entire, closely sessile but not connate at base: involucre 4 lines high, considerably shorter than the 25 or 30 flowers: corollas pale yellow: achenes glandular-hirsute. On Mt. Shasta California". perhaps in Oregon.

+ + Less leafy: cauline leaves 1 or 2 rarely 3 pairs, the upper mostly small.

+ + Heads rayless, mostly 3-5 and rather short-peduncled at the naked summit of the stem.

A. Parryi Gray Am. Nat. viii, 213. Somewhat hirsutely pubescent and above glandular, slender, simple, 1-2 feet high: leaves membranaceous, commonly denticulate, radical oval or ovate-oblong, 1-3 inches long, abruptly or cuneately contracted at base into a short margined petiole; cauline remote: involucre hirsute and glandular, 6 lines or less high, occasionally some outermost corollas ampliate: achenes glabrous or with a few sparse hairs. Eastern Oregon and Washington to the Rocky Mountains.

+ + Heads conspicuously radiate, solitary or very few, mostly long-peduncled.

A. alpina Olin. Pubescent, hirsute or at summit villous: stems 18 inches high. Strict, simple, usually monocephalous: leaves thickish, from narrowly oblong to lanceolate or the radical oblong-spatulate and small, uppermost linear entire, or denticulate, 3-nerved; base of the cauline barely at all connate: achenes hirsute-pubescent, rarely glabrate. Oregon and Washington to the Aleutian Islands, the Rocky and Sierra Nevada Mountains Labrador and the Arctic coast

+ + + *Pappus of soft-capillary and merely scabrous very numerous bristles. Style-branches narrow, truncate or capitellate and often bearing a bearded ring at tip which sometimes is produced into a short central cusp or obscure cone. Leaves all alternate.*

86 SENECIO Tourn. L. Gen. n. 954.

Perennial herbs; with mostly simple stems from creeping root-stocks, bearing solitary or few usually long-peduncled and rather large heads of yellow flowers. Head many-flowered, with pistillate rays; or sometimes homogamous by the absence of the rays; the flowers all fertile. Involucre usually broadly campanulate nar-

ked at base: the scales thin-herbaceous, lanceolate or linear, equal, in one or two series. Receptacle flat, naked. Rays elongated: disk-corollas with distinct and usually elongated tube and funnelliform or cylindraceous 5-lobed limb. Style-appendages obtuse, pubescent. Achenes linear, 5-angled or 5-10-ribbed, somewhat hirsute or nearly glabrous. Pappus a single series of rather rigid strongly scabrous or barbellate capillary bristles.

§ 1 Ours perennials with tomentose and usually floccose pubescence or none, never viscid nor obviously hirsute.

* Heads more than half-inch high, very many-flowered: disk corollas merely 5-toothed: heads radiate.

S. megacephalus Nutt. Trans. Am. Phil. Soc. vii, 410. About a foot high, loosely floccose-woolly, tardily glabrate, leafy: leaves entire, lanceolate and tapering into a petiole, uppermost cauline attenuate, thickish: heads 1-3, short-peduncled, 8-12 lines high: involucre calyculate by some very loose and setaceous-subulate elongated accessory bracts: rays over half inch long. Mountains of Idaho.

* * Heads middle-sized or small, erect, mostly radiate.

+ Stems herbaceous, numerous and equally leafy to the top: leaves pinnately veined, not conspicuously reticulate, from entire to lacinate-dentate or dissected, not narrowly linear, glabrous or very early glabrate and smooth.

-- Low, alpine: heads few or solitary.

S. hesperis Greene. Pitt. ii, 166. Stems 4-10 inches high from short, spreading rootstocks, leafy only at the decumbent base; sparingly floccose-tomentose when young, in age nearly glabrous: leaves thickish and somewhat fleshy, from round-oval to oblong and oblong-lanceolate, 6-12 lines long, tapering or abruptly contracted to a short or long petiole, almost entire or repandy or crenately few-toothed: head solitary half-inch high, with the expanded rays 1 inch broad: involucre campanulate, the bracts linear, outer calyculate ones few or none: rays 10-12 deep yellow, style tips slightly penicillate. On the serpentine formation of the Coast range of southern Oregon.

S. Fremontii T. & G. Fl. ii, 445. Many-stemmed from a thickish caudex, 6-12 inches high, leafy to the top: leaves thickish, from rounded-obovate or spatulate to oblong, obtuse, obtusely or acutely dentate, sometimes even pinnatifid-dentate; lower abruptly contracted into a winged petiole; uppermost sessile by a broadish base: head half-inch high, short-peduncled, subtended by a few short loose bractlets: rays 3-5 lines long. Alpine regions of the Rocky Mountains to Lassen Peak California and the Blue Mountains of Oregon.

S. occidentalis Greene Pitt. iv, 122. *S. Fremontii* Var *occidentalis* Gray. Stems many from running rootstocks, 4-12 inches high, rather slender: leaves from round-obovate to spatulate, 6-12 lines long those in the middle of the stem largest and the lowest smallest, coarsely dentate: heads 1-several, about 6 lines high: bracts of the involucre linear, 1-nerved, scarious-margined, the small accessory ones setaceous to lanceolate, rays 4-6 lines long. On the higher mountains, Oregon to California and the Rocky mountains.

S. streptanthifolius Greene Eryth. iii, 23. "Only a foot high, or even less, from clustered leafy perennial rootstocks, glabrous throughout, somewhat fleshy-coriaceous and glaucous: leaves 1 to 1½ inches long, orbicular

to obovate and oblong-obovate, rather long-peduncled, the margin from merely repand-denticulate to more conspicuously though sparingly toothed: heads less than $\frac{1}{2}$ inch high, in a loose unequally-branched corymb terminating the remotely bracted stem: both disk and ray flowers very light yellow. On dry wooded banks in Beaver Canon, Idaho,"

S. Gibbonsii Greene Pitt. ii, 20. Stems stout, simple, 3 feet high or more, leafy throughout: leaves rather fleshy, short-petioled, 3 inches long deltoid-lanceolate, acute, entire or with a few irregular teeth near the base: heads radiate, 6 lines high, disposed in a lax somewhat dichotomous cyme: involucre campanulate, calyculate-bracted at base. Salt-marshes at the mouth of the Columbia river."

++ ++ Tall with corymbosely cymous and radiate heads: involucre setaceously few-bracteolate, campanulate or narrower: leaves nearly membranaceous.

S. triangularis Hook. Fl. i, 332. Rather stout, glabrate, stem simple, 2-5 feet high bearing several or somewhat numerous heads in a corymbiform open cyme: leaves all more or less petioled and thickly dentate, deltoid-lanceolate or the lower triangular hastate or deltoid-cordate and the uppermost lanceolate with cuneate base: heads about half-inch high, involucre campanulate, mostly 25-30-flowered, the oblong-linear, rays 6-12. In wet ground on the high mountains, British Columbia to California and the Rocky Mountains.

S. subvestitus Howell Eryth. iii, 35. Densely floccose-woolly throughout: stem simple, 1-2 feet high, from short spreading rootstocks, leafy to the top: leaves lanceolate, obscurely hastate, the lowest subcordate, all petioled, 1-2 inches long, strongly denticulate: heads several in a close cyme, radiate, half-inch high, involucre campanulate, many-flowered with or without calyculate setaceous bracts at base. In wet meadows, top of the Siskiyou mountains near Waldo, Oregon.

S. serra Hook l. c. Strict, 2-4 feet high, very leafy, sometimes simple and bearing rather few, somewhat large heads, commonly branching at summit, then bearing numerous corymbosely paniculate smaller heads: leaves 4-6 inches long, all lanceolate and tapering to both ends, sessile by a narrow base, or the lowest short petioled, usually with the whole margin thickly serrate or serrulate with very acute salient teeth: involucre oblong-campanulate, 20-30 flowered: rays 5-8, oblong linear. Along streams, eastern Oregon to Idaho, Wyoming and Colorado

Var. integrisculus Gray Syn. Fl. i, Pt. 2, 386. Heads smaller, (3 or 4 lines high) and narrower, fewer-flowered: leaves minutely serrate or denticulate or the upper entire, sometimes all entire or nearly so generally shorter and smaller or broader and not acuminate. Common from Eastern Oregon to California and Wyoming.

+ + Stems either few-leaved or with the upper leaves reduced in size; the inflorescence therefore naked: none with linear leaves.

++ Tall and simple-stemmed, from a coarsely fibrous cluster of roots: leaves fleshy-coriaceous, all entire or barely denticulate.

S. hydrophyllus Nutt. l. c. Very glabrous and smooth sometimes glaucous: stems robust, 2-4 feet high, strict: leaves lanceolate with strong midrib and obsolete veins; radical oblanceolate and stout-petioled, sometimes a foot long and nearly 2 inches wide; upper cauline sessile or partly clasping: heads numerous in a branching corymbiform cyme, 5 lines high, short pedicelled: involucre narrowly campanulate, slightly bracteolate, its bracts 8-12: rays 3-6, small, sometimes none. In water or wet places, British Columbia to California. Along the Columbia river above the Dalles.

++ ++ Plants mostly in clumps or tufts, or from tufted or creeping rootstocks: stems commonly robust, 1-5 feet high, bearing mostly numerous heads in a cyme: leaves from entire to dentate, none really cordate, nor with permanent tomentum: usually more or less woolly-pubescent when young, often quite glabrate and green at flowering time: heads many-flowered: rays 8-12, conspicuous.

S. Columbianus Greene Pitt. iii, 170. *S. lugens* in part of authors, not of Richardson. Floccose-woolly when young, at length glabrate: stems stout, 2-4 feet high, from a fascicle of coarse fibrous roots: leaves thick, very variable, from oblong to lanceolate, variously dentate to serrulate; the lower petioled; the upper sessile by a broad base: heads numerous, in an ample cymose panicle: involucre campanulate, 6-8 lines high; its numerous bracts lanceolate, acute or acuminate, with or without black tips: rays yellow, 6-8 lines long, oblong to oblanceolate. Common on plains and hills, Brit. Columbia to California and Nebraska.

S. exaltatus Nutt Trans. Am. Phil. Soc. vii, 410. Sparingly villous when young, at length glabrous: stems stout, 2-3 feet high, simple, naked above: leaves thick, equally crenate-denticulate; the radical and lower cauline broadly lanceolate-oblong, obtuse, on long petioles; the upper lanceolate, acute, partly clasping, serrate: heads small, numerous, in a compound fastigiate cyme: bracts of the involucre linear, with pubescent purplish or black tips: rays 6-8, oblong, short: achenes glabrous. Plains of the Columbia. Oregon and Washington. *S. lugens* var. *ochroleucus* Gray appears to be a nearly white-flowered form of this.

S. cordatus Nutt. l. c. More or less pubescent, especially toward the base of the stem: stem solitary. 2-6 feet high, from a fascicle of fibrous roots, sulcate angled: lower leaves cordate-ovate, repandly serrulate or nearly entire, obtuse, on long petioles; the upper lanceolate, clasping, serrate: heads numerous, in a nearly simple corymb: bracts of the involucre about 15, linear, with pubescent black tips: rays 5-6, oblong. On sandy hills Sauvie Island near the mouth of the Willamette River

S. Oregonus. Glabrous throughout: stems rather slender, 2-3 feet high, from a somewhat woody caudex: leaves from spatulate to linear, usually narrowly lanceolate, narrowed below to a slender petiole with a dilated base, acutish to acuminate, more or less remotely denticulate; the lowest ones, including the petiole, 4-8 inches long; the upper ones reduced to sessile subulate or setaceous bracts: heads 8-20, in a close umbel the rays of which elongate forming a loose cymose panicle in fruit: bracts of the involucre linear-lanceolate or linear, acuminate, with black tips: rays yellow, spatulate, 4-6 lines long: achenes about 2 lines long, glabrous. In marshes bordering Lake Labish, Marion Co. Oregon.

S. foetidus. Glabrous: stems stout, 2-3 feet high, from a short hard caudex, bearing an ample umbellate cyme of middlesized heads: leaves thin, lanceolate, finely denticulate; the lowest 4-8 inches long including the petiole, acute, tapering below to a short petiole; upper ones sessile by a broad base, reduced upward to small bracts: involucre 6 lines high, its very numerous linear bracts very acute, green or yellowish, often sparingly hispidulous: rays 8-12, yellow: achenes short, glabrous. In swales, Klickitat Valley Washington. This plant has a very unpleasant odor, and my specimens that have been in my herbarium 20 years have not lost it.

++ + ++ Leaves crowded on the matted rootstock nearly veinless: achenes glabrous.

S. valerianella Greene Pitt. iv, 109. Glabrous: stems slender, decumbent at base, 4-6 inches long, from slender densely tufted rootstocks: leaves from round-obovoid to almost orbicular, about 8 lines in diameter,

slender-petioled, thin and delicate, lightly but rather evenly crenate; cauline bracts very variable, from somewhat lyrate to lanceolate or subulate: heads usually solitary: involucre subcampanulate, 3-4 lines high, of numerous broad thin bracts and one or more rather broad and herbaceous bractlets at base: rays 10 or more, broad and short, golden-yellow. Cœur d'Alène Mountains Idaho.

** ** * * Stems 6-30 inches high, bearing some leaves and corymbosely cymose heads: involucre sparingly calyculate or nearly naked at base.

= Leaves all entire, rarely sparingly denticulate or toothed.

S. fastigiatus Nutt. l. c. Cinereous with a fine and close pannose tomentum, or glabrate: stems strict, simple, 1-2 feet high, terminated by a fastigate cyme of several heads, or sometimes with branches terminated with single and rather large heads: leaves lanceolate or spatulate-lanceolate, obtuse, about 2 inches long, entire or sparingly dentate; upper often linear; lower cauline, and the sometimes oblong, radical tapering into slender petioles: heads 4-6 lines high: rays conspicuous: achenes glabrous. Plains of Oregon and Washington to Idaho and British Columbia.

= = Leaves from entire or serrate to pinnatifid in the same species, none pinnately divided.

S. Purshianus Nutt. l. c. *S. Howellii* Greene. Densely white tomentose when young, tardily deciduous above: stems 4-10 inches high leafy: leaves thickish the lower ones lanceolate, from nearly entire to coarsely dentate or pinnatifid, slender-petioled; upper leaves pinnately lobed or parted into oblong divisions, all petioled or the uppermost sessile: heads few to numerous, in a rather close fastigate cyme, 6 lines high or more; involucre campanulate its numerous bracts lanceolate acute or acuminate, green with white margins, minutely puberulent, the tips pubescent: rays 6-12, elongated oblong, 6 lines long or more: achenes glabrous, light colored prominently striate. Rocky banks Eastern Oregon and Washington to the Rocky mountains.

S. aureus L. Sp. 870. Perennial, glabrous or very nearly so throughout; stems rather slender, solitary or tufted, 12-30 inches high: basal leaves cordate-orbicular or reniform, crenate-dentate, very obtuse and rounded, often purplish, 1-6 inches long, with long slender petioles; lower stem-leaves lanceolate or oblong, usually laciniate, pinnatifid or lyrate, the uppermost small, sessile, somewhat auriculate and clasping: heads several, 8-10 lines broad, 4-5 lines high, slender-peduncled, in an open corymb; rays 8-12, golden-yellow; achenes glabrous; pappus white. In wet places in the high mountains, Alaska to California and across the continent

S. balsamitæ Muhl. Wild. Sp. 1999. Stems slender, 10-20 inches high, woolly at the base and in the axils of the lower leaves: radical leaves slender-petioled, oblong, rarely slightly spatulate, very obtuse, narrow at the base, mostly thick, crenate, often purplish, 1-3 inches long, 3-6 lines wide, their petioles and sometimes their lower surfaces persistently tomentose or woolly, or glabrous throughout; lower stem leaves petioled, lanceolate or pinnatifid, the upper sessile very small: heads few or several, slender peduncled, 6-10 lines broad, 3-4 lines high: rays 8-12: achenes usually hispidulous: on the angles. Dry soil, British Columbia to Washington, Texas, Nebraska and Nova Scotia.

S. subnudus DC. Prodr. vi, 428. Very glabrous throughout: stems often decumbent at base, simple, slender, 6-10 inches high, nearly leafless above and usually bearing a single head: radical leaves obovate, slender-petioled, coarsely dentate; cauline very few, sessile, oblong to linear, incised

or somewhat pinnatifid: involucre open-campanulate, 4-5 lines high, of linear acute bracts: rays 8-12, elongated oblong: achenes glabrous, striate. In marshy grounds, Cascade and Rocky Mountains.

S. elongatus Pursh Fl ii, 529. *S. aureus* var. *borealis* T & G. Stems 10-20 inches high: leaves thickish; the radical from roundish with abrupt or even truncate base to cuneate-obovate and cuneate spatulate, 6-12 lines long, slender-petioled: cauline seldom much pinnatifid; heads numerous or few, not rarely rayless: achenes glabrous. In the high mountains Brit. Columbia to California and the Rocky Mountains.

S. Adamsi. Floccose-woolly below, glabrous above except the axils of the leaves: stems 4-12 inches high: radical leaves obovate or oblong to almost orbicular, crenately toothed, the blade 6-18 lines long, on slender petioles as long or longer; cauline leaves lanceolate to linear in outline, pinnately lobed or parted into oblong or linear lobes or divisions, sessile by a somewhat clasping base: heads 1-12, in a close or at length open cyme: involucre hemispherical, of numerous linear-lanceolate acute bracts, 4-5 lines long: rays 12-15, elongated oblong: achenes glabrous, about a line long. By the base of cliffs, Mount Adams Washington.

= = = Leaves mostly once pinnately divided or parted and again lobed or incised.

S. Bolanderi Gray Proc. Am. Acad. vii, 362. Glabrous or early glabrate: stems weak and slender, 6-30 inches high from slender creeping rootstocks: leaves thin and membranous, mostly petioled: early radical orbicular, subcordate, palmately 5-9 lobed or crenate-incised; others pinnately divided into 5-9 distinct leaflets or the upper lobes confluent with rounded terminal one, all obtusely incised: heads several, loosely cymose 4 or 5 lines high, rays 5-8, rather long. Common along streams and bluffs Washington to Northern California west of the Cascade mountains.

†† †† †† †† †† Stems leafy, numerous or somewhat equably so up to the top

S. condensatus Greene Pitt. iii, 298 "Stems solitary, stout and low, very leafy, 4 to 6 inches or rarely almost a foot high: herbage somewhat succulent, sparsely flocculent when young: lower leaves almost as long as the stem, spatulate-obovate; the upper oblanceolate, all obtuse, crenately or more sharply dentate; heads 3 to 6, more than $\frac{1}{2}$ inch high, closely sessile in a large cluster among the upper leaves: bracts of the decidedly flocculent involucre lanceolate, acuminate: rays either wanting or few and deep yellow. High ridges of the Blue Mountains Walla Walla Co. Washington, *Piper*.

§ 2 Annuals or biennials.

S. VULGARIS L. Engl. Bot. t., 748. (GROUNDSEL). Rather stout, branching and leafy to the top glabrate 4-16 inches high from an annual root: leaves incisedly pinnatifid the long or roundish lobes and the sinuses sharply toothed: heads 4-5 lines high: tips of the involucral bracts and the short calyculate ones at base blackish: rays none: achenes canescently puberulent, common in cultivated fields and moist places, flowering most of the winter months. (Nat. from Eu.)

Tribe viii. CYNAROIDEÆ B. & H. Gen. ii, 211. Heads homogamous tubiflorous, the flowers all hermaphrodite with equally or sometimes unequally 5-cleft corollas, the lobes long and narrow, or sometimes radiatifid and heterogamous by enlargement of the limb of marginal flowers which are commonly neutral. Involucre much im-

bricated: receptacle mostly flat or convexed, often fimbriate or densely setose. Anthers with tails at base and commonly with elongated and connate cartilaginous apical appendages, their tips distinct. Style-branches destitute of appendage, short, sometimes distinct or partly so, more commonly united up to the simply obtuse tips, not hirsute or hispid, but sometimes an hispidulous or pubescent ring or node below. Achenes thickish and hard. Pappus setose or rarely paleaceous. Leaves alternate the teeth or margins often prickly.

SUBTRIBE I CARDUINEÆ Achenes attached by their very base. Flowers all perfect, (except one THISTLE).

* Filaments distinct.

+ Leaves never prickly: style slender, its branches partly distinct: filaments glabrous.

87 Saussurea Involucre obovoid to oblong; its bracts appressed and without spinose or hooked tips pappus double, the inner series united at base and falling together, the outer distinct and falling separately.

88 Arctium Involucre globular; its bracts spreading above the appressed base and hooked at tip.

+ + Leaves more or less prickly: style-branches united to or near the tip: pappus simple, its bristles united at base and falling together; filaments bearded or papillose-pubescent: involucre globose or obovoid, of numerous usually prickly-tipped much imbricated bracts.

89 Carduus Bristles of the pappus long and soft-plumose: receptacle densely villous-setose.

** Filaments united below, glabrous.

90 Silphium Involucre depressed-globose, its bracts prickly along the margins and tapering into a widely spreading spine: bristles of the pappus in more than one series.

SUBTRIBE II CENTAURINEÆ Achenes obliquely attached by one side of the base or more laterally. Involucre globose or ovoid, its bracts appressed and variously appendaged.

91 Centaurea Achenes more or less compressed or quadrangular: pappus of indefinite bristles or narrow palæ.

92 Cnicus Achenes terete: pappus double, each of 10 aristiform bristles.

Subtribe i, Carduineæ Less. DC. Prodr. vi, 617. Heads discoid, homogamous, many-flowered; the flowers all similar, perfect or dioecious. Bracts of the involucre imbricated in several series, often spinose at the apex. Corollas usually curved outward, the exterior often deeper cleft than the others. Anthers slightly or not at all caudate. Achenes attached by their very base, glabrous, with a terminal areola.

87 SAUSSUREA DC. Ann. Mus. Par. xvi, 107, t. 10-13.

Tall herbs with alternate not prickly leaves and middlesized heads of purple or dark violet flowers. Heads many-flowered, the flowers all tubular, similar and perfect. Bracts of the invo-

lucre imbricated in several series, mostly not appendaged. Receptacle flat, fimbriate or with persistent chaff. Corollas with slender tube, inflated throat and 5-cleft limb. Anthers with setiform ciliate or villous tails. Pappus double, the outer of a few short denticulate rigid distinct bristles; the inner of a series of stout plumose bristles which are united at base.

S. Americana Eaton Bot. Gaz. vi, 283. Stems rather stout, 2-6 feet high, leafy to the top, lightly arachnoid when young, soon glabrate, bearing numerous corymbosely cymose heads: leaves membranaceous, ovate and oblong-ovate, acute, or acuminate, denticulate or dentate: radical and lower cauline subcordate, on slender margined petioles, 4 inches long or more; upper sessile, with acute base; uppermost lanceolate: heads 6-10 lines high: involucre somewhat turbinate, pubescent; its bracts thin-coriaceous: in 4-9 ranks all pointless and obtuse, the outer successively shorter: corollas blue or purple: receptacle naked, or bearing more or less copious setiform chaff among the flowers. In moist places in the high mountains, Oregon and Washington.

88 ARCTIUM L. Gen. n. 923. (BURDOCK).

Coarse biennial herbs with broad alternate petioled leaves and rather large heads of purple or white tubular perfect flowers, racemose, corymbose or paniculate at the ends of the stems or branches. Involucre globular; its bracts slender-subulate or aristiform and spreading above the broader appressed base, hooked at tip, imbricated in several series. Receptacle flat, densely setose. Anthers sagittate at base. Filaments glabrous. Achenes oblong, somewhat compressed and 3-angled, truncate. Pappus of numerous short and rigid or chaffy bristles, separately deciduous.

A. LAPPA L. Sp. 816. Stem stout, 2-9 feet high much branched, rough: leaves thin, broadly ovate, pale and tomentose beneath, obtuse, entire repand or dentate, mostly cordate, the lower often 18 inches long: petioles solid, deeply furrowed: heads clustered or corymbose, sometimes long-peduncled, 6-12 lines in diameter: bracts of the involucre glabrous or nearly so, their spines spreading, the inner ones equalling the flowers. Common in waste places. Naturalized from Europe.

89 CARDUUS L. Gen. n. 925. (THISTLE)

Stout herbs with alternate usually prickly leaves and large or middle-sized heads of purple, red, white or pale yellow flowers. Heads many-flowered; the flowers all perfect and fertile, with tubular corollas with deeply, often more or less unequally, 5-cleft narrow lobes. Involucre globular, ovoid, or at maturity sometimes campanulate, the mostly narrow bracts imbricated in many series, more commonly tipped with a spine or cuspidate point. Receptacle flat, fleshy, densely clothed with bristles. Filaments commonly papillose-hairy, distinct. Anthers sagittate at base, the auricles frequently extended with tails. Style filiform, sometimes thickened, or with a ring or node at the base of stigmatic portion. Achenes glabrous, thick-walled, obovate or

oblong, more or less compressed, attached by their very base. Pappus of copious and rather rigid, long and plumous bristles in a single series, connected at the very base into a ring, so that they remain united after detaching.

§ Perennials with comparatively small diœcious heads.

C. ARVENSIS Robs. Brit. Fl. 163. (CANADA THISTLE.) Stems 1-3 feet high from creeping perennial rootstocks, corymbosely branching, usually glabrate and green: leaves lanceolate, pinnatifid and toothed, furnished with abundant weak prickles: heads loosely cymose, less than an inch high, diœcious, in staminate plants ovate-globular with the flowers well exerted; the pistillate oblong-campanulate, the flowers less exerted: bracts of the involucre appressed, short, with very small weak prickly points. A troublesome weed introduced from Europe: becoming too common in the Willamette Valley

§ 2 Biennials with the flowers all perfect.

* Bracts of the involucre more or less unequal, all but the innermost terminating in subulate, spinose spreading appendages.

C. LANCEOLATUS L. Sp. 821. (COMMON THISTLE) Stems stout, 2-4 feet high, much branched: more or less villous-hirsute: leaves lanceolate, deeply pinnatifid with lanceolate lobes, rigidly prickly, upper face strigose-setulose; the base decurrent on the stem into interrupted prickly wings: heads obovoid, 1-2 inches high, terminating the stems and branches: bracts of the involucre arachnoid-woolly, lanceolate and mostly attenuate into slender spreading spines: corollas rose-purple. Pastures and waste places throughout the northern United States. Naturalized from Europe.

* * Bracts of the ovoid or hemispherical involucre appressed-imbriate, the outer successively shorter, all with loose and dilated fimbriate or lacerate white-scarious tips.

C. Americanus Greene Proc. Philad. Acad. Stems rather slender, 2-4 feet high, branching above, the branches bearing solitary or scattered naked heads leaves white-tomentose beneath, lanceolate or broader, sinuately pinnatifid or some nearly dentate, others pinnately parted, weakly prickly: heads erect, one inch high; principal bracts of the involucre naked-edged or merely fimbriate-ciliate below, and the dilated scarious apex as broad as long, fimbriate-lacerate, tipped with barely exerted cusp or mucro; innermost with lanceolate nearly entire scarious tips: flowers ochroleucous: stronger pappus-bristles dilated-clavellate at tip. Willamette Valley Oregon to Colorado and New Mexico.

* * * Bracts of the involucre mostly loose, not appressed-imbriate nor rigid, tapering gradually from a narrow base to a slender prickly mucicose apex; outer not very much shorter than the inner, wholly destitute of dorsal glandular ridge or spot.

+ Some bracts of the involucre with scarious or fringed tip or margins, at least the innermost slightly or not at all prickly-pointed: leaves not decurrent on the stem, moderately prickly.

C. remotifolius Hook. Fl. i, 302. Loosely arachnoid-woolly when young: stems 2-8 feet high: leaves from sinuately to deeply pinnatifid, more or less whitened by the loose tomentum beneath even in age: heads 12-18 lines high, pedunculate, scattered, naked or nearly so at base: involucre lightly arachnoid and glabrate; the bracts attenuate, the outer into a weak small prickle; the inner or some of them with a scarious entire or sparingly lacerate tip: corollas ochroleucous, their lobes much shorter than the throat: pappus of coarse bristles, the strongest with conspicuously

clavellate tips. Common on prairies Brit. Columbia to California.

+ + None of the involucre bracts with fimbriate or scarious-dilated tips, but tapering into an almost innocuous weak and short prickly or soft point: leaves green both sides, mostly membranaceous, not decurrent on the stem.

C. edulis Greene Proc. Philad. Acad. 1892, 368. Stems robust and somewhat succulent, 3-10 feet high, pubescent, leafy to the top: leaves oblong or narrower, from slightly to deeply sinuate-pinnatifid, weakly prickly-ciliate: heads an inch high, scattered, or few in a cluster, usually bracteose at base: involucre conspicuously arachnoid-woolly when young, partly glabrate in age: corollas purple or whitish the lobes much shorter than the throat, filiform in the dried state and capitellate-callous at the apex. Edge of timbered lands, Alaska to California west of the Cascade Mountains.

C. Hallii. *Cnicus Hallii* Gray. Glabrate and green: stems slender, 2-3 feet high leafy: leaves pinnatifid; the lobes and teeth rather strongly prickly: heads solitary and pedunculate or 2-3 in a small terminal cluster, more or less bracteose leafy at base: involucre sparingly arachnoid when young, soon glabrate, the attenuate tips of all but the outermost without rigid spines: corollas rose-purple to white; the lobes linear, plane, obtuse. Oregon to southern California and Utah.

* * * * Bracts of the involucre moderately unequal, or the lower not rarely about equalling the upper, most of them with more or less herbaceous spinescent-tipped spreading upper portion and no glandular dorsal ridge.

C. occidentalis Nutt. Trans. Am. Phil. Soc. vii, 418. Mostly stout, 2-12 feet high, very white with a thick coat of cottony wool: leaves from sinuate-dentate to pinnatifid, not very prickly: involucre bracts sometimes narrow and herbaceous acerose from a little-dilated base, sometimes with broader more coriaceous base, or the outer with lanceolate-subulate tips: corollas bright red or crimson: style destitute of node. Dry hillsides, southwestern Oregon to California.

* * * * * Bracts of the involucre regularly and chiefly appressed-imbriated in numerous ranks; the outer successively shorter; not herbaceous-tipped or appendaged.

+ Heads oblong or cylindraceous, showy: not at all glandular on the back; inner ones all erect and purplish-tinged.

C. Andersoni Greene l. c. Slender, rather lightly and loosely woolly: leaves lightly prickly, sinuate-pinnatifid, rather sparse: heads naked-pedunculate: involucre bracts comparatively loose and erect, all gradually attenuate from a narrow base: outermost tipped with small weak prickles: corollas bright pink-red, their slender lobes about equalling their throat: style prolonged above the very obscure node. Dry hills, southwestern Idaho to eastern California.

+ + Heads broad, mostly large: involucre glabrous or early glabrate, the light arachnoid wool caducous, its bracts rather large, chartaceous or coriaceous, not at all glandular on the back: anther-tips narrow, very acute.

C. Drummondii Coville Contr. Nat. Herb. iv, 142. Green and somewhat villous-pubescent, or when young lightly arachnoid-woolly: either stemless and bearing sessile heads in a cluster on the crown, or caulescent and even 2-3 feet high, with solitary or several loosely disposed heads: leaves from sinuate or almost entire to pinnately parted, moderately prickly: larger heads fully half-inch high: bracts of the involucre thin-chartaceous or chartaceous, mostly acuminate, weak-prickly, pointed or

innocuous with more scarious and sometimes obviously dilated and erose-fimbriate tips: corollas white to rose-purple, with lobes usually shorter than the throat. From the Arctic sea-shore to California and the Rocky Mountains.

C. foliosus Hook. Fl. i, 303. Stems erect, robust, striate, somewhat woolly, leafy to the cluster of a few sessile heads, 12-18 inches high: leaves commonly elongated, linear-lanceolate, laciniately dentate, with rather rigid prickles, arachnoid-tomentose beneath: heads broad, inch and a half high leafy-bracteose: involucrel bracts thin-coriaceous: corollas pale or white, with lobes equalling or longer than the throat. Idaho to the Rocky Mountains.

+ + + Heads large or comparatively small: involucrel bracts closely appressed, coriaceous or thickish, commonly with a glandular or viscid ridge, short line, or broad spot on the back near the summit.

C. undulatus Nutt. Gen. ii, 130. Persistently white-tomentose, 1-4 feet high: leaves lanceolate or oblong-lanceolate, sessile or decurrent, or the lowest petioled, undulate, lobed or pinnatifid the lobes dentate, triangular, often very prickly: heads about 2 inches broad, nearly as high, solitary at the ends of the branches: principal bracts of the involucre mostly thickened on the back by the broad glandular-viscid ridge, comparatively narrow, tipped with short spreading prickles: corollas rose color or pale purple to white, with lobes equalling or longer than their throats. Dry prairies, Brit. Columbia to Oregon, New Mexico and Lake Huron.

Var. megacephalus Greene l. c. Stout, usually broader-leaved; with broad heads 2 inches or more high. Idaho to Minnesota and Texas.

C. Breweri Greene l. c. 363. Usually white-tomentose, 4-10 feet high: leaves mostly elongated-lanceolate, conspicuously prickly: heads paniculate, sometimes very numerous, subsessile, an inch or more high: bracts of the globular involucre much appressed, firm coriaceous, with an oblong or oval greenish viscid-glandular spot near the tip; outer ones ovate to oblong, abruptly tipped with a rather slender spreading prickle: corollas pale purple or whitish, the lobes shorter than the throat. Moist places, southern and eastern Oregon to California and Nevada.

90 SILYBUM Gært. Fr. ii, 308. (MILK THISTLE)

Annual or biennial herbs with large alternate clasping sinuate-lobed or pinnatifid white-blotched leaves, and large discoid heads of purple tubular flowers, solitary at the ends of the branches. involucre broad, subglobose; its bracts rigid, imbricated in many series, the lower ones fimbriate-spinulose at the broad triangular summit, the middle ones similar but armed with stout spreading or recurved spines; the inner ones lanceolate. Receptacle flat, densely bristly. Corollas with slender tube and deeply 5-c'eft limb. Filaments united below, glabrous. Anthers sagittate at base. Style nearly entire. Achenes obovate-oblong, compressed, glabrous, surmounted by a papillose ring. Pappus-bristles in several series, flattish, barbellate or scabrous.

S. MARIANUM Gært. l. c. 378. Stout, 2-4 feet high, little branched, glabrate or glabrous: leaves oblong-lanceolate, prickly, sinuate or pinnatifid, the lower often a foot long, green blotched with white along the veins: heads about $2\frac{1}{2}$ inches broad: corollas rose-purple, deeply cleft: pappus-bristles white, barbellate. Waste places and road-sides, Brit. Columbia to California. Naturalized from Europe.

Subtribe ii, Centauriæ DC. Prodr. vi. 557. Achenes more or less compressed or quadrangular. Heads globular or ovoid. Pappus of indefinite, few or many, bristles or narrow paleæ.

91 CENTAUREA L. Gen. n. 984.

Perennial or annual herbs with alternate leaves and large or middlesized heads of tubular and various colored flowers. Involucre ovoid or globose, its bracts imbricated in many series, appressed, fimbriate, or dentate. Receptacle flat, densely bristly. Marginal flowers usually neutral and larger than the central perfect and fertile ones, or flowers all perfect in some species. Corolla-tube slender, the limb regular or oblique, 5-cleft or 5-lobed, the segments sometimes appearing like rays. Anthers sagittate at base. Style-branches short, somewhat connate, obtuse. Achenes compressed or obtusely 4-angled, usually smooth and shining, obliquely or laterally attached to the receptacle, surmounted by a disk with an elevated margin. Pappus of several series of bristles or scales, rarely none.

* At least some of the involucrel bracts armed with a rigid spine or prickle and also spinulose along its sides or base: cartilaginous appendages of the anthers commonly elongated and connate.

C. CALCITRAPA L. Sp. 917. (STAR THISTLE). Low, much branched, diffusely spreading, green, glabrate or hairy: leaves narrow, lacinate-pinnatifid; uppermost somewhat involucrel-crowded at the base of the sessile heads: principal bracts of the involucre armed with a widely spreading very long and rigid spine which bears 2 or 3 spinules on each side at base: corollas purple or pinkish: pappus none. Vancouver Island to California. Sparingly introduced from Europe.

C. MELTENSIS L. l. c. ¶ Stems erect, 1-4 feet high, paniculately branched, cinereous-pubescent, somewhat woolly when young: radical leaves lyrate pinnatifid; cauline lanceolate or linear, mostly entire, narrowly decurrent on the branches: heads sessile or 1- or 2-leaved at base, principal bracts of the involucre bearing a slender spreading spine of about their own length, which is pectinately spinulose toward the base; innermost with simply spinescent tips; outermost usually with the central spine reduced and the spinules palmate: corollas yellow: achenes lightly costate: pappus of very unequal rigid bristles or squamellæ. Rather common in fields and waste places British Columbia to California and Arizona. Naturalized from Europe.

+ + Bracts of the involucre unarmed, most of them terminated by a scarious discolored fimbriate-ciliate or lacerate appendage.

C. CYANUS L. Sp. 911. (FRENCH PINK, BLUE BOTTLE.) Slender branching annual: stems 1-6 feet high, whitened when young with floccose wool: leaves linear, entire, or the lower toothed or pinnatifid: heads naked on slender peduncles: involucrel bracts rather narrow, furnished with short scarious teeth: marginal flowers neutral, with much enlarged radiform blue or white varying to pink purple or brown corollas: pappus of unequal bristles about the length of the achene. Very common in fields Brit. Columbia to California. Introduced from Europe.

92 CNICUS L. Sp. 826. (BLESSED THISTLE.)

Annual herbs with alternate sinuate or pinnatifid prickly leaves, and large sessile heads of yellow tubular flowers solitary at the

ends of the branches subtended by the upper leaves. Bracts of the involucre imbricated in several series, the outer ovate, the inner lanceolate, tipped by a pinnately branched spine. Receptacle bristly. Achenes terete, striate, laterally attached, the horny margin 10-toothed at the summit. Pappus of 2 series of awns, the inner fimbriate the outer longer, naked.

C. BENEDICTUS L. Sp. 826. Hirsute or pubescent: stems low and branching: leaves prominently reticulated, sinuate-pinnatifid or laciniate-dentate, the teeth or margins prickly; lower attenuate at base; upper narrowly oblong, partly clasping by a broad base: heads sessile, inch and a half high, equalled by the upper leaves: bracts of the involucre thin-coriaceous, in few ranks, all or most of them abruptly tipped with a spinescent and pectinately prickly spreading appendage: receptacle densely setose with long and soft capillary bristles: corollas light yellow. In fields southern Oregon to California and the Eastern States. Naturalized from Europe.

SUBORDER II LIGULIFLORÆ DC. Prodr. vii 74.

Flowers all ligulate and perfect, in a homogamous radiiform head.

Tribe ix, CICHORACEÆ Juss. Gen. 168. Herbs (or rarely trees) almost always with milky bitter or acrid juice, alternate or all radical leaves and yellow pink blue or white flowers in involucre heads. Heads homogamous, the flowers all hermaphrodite and with ligulate corolla. Receptacle flat or flattish. Ligules usually 5-toothed at the truncate apex. Anthers sagittate-auriculate at base, not caudate: pollen-grains scabrous, dodecahedral. Style-branches filiform, minutely papillose, not appendaged but stigmatic lines evident only toward the base.

§ 1 Pappus none. Receptacle naked.

* Achenes with rounded or somewhat contracted apex and small areola.

93 *Lapsana* Heads paniculate: involucre erect: achenes obscurely striate.

§ 2 Pappus paleaceous or partly so; or aristiform, or plumose.

* Caulescent herbs with small or reduced leaves on the rigid stems or branches: receptacle not chaffy: flowers never yellow: achenes usually short with truncate summit, not rostrate.

94 *Cichorium* Flowers blue: pappus of numerous very short and blunt paleæ in 2 or more series.

95 *Ptiloria* Flowers pink or rose-color: pappus a series of plumose bristles or rarely chaffy awns.

** Receptacle naked: achenes long-rostrate: pappus a series of long-plumose bristles or awns.

96 *Tragopogon*. Flowers yellow or purple: pappus a series of stout bristles somewhat united at base into a ring.

*** Involucre sparingly imbricated: receptacle with soft slender chaff among the flowers: achenes either truncate or the inner ones rostrate.

97 **Hypochoeris** Flowers yellow: pappus a series of fine plumose bristles with or without some naked and shorter outer ones.

+ + + + Receptacle not chaffy: achenes either truncate at summit or upwardly attenuate, yet with no distinct or prolonged beak: pappus of awned or pointed scarious paleæ, or of awns or bristles with paleaceous base, or plumose.

98 **Ptilocalais** Perennial herbs with biennial fusiform and more or less branching and leafy stems: pappus of 15-20 white and soft plumose bristles with paleaceous base.

99 **Microseris** Annual or perennial herbs with branching leafy stems: pappus of 4-10, usually 5 paleæ tapering into scabrous awns.

100 **Scorzonella** Glabrous perennials with leafy stems from fusiform roots: pappus of 5-10 bristles with small paleaceous base.

101 **Uropappus** Acaulescent or subcaulescent annuals: pappus of 5 scarious bidentate awn-tipped paleæ.

102 **Nothocalais** Acaulescent perennials: pappus of 20-25 linear-lanceolate silvery-white paleæ in 2 or more series.

§ 3 Pappus of capillary bristles scabrous, rarely barbellate, never plumous nor rose-tinted: except in *Rafinesquia*.

* Receptacle with or without some capillary bristles among the flowers.

103 **Malacothrix** Achenes terete: pappus soft and white, promptly deciduous, mostly together.

* * Receptacle naked.

+ Achenes not flattened: pappus persistent, or the bristles tardily falling quite separately.

++ Beak of the achene none, or a mere attenuation.

104 **Apargidium** Heads solitary, terminating simple bractless scapes: achenes columnar, truncate, not tapering at either end: pappus brownish, of soft and rather fragile capillary bristles.

105 **Hieracium** Achenes oblong or columnar, mostly 10-ribbed or striate: pappus tawny, of rather rigid scabrous fragile bristles in a single series.

106 **Crepis** Achenes from columnar to fusiform, 10-20-costate: pappus white and soft, in 2 or more series.

107 **Nabalus** Achenes terete or 4-5-angled, linear-oblong or cylindrical: pappus of copious rather rigid capillary bristles.

108 **Lygodesmia** Achenes terete, linear or slender-fusiform: pappus of copious and usually unequal capillary bristles.

++ Beak of the achene distinct, usually slender: heads always erect.

109 **Agoseris** Involucre more or less imbricated in more than 1 series: achenes 10-costate or 10-nerved.

110 **Taraxacum** Involucre of a single series: achenes 4- or 5-costate or angled and usually with some intervening nerves.

111 **Rafinesquia** Achenes terete, obscurely few-ribbed: pappus of 10-15 slender softly long-plumose bristles.

+ + Leafy-stemmed plants with more or less paniculate heads: achenes flattened: pappus of copious fine and soft capillary bristles.

- 112 **Lactuca** Achenes with a beak or narrowed summit: pappus-bristles falling separately.
- 113 **Sonchus** Achenes without beak or neck: pappus of very soft and fine bristles which fall more or less in connection, and commonly one or two stouter ones that fall separately.

93 LAPSANA L. Gen. n. 919

Erect paniculately branching annual herbs with alternate leaves and small heads of yellow flowers. Involucre nearly cylindrical, its principal bracts nearly equal, and with a few exterior small ones at base: Receptacle flat, naked. Rays truncate 5-toothed at the apex. Anther sagittate at base. Style-branches slender. Achenes 20-30-nerved, somewhat flattened, with rounded apex and small areola. Pappus none.

L. COMMUNIS L. Sp. 811. Stems 1-4 feet high, paniculately branched, glabrous above more or less hispid-pubescent below: lower leaves ovate, repand-dentate, obtuse, thin, pubescent or glabrate, petioled, 2-4 inches long, often with 2-6 lobes on the petiole; the uppermost oblong or lanceolate, sessile, acute, much smaller, mostly entire: heads very numerous, 3-6 lines broad, loosely paniculate: involucre oblong-cylindric, 2-3 lines high of about 8 linear glaucous connate principal bracts and several very small outer ones. Along road-sides and moist places, Oregon and the Eastern States. Naturalized from Europe.

94 CICHORIUM TOURN. L. Gen. n. 921.

Erect branching herbs with alternate and radical leaves and large heads of blue, purple, pink or white flowers panicled or in sessile clusters along the stem. Heads several to many-flowered. Involucre of 2 series of herbaceous bracts with coriaceous or indurated base; the outer somewhat spreading; the inner subtending and partly enclosing the outer achenes. Receptacle flat, naked or slightly fimbriate. Anthers sagittate at base. Style-branches slender, obtusish. Achenes somewhat angled; the broad summit bordered with a crown-like pappus of numerous short and blunt paleæ in 2 or more series.

C. INTYBUS L. Sp. 813 (CHICORY) Perennial from a long deep tap-root: stems 1-3 feet high, with stout, rigid branches, more or less hirsute, at least below: radical leaves spatulate in outline, runcinate-pinnatifid, 3-6 inches long, narrowed into long petioles; cauline oblong or lanceolate, commonly dentate, those of the flowering branches mostly reduced and scale-like, subtending solitary or clustered sessile heads, or some heads raised on fistulous peduncles: flowers sky-blue, varying to purple or white, open only at night or in cloudy weather. Roadsides and waste places.

96 PTILORIA Raf. Atl. Journ. 145, 1832.

STEPHANOMERIA Nutt.

Smooth and glabrous herbs with branching or virgate often rigid or rush-like stems, small or scale-like leaves on the flowering branches, and usually paniculate small or middle-sized heads of white to pink flowers that open only at night or on cloudy days. Heads 3-20-flowered. Involucre cylindraceous or oblong, of several appressed and equal plain bracts and some short calyculate

ones, not rarely with two or three of intermediate length. Receptacle quite naked. Achenes 5-angled or ribbed, sometimes with intermediate ribs. Pappus a series of plumose bristles or rarely chaffy awns, not rarely naked toward the base.

P. tenuifolia Raf. Atl. Journ. 145, 1832. *Stephanomeria minor* Nutt. Perennial, 1-2 feet high, stems slender, branches ascending bearing numerous small heads of pink flowers in long loose racemes: radical leaves runcinate pinnatifid, those of the stem linear or filiform, entire, or sometimes runcinate-dentate, the uppermost reduced to small scales: involucre narrow, usually 5-flowered with about the same number of linear-lanceolate scarious-margined bracts: pappus white, very plumose to the base. Plains and mountains from British Columbia to California, Texas and Nebraska,

P. virgata Greene Pitt. ii, 130. *Stephanomeria virgata* Benth. Stems rigid, 1-4 feet high from an annual root: lower leaves oblong or spatulate, often sinuate or pinnatifid; upper leaves linear, small and entire: heads 3-4 lines long, mostly sessile or short-peduncled, spicately or thyrsoidly disposed along the naked upper part of the virgate stem or smaller branches, sometimes more loosely paniculate on open branchlets: involucre 4-8 flowered: achenes subclavate or oblong, rugose-tuberculate between the narrow ribs: pappus moderately plumose to the base, white, not paleaceous-dilated. Oregon and California.

P. paniculata Greene l. c. 132. *Stephanomeria paniculata* Nutt. Stems erect from an annual root: a foot or two high, bearing numerous narrow 3-5 flowered heads in an elongated, narrow or more open panicle, or else more strictly disposed or virgate branches: leaves linear or the lower lanceolate: achenes subclavate or oblong, rugose tuberculate or oblong, rugose-tuberculate between the narrow ribs: pappus grayish or fuscous, its bristles short-plumose nearly or quite to the more or less paleaceous or squamelliferous base. Plains of Eastern Oregon and Idaho.

P. exigua Greene l. c. *Stephanomeria exigua* Nutt. Stems paniculately and often divergently branched with slender branches and branchlets, 1-2 feet high: radical and lower cauline leaves pinnatifid or bipinnatifid, those of the branches mainly reduced to short scales: heads scattered: involucre 4-5 lines high, usually 5-flowered: achenes thick-ribbed and tuberculate-rugose when mature: bristles of the pappus 8-18, their more or less dilated and paleaceous or thickened base commonly a little connate into 4 or 5 phalanges and often 1-2-setose on each side. Idaho to eastern California and Texas.

96 TRAGOPOGON L. Gen. n. 905.

Biennial or perennial somewhat succulent herbs with alternate, sessile and clasping leaves, and long-peduncled large heads of yellow or purple flowers opening in the early morning, usually closed by noon. Involucre cylindrical or narrowly campanulate, its bracts in one series, nearly equal, united at base. Rays truncate and 5-toothed at the apex. Anthers sagittate at base. Style-branches slender. Achenes linear, terete or 5-angled 5-10-ribbed, terminated by slender beaks, or the outermost beakless. Pappus-bristles in one series, plumose, connate at the base, the plume-branches interwebbed.

T. PORRIFOLIUS L. Sp. 780. (OYSTER PLANT, SALSIFY.) Stems erect, 2-7 feet high from a long fleshy tap-root: leaves entire, linear-lanceolate, long-

acuminate: peduncles very much thickened and hollow for 1-3 inches below the heads: Heads 2-4 inches broad, very showy: bracts of the involucre linear-lanceolate, acuminate usually much longer than the purple rays: achenes sometimes 2 inches long, the outer ones covered with scale-like tubercles especially on the ribs below. Escaped from cultivation.

97 HYPOCHÆRIS. L. Gen. n. 918.

Mostly perennial herbs with scape-like often branching stems, chiefly radical leaves and large heads of yellow flowers. Involucre campanulate of somewhat herbaceous marginless bracts imbricated in several series. Receptacle paleaceous with soft, narrow and scarious scales among the flowers. Anthers sagittate. Style-branches slender, obtusish. Achenes oblong or fusiform, tapering upward at least the inner ones into a beak. Pappus a series of fine plumose bristles, with or without some naked and shorter outer ones.

H. radicata L Sp 811. Stems several together from a perennial root, slender, 1-2 feet high, branched or rarely simple, bearing a few scales, leaves oblanceolate to obovate in outline, pinnatifid-lobed to dentate, 2-6 inches long, hirsute on both sides: involucre oblong-cylindric, about an inch high its bracts glabrous, or sparingly pubescent: achenes rough, all with very slender beaks longer than the body. In waste places, Western Washington to California. Naturalized from Europe.

98 PTILOCALAIS Greene Bull. Cal. Acad. ii, 59.

MICROSERIS § *PTILOPHORA* Gray.

Glabrous herbs from fusiform biennial roots laciniately cut leaves and middlesized to large heads of yellow flowers. Heads nodding in bud. Involucre campanulate, its bracts imbricated in several series, the inner long-acuminate the outer successively shorter and acute. Receptacle flat, foveolate. Achenes linear-columnar, of the same diameter from base to summit. Pappus bright white, soft, of 15-20 truncate or emarginate paleæ terminating in a long, soft-plumose capillary bristle or awn and often with one or more short external merely scabrous bristle.

P. nutans Greene l. c. *Microseris nutans* Gray. Stem slender, 6-18 inches high: roots either fascicled or solitary: leaves from entire and spatulate-obovate to pinnately parted into narrow linear lobes: heads 8-20 flowered, slender-peduncled: involucre cylindraceous, of 8-10 linear-lanceolate gradually acuminate principal bracts and a few short calyculate ones below, bristles of the pappus several times longer than the oblong paleæ. In open pine woods, British Columbia to California and Montana.

P. major Greene l. c. *Microseris major* Gray. Stout, often more than 2 feet high: leaves oblong lanceolate, entire or sparingly lacinate involucre sometimes an inch high; its lanceolate bracts imbricated in 3 lengths. Idaho to Utah.

99 MICROSERIS Don Phil. Mag. xi. 388.

Acaulescent glabrous annuals with entire or laciniately lobed or pinnatifid leaves and rather small nodding heads of yellow flowers on slender peduncles. Involucre oblong-cylindraceous to

hemispherical, inner bracts in one or two series, equal, thin, with membranous margins outer, very short. Receptacle flat. Achenes terete, 8-10 costate, with a broad basal callosity which is hollowed at the insertion and produced upward into a sharp denticulate scabrous collar-like rim. Paleæ of the pappus 4-10, usually 5, mostly short and tapering into a long or short scabrous awn.

M. Douglasii Gray Proc. Am. Acad. ix 210. Stems slender, 3-24 inches high: leaves chiefly clustered at the base of the stem, linear to spatulate, entire or sparingly laciniate, 1-3 inches long: involucre oblong of 4-10 oblong, obtuse principal bracts and 3-5 very short erose dentate calyculate ones at base: achenes oblong-turbinate, contracted under the summit, 3 lines long: paleæ of the pappus, ovate, 2 lines long, tapering abruptly into an awn. Southwestern Oregon to California.

M. Bigelovii Gray l. c. Stems slender, 4-12 inches high: leaves lanceolate to linear in outline, entire to laciniately toothed or pinnately parted into linear lobes: involucre campanulate, of 8-10 lanceolate acute or acuminate principal bracts and several smaller obtuse or barely acute ones at their base: achenes oblong-turbinate, not contracted under the truncate summit, 2 lines long, outermost sometimes villous: paleæ of the pappus 5, oblong to lanceolate, gradually tapering to an awn twice or thrice their length. Along the coast, Oregon and California.

100 SCORZONELLA Nutt. Trans. Am. Phil. Soc. vii, 426.

MICROSERIS § SCORZONELLA Gray.

Glabrous perennial herbs with fusiform biennial roots, laciniately cut leaves and long-peduncled heads of yellow flowers that are nodding in bud. Involucre campanulate, its bracts herbaceous, imbricated in several series, the inner long acuminate, the other shorter and acute. Receptacle flat or convex. foveolate or alveolate. Achenes linear or somewhat turbinate, 8-10-costate or striate, truncate at summit, the basal callosity acute and not expanded, areola lateral. Pappus 5 or 10 ovate or lanceolate paleæ tipped with a generally much longer, straight scabrous or barbellulate bristle or awn.

S. procera Greene Bull. Cal. Acad. ii, 50. *Microseris procera* Gray. Stems robust, 2-3 feet high: leaves chiefly oblong apiculate-acuminate, dentate or entire, rarely laciniate-lobed; larger cauline 6-8 inches long, radical larger: involucre an inch or more high and broad, its bracts in 2 or 3 series, the outer ones ovate, the inner ones ovate-lanceolate, all acuminate: achenes nearly columnar 3 lines long, pappus of 10 brownish lanceolate paleæ with long barbellate awns. Rather common in open places, Washington to California.

S. pratensis Greene l. c. 51. Leafy at base only, the scapose peduncles 1-2 feet high: leaves linear-lanceolate, long-acuminate, entire, 6-12 inches long: heads an inch high and nearly as broad, bracts of the involucre in 3 series, ovate to lanceolate, acuminate: pappus of 10 white or sordid narrowly lanceolate paleæ with long minutely plumose awns. Moist meadow lands near Ashland, Oregon, and Yreka, California

S. laciniata Nutt. Trans. Am. Phil. Soc. vii, 426. *Microseris laciniata* Gray Glaucous: stems rather stout, leafy and branching, 2-3 feet high: leaves laciniate pinnatifid into attenuate lobes, or sometimes entire; radical 4-10 inches long: involucre an inch or less high, its bracts nearly all with dilated base and more or less abrupt acumination. Achenes columnar,

2 lines long: paleae of the pappus deltoid or triangular-ovate, abruptly tipped with an awn or bristle 8 or 9 times longer. Alluvial grounds, British Columbia to Northern California.

S. leptosepala Nutt. l. c. *Microseris leptosepala* Gray. Stems slender, a foot or so high: leaves from linear to lanceolate and from entire to attenuate-pinnatifid, all attenuate: heads comparatively small and few-flowered; involucre 6-10 lines high, of 6-12 lanceolate acuminate principal bracts and a few small, ovate, abruptly acuminate ones at their base: achenes slender-columnar: paleae of the pappus ovate-lanceolate, or narrower, tapering gradually from the base: into an awn or 4 or 5 times as long. Moist ground, British Columbia to California.

S. Bolanderi Greene l. c. *Microseris Bolanderi* Gray. Stems slender, 1-2 feet high: leaves from narrowly linear-lanceolate to somewhat spatulate, entire or with a few small salient linear lobes, 6-12 inches long: involucre 6-9 lines high, its bracts all gradually lanceolate-attenuate from a broadish base, or some small outermost abruptly acuminate: paleae of the pappus little exceeding the breadth of the achene, broadly ovate, mostly obtuse, tipped by the long slender awn. In swamps near the coast, Washington to California.

S. Howelli Greene l. c. *Microseris Howellii* Gray. A foot or more high from a fusiform root slender bearing solitary or 2 or 3 heads: leaves elongated-linear and attenuate, some bearing a few attenuate reflexed lobes: involucre half-inch high, narrow, 15-20-flowered, its bracts all acuminate; the inner oblong-lanceolate, and all nearly equal; the outer much shorter and mostly ovate achenes 3 lines long, narrower at base: pappus of 8 or 10 conspicuous and firm lanceolate paleae 2-3 lines long, tipped with a denticulate-scabrous awn of hardly greater length. Hillsides about Waldo, southeastern Oregon.

101 UROPAPPUS Nutt. l. c. 425.

MICROSERIS § *CALAIS* Gray.

Subcaulescent annuals with laciniately lobed or pinnatifid leaves and erect heads of yellow flowers on long scape-like strict and erect peduncles which are thickened above. Involucre campanulate, its numerous bracts imbricated in 2 or more series, the outer successively shorter, all thin and scarious margined. Receptacle flat, more or less alveolate-chaffy in the centre. Achenes terete, 8-10-costate, glabrous with scabrous costa, the basal callusity not angled. Paleae of the pappus 5, elongated, flat, hispid and short-awned at the apex.

U. linearifolius Nutt. l. c. *Microseris linearifolia* Gray. Scapes or peduncles 6-24 inches high: leaves linear, coarsely few-toothed or pinnatifid, 2-6 inches long, more or less villous-pubescent when young: achenes black, slender, tapering above almost to a beak, 6-8 lines long: paleae of the pappus silvery-white, linear oblong 4-8 lines long, deeply notched above and bearing slender awns barely half their length. Dry hillsides, Brit. Columbia to California and New Mexico.

U. macrochætus Greene Pitt. iii, 137. *Microseris macrochata* Gray. "Scapes or peduncles sometimes 2 feet high: involucre narrow, 8-10 lines high, its bracts attenuate-acuminate: paleae of the pappus thin, small, cleft quite to the middle from the first, bearing a long and weak awn. Southwest Idaho to California."

102 NOTHOCALAIS Greene Bull. Cal. Acad. ii, 54.

MICROSERIS § *NOTHOCALAIS* Gray.

Acaulescent perennial herbs with linear leaves and middle-sized erect heads of yellow flowers. Involucre oblong-campanulate; its bracts in two series, narrowly lanceolate, membranaceous with somewhat thinner hyaline margins, nearly equal. Receptacle flat, alveolate. Achenes fusiform, stipitate, contracted or rostrate-attenuate at summit, 10-costate. Pappus very white and soft, of 10-40 scabrous-margined narrow unequal paleæ with or without some capillary bristles.

N. Suksdorfii Greene l. c. More or less pubescent: scapes 4-10 inches high: leaves linear, attenuate nearly equalling the flowering scapes, all from the crown of a thick perennial root: bracts of the involucre lanceolate, long-attenuate, 6-12 lines long: achenes slender, 5-6 lines long, only half filled by the seed: paleæ of the pappus 10-12 narrow and nearly equal. Plains of Klickitat Co. Washington and adjacent Oregon.

N. troximoides Greene l. c. *Microseris troximoides* Gray. Scapose stems 6-12 inches high: leaves tufted on the crown of a thick perennial root, rather fleshy, narrowly linear-lanceolate, entire or undulate, 4-6 inches long: achenes fusiform, scarcely 4 lines long, its summit merely contracted, nearly filled by the seed: paleæ of the pappus 20-24, lanceolate below, very unequal half-inch long. Plains and hillsides eastern Oregon and Washington to California and Idaho.

N. cuspidata Greene l. c. *Troximon cuspidatum* Pursh. Scapes stout, shorter than or equalling the leaves: leaves linear, long-acuminate, thick, pubescent or glabrate, 4-8 inches long, 2-5 lines wide, somewhat conduplicate, their margins white-tomentose and crisp, or entire: involucre usually quite glabrous, nearly 1 inch high: achenes slightly contracted at the summit, about 3 lines long: pappus of 40-50 unequal paleæ and bristles. Dry soil, Idaho to Illinois.

103 MALACOTHRIX DC. Prodr. vii, 192.

Leafy-stemmed or sometimes scapose herbs with alternate or all radical leaves and long-peduncled, paniced or solitary, heads of yellow or white flowers that are usually nodding in the bud. Involucre many-flowered, its bracts either imbricated or only calyculate. Receptacle with or without delicate capillary bristles among the flowers. Achenes not flattened, short-oblong or columnar, glabrous, terete and striately 5-15-costate, or 4-5-angled by the prominence of the stronger ribs, slightly if at all narrowed either way with broad truncate apex having an entire or denticulate border or sharp edge. Pappus a series of soft and scabrous, or near the base barbellulate, bristles which are deciduous more or less in connection, and commonly 1-8 outer and stouter ones which are more persistent and smoother.

M. glabrata Gray Syn. Fl. i, pt 2, 422. Subcaulescent annual: erect or with ascending branches from the base, these leafy, often again branching and bearing a few lateral as well as terminal long-peduncled heads of yellow flowers: leaves once or twice laciniately pinnatifid into narrow linear or almost filiform lobes: involucre fully half-inch high, glabrous, or the outer bracts sometimes canescent when young: achenes narrow, lightly

costate: outer pappus of 2 persistent bristles and between them some minute pointed teeth. Eastern Oregon to California and Arizona.

M. Torreyi Gray Proc. Am. Acad. ix, 213. Stems 1-12 inches high from an annual root, branching from the base: lower leaves oblong, rather short, pinnatifid with short and dentate lobes, teeth and lobes callous-mucronate: heads seldom less than half-inch high, broadish-campanulate, short peduncled on the leafy branches: bracts of the involucre lanceolate, acuminate: achenes linear-oblong, 5-angled by as many salient often almost wing-like ribs, a much less prominent pair in each interval: outer pappus of 2-8 stout persistent bristles, between the thickish bases of which are minute teeth. Southeastern Oregon to Nevada and Utah.

104 APARGIDIUM T. & G. Fl. ii, 474.

Low herbs with fusiform biennial roots, all radical leaves, and rather small heads of yellow flowers on slender scapes. Heads many-flowered, nodding in bud. Involucre narrow-campanulate; its bracts strongly 1-nerved, in 2-3 series. Receptacle naked. Achenes columnar, truncate, smooth. Pappus brownish, of copious rather rigid and fragile barbellate-denticulate capillary bristles, with some outer and smaller ones nearly smooth.

A. boreale T. & G. l. c. Scape solitary, slender, 6-12 inches high, bearing a single head: leaves linear-lanceolate, 3-6 inches long, attenuate at both ends, entire, or obscurely undulate: involucre 6-9 lines high; of 10-15 lanceolate acuminate principal bracts and about as many similar but smaller outer ones. Wet meadows in the high mountains, Alaska to California.

105 HIERACIUM Tourn. L. Gen. n. 913.

Perennial herbs with alternate or all radical leaves and small to large erect heads of yellow, rarely white or red flowers in panicles or corymbs, or solitary. Involucre several- to many-flowered of narrow equal bracts and some short calyculate ones, or sometimes imbricated, not thickened at base nor with thickened midrib. Achenes oblong or columnar, smooth and glabrous, mostly 10-ribbed or striate, either terete or 4 or 5-angled, slightly contracted at the very base, commonly of the same thickness to the truncate summit. Pappus of rather rigid scabrous fragile bristles, brown or brownish, rarely white and soft.

§ 1 ARCHIERACIUM Fries. Heads corymbosely paniculate. Involucre of the comparatively large heads irregularly more or less imbricated. Achenes columnar. Pappus of numerous unequal bristles.

H. Canadense Michx. Fl. ii, 86. Stems robust, 4-6 feet high: leaves from lanceolate to ovate-oblong, acute, sparsely and acutely dentate, or even lacinate, at least the upper partly clasping and broad or broadish at base: involucre usually pubescent when young, occasionally glandular, the narrow outermost bracts loose: pappus sordid. Dry open woods, Oregon and northward to Pennsylvania and Canada.

§ 2 STENOTHECA T. & G. Fl. ii, 476. Involucre a series of equal bracts and a few short calyculate ones, usually narrow

and few- to many-flowered. Achenes in a few species slender or tapering to the summit. Pappus of more or less scanty equal bristles.

* Crinite-hirsute with long and whitish or yellowish shaggy hairs, especially on both sides of the entire leaves: flowers yellow: achenes columnar and short, not at all narrowed upward.

H. longiberbe. Whole plant sparsely covered with long soft hairs: stems usually slender and ascending or suberect, 6-18 inches long: leaves lanceolate, entire or sparingly dentate, 3-6 inches long: heads rather few, in an irregular panicle: involucre campanulate, 6 lines high, of 10-20 lanceolate acuminate principal bracts with smaller calyculate ones at their base, all densely clothed with long spreading hairs, not glandular. On cliffs along the Columbia river near the Cascades.

H. Scouleri Hook. Fl. i, 198. Sparingly pubescent with long crisp hairs, pale and more or less glaucescent: stems 1-2 feet high, very leafy: leaves lanceolate, sessile or the lowest short-petioled, 2-6 inches long: heads rather few, in a loose irregular panicle: involucre 6 lines high; its bracts linear-lanceolate, often acuminate, imbricated in 2 or 3 series, the outer successively shorter, all beset with long bristly hairs, and more or less glandular: pappus whitish. Brit. Columbia to Oregon and Montana.

** Crinitely long-villous with soft-woolly and blackish smooth hairs above, wanting below: without stellate or glandular pubescence: flowers yellow: pappus fuscous.

H. triste Cham. in herb. Willd. Stems simple, 4-12 inches high, few-leaved, bearing solitary or 2-4 racemously disposed small heads: radical leaves obovate to spatulate, entire, green and glabrate, or with sparse pale hairs; cauline oblong, upper ones and stem more or less villous-lanate: heads half-inch high, livid: involucre and peduncle densely clothed with long dark-brown or partly grayish soft wool. Aleutian Islands to northern Washington.

*** Dark-hirsute and somewhat glandular on the involucre: leaves and lower part of stems glabrous, or at most pubescent: flowers yellow.

H. gracile Hook. Fl. i, 298. Pale green and more or less pubescent: stems tufted, slender, 2-18 inches high: leaves mostly in radical cluster, obovate to oblong-spatulate, 1-3 inches long, attenuate below to petioles, entire or repand-dentate: heads few to several, racemously disposed, the lower linear-bracteate: involucre about 4 lines high, its numerous linear bracts all nearly equal, beset with short black somewhat hispid hairs and also tomentose and glandular: achenes short-columnar: pappus almost white. In open places on the highest peaks; Alaska to California and the Rocky Mountains.

**** Not crinite but at least the radical leaves and base of the stem sparsely or even thickly setose-hirsute with spreading hairs.

+ Flowers white: stems leafy, and in large plants loosely branching

H. albiflorum Hook. l. c. Stems slender, 1-3 feet high, bearing few to numerous small heads in an open, simple or compound paniculate cyme: leaves oblong to broadly lanceolate, thin, 1-4 inches long; the upper sessile by a broad base, the lower tapering into slender petioles: involucre campanulate, 4-5 lines high, of several linear-lanceolate acute bracts, imbricated in 2 or 3 ranks, the outer successively shorter, glabrous or nearly so, not rarely with a few bristly hairs: achenes black, a line long. Common in dry wooded districts, Alaska to California and the Rocky Mountains.

+ + Stems more or less leafy: involucre 15-30-flowered, oblong-campanulate, of rather numerous narrow and acute or acutish bracts: flowers yellow: achenes not narrowed upward: pappus from sordid to dull white.

H. cynoglossoides Arvet. Gray Proc. Am. Acad. xix, 68. More or less pubescent with somewhat hispid hairs, and the inflorescence glandular: stems 1-2 feet high, numerous from the crown of a perennial root, leafy: leaves lanceolate, mostly acute, 2-6 inches long; the upper sessile by a narrow base; the lower narrowed to a winged petiole: heads few to several in an open corymbose cyme: involucre 6-8 lines high: its linear acute bracts and short peduncles rather densely hirsute with short black hairs as well as glandular: achenes rather short. In open woods British Columbia to California and the Rocky Mountains.

H. amplum Greene Eryth. iii, 101. "Stoutish 2 or 3 feet high, amply leafy up to the rather broad corymbose panicle, but no radical tuft of foliage: leaves oblong-spatulate, acutish, entire, 4-6 inches long hirsute along the margins, and with scattered appressed hairs on both faces: upper cauline leaves and branches of the inflorescence pale and glaucescent, seemingly glabrous, but somewhat tomentose-puberulent under a lens: involucre about 5 lines high, loosely calyculate the subequal bracts dark with black setulose stout hairs otherwise glabrous: ligules yellow: achenes columnar or eyen slightly widening to the summit: pappus white. On hillsides at 6000-7000 feet altitude Mount Adams, Washington, Suksdorf."

H. barbigerum Greene Pitt. iii, 228. Stems slender, tufted, from deep seated somewhat running rootstocks, 4-10 inches high, leafy only near the base: leaves somewhat crowded but not rosulate, lanceolate to spatulate, short petioles and leaf-margins hirsute with long spreading hairs which extend more sparsely to both sides of the leaves and stem, the lower faces of the leaves also tomentulose with branched hairs: heads 1-5, in a loose cyme: involucre campanulate, about 6 lines high its linear bracts hirsute and tomentulose like the leaves with also a few dark setulose hairs: pappus nearly white. On grassy slopes of Ashland Butte, Oregon, to Lassen county, California.

H. cinereum. Cinereous with a minute white scurfy tomentum: stems rather stout, 6-10 inches high, from stout creeping rootstocks forming large patches leafy only toward the base: leaves lanceolate or narrower, acute or acuminate, 3-4 inches long, sparsely denticulate narrowed below to broad winged petioles; sparsely hirsute with crisp hairs: heads several to numerous in a close corymbose paniculate-cyme: involucre 5-6 lines high, its linear principal bracts with broad scarios margins, the outer and shorter ones subulate all sparsely or not at all hirsute: pappus sordid. In open places near Table Rock, Clackamas county, Oregon.

** ** * Leaves all at the base of the loosely branching scape-like stem: flowers yellow only 5-15 in the narrow and diffusely paniculate heads: achenes slightly if at all tapering to the summit.

H. Bolanderi Gray Proc. Am. Acad. vii, 265. Stem slender, 6-18 inches high, commonly solitary, glabrous: leaves nearly all in a radical tuft, ovate to broadly lanceolate mostly obtuse, sparingly denticulate or entire 2-3 inches long, tapering below to a winged petiole, pale and glaucous below, green and beset with bristles above: heads few to several in a loose paniculate cyme: involucre narrow, 5-lines high, glabrous of 5-10 linear-lanceolate, very acute principal bracts and a few smaller ones at their base: achenes fully as long as the pappus.

H. Howellii Gray Bot. Gaz. xiii, 73. Stems 1-2 feet high, hoary with close stellular pubescence, hirsute below: leaves spatulate to oblanceolate entire or some of them sparingly dentate, 3-4 inches long, obtuse, tapering

below to short petioles, or the cauline sessile, villous-crinite and tomentose-canescens both sides: heads rather numerous, in an open panicle few-flowered: involucre about 5 lines high cylindrical of 6-8 linear-lanceolate obtuse principal bracts and a few shorter ones at their base, all hoary with close stellular pubescence, without any setose bristles: pappus white when young. Open Rocky ridges, Mooney Mountain, Josephine county, Oregon.

106 CREPIS L. Gen. n. 9. 14.

Perennial or annual herbs with alternate or all radical mostly toothed or pinnatifid leaves and small or middle-sized heads of yellow flowers. Involucre few- to many-flowered, cylindric, campanulate, or swollen at base, its principal bracts in one series, equal, with a number of exterior smaller ones. Receptacle mostly flat, naked or short-fimbriate. Achenes from columnar to fusiform, 10-20-ribbed or nerved, not transversely rugose, narrowed at the base and apex. Pappus of copious white and usually soft capillary bristles.

* Bracts of the involucre thickening and becoming more or less rigid at base in age: achenes beakless or nearly so.

C. VIRENS L. Sp. ed. 2, 1134. Glabrous annual; stems leafy 1-2 feet high corymbosely branched above: radical leaves spatulate to lanceolate, from dentate to lacinate pinnatifid, 2-8 inches long, narrowed below to petioles: cauline smaller and narrower, clasping by a sagittate base the upper usually very small and entire: heads numerous, slender-peduncled: involucre 4-5 lines high, oblong, more or less pubescent or glandular, its principal bracts lanceolate, the outer mostly appressed achenes oblong, 10-striate, smooth slightly contracted at both ends. In fields and waste places, British Columbia to California. Naturalized from Europe.

* * Perennials: achenes beakless or short-beaked.

C. nana Richards, App. Franklin Journ. ed. 2, 62. Glaucous and wholly glabrous: low and depressed, forming tufts and bearing numerous clustered and narrow short peduncled heads: leaves chiefly radical, ovate to spatulate, entire, repand-dentate or lyrate, commonly equalling the clustered scapes or stems: involucre cylindrical 8-14 flowered, of 8-10 smooth and narrowly linear obtuse bracts in a single series and 3 or 4 short calyculate ones at base: achenes linear, unequally costate, obscurely contracted under the moderately dilated pappiferous disk. Alaska to the Wallowa Mountains of Oregon and to California.

C. runcinata T. & G. Fl. ii, 438. Slightly if at all glaucous: stems scape-like, 1-3 feet high, paniculately branched above: radical leaves ovate-oblong to oblong-lanceolate, 2-6 inches long, from repand-dentate to runcinate-pinnatifid, with short lobes or teeth; cauline none or small and narrow at the forks: involucre half-inch high or less, pubescent, often hirsute, sometimes glandular-hispidulous: achenes narrowly oblong, moderately narrowed upward, somewhat evenly 10-costate. In moist soil, southeastern Oregon to Manitoba and Iowa.

Var. hispidulosa. whole plant hispidulous and glandular. Moist places, southeastern Oregon.

C. Andersoni Gray Proc. Am. Acad. vi, 436. "Not glaucous, a foot or more high: leaves laciniately pinnatifid or dentate, but not runcinate: involucre half to three-fourths inch high, cinereous-pubescent, of broader and firmer bracts, more imbricated, outermost oblong to ovate-lanceolate: achenes fusiform, usually 8-10-costate, tapering into a short but manifest beak." Eastern Oregon to Nevada and eastern California.

C. platyphylla Greene Pitt. iii, 27. "Related to *C. runcinata*, similarly acaulescent, the corymbosely paniced stout scape 12 to 18 inches high, rather strongly hispid and somewhat glandular: leaves depressed or ascending, oval and oblong to spatulate-oblong, subsessile or short petioled, mostly 4 to 6 inches long, often 3 in breadth, obtuse, coarsely and remotely, often somewhat runcinately toothed, green and glabrous above: involucre 4 or 5 lines high, very hispid, slightly glandular: achenes dark brown, oblong-fusiform, slightly contracted toward the summit, sharply 10-ribbed. Moist mountain meadows of southern Idaho and northern Utah."

C. subcarnosa Greene l. c. 107. "Stout and low, more or less pubescent, slightly succulent, the scape about a foot high, bearing at summit few and long-peduncled heads: leaves of spatulate-oblancoolate outline, obtuse or acutish, saliently but not runcinately toothed: peduncles and involucre glandular-hispid: slender-fusiform achenes tapering; pappus fine fragile. Meadows along the Humboldt River at Death and elsewhere in eastern Nevada, thence northward to southern Idaho."

C. acuminata Nutt. Trans. Am. Phil. soc. vii, 437. Minutely cinereous-pubescent below, but green: stems slender, 1-3 feet high, 1-3-leaved, bearing a fastigiate or corymbiform cyme of numerous small heads: leaves elongated, slender-petioled, oblong-lanceolate in outline, laciniate-pinnatifid, tapering to both ends, the apex usually into a lanceolate or linear prolongation: involucre narrow-cylindrical, 4-6 lines long, rarely more than 6-flowered, of 5-8 principal bracts, glabrous, or the few minute bractlets tomentulose: mature achenes fusiform, considerably longer than the pappus, lightly striate-costate moderately attenuate at summit. Dry ground, eastern Oregon to California, Utah and Montana.

C. intermedia Gray Syn. Fl. i pt 2, 432. Cinereous-puberulent: stems 1-2 feet high, 1-3-leaved, terminating in a rather few-flowered corymb or paniculate cyme: leaves elongated, slender-petioled, oblong-lanceolate in outline, laciniate-pinnatifid, tapering to both ends, involucre half-inch or more high, canescently puberulent; its bracts in age carinate by thickening of the midrib: achenes acutely 10-costate when mature, oblong-fusiform, slightly attenuate upward, longer than or equalling the pappus. Eastern Washington and Brit. Columbia to California and the Rocky Mountains.

C. occidentalis Nutt. Journ. Acad. Philad. vii, 29. Canescent with a close scurfy tomentum; stems usually 4-18 inches high, solitary or 2 or 3 from a single caudex, corymbosely branched above, rarely from near the base, often with glandular bristly hairs above: leaves from runcinately toothed to deeply pinnatifid, or somewhat bipinnatifid; the lower and radical 4-10 inches long, narrowed into petioles; the upper sessile and slightly clasping: heads few to several, corymbosely paniced: involucre 6-8 lines high, cylindrical, its principal bracts linear and acute, with several small ovate to subulate calyculate ones at their base, all canescent with close minute tomentum, and often with a few short bristles: achenes fusiform, truncate at the apex, 10-18-costate. On dry plains and hillsides, Brit. Columbia to California and Colorado. East of the Cascade Mountains.

C. monticola Coville Cont. Nat. Herb. iii, 562. Crinitely pubescent with long brownish glanduliferous hairs: stems stout, usually solitary, freely branching, 6-12 inches high: leaves oblong to broadly lanceolate in outline, 2-4 inches long, acute, narrowed below to short petioles or narrow sessile base; sometimes with merely dentate margins, sometimes deeply pinnatifid with toothed or even pinnatifid lobes: involucre 8-10 lines high, narrow-campanulate; its principal bracts narrowly lanceolate, acuminate, nearly or quite equalling the ligules. Dry hillsides, southern Oregon to California.

C. scopolorum Coville l. c. 563. Scantily tomentose, usually glabrate

NABALUS

in age, and bearing toward the base scattered eglandulose bristles: stems rather slender, 10-20 inches high, solitary or rarely 2 from the same caudex, bearing 1-5 heads leaves broadly lanceolate in outline, 4-6 inches long, pinnately or bipinnately divided into linear-lanceolate lobes: peduncles slender, usually thickened just below the heads: involucre 6-8 lines high; its bracts linear-lanceolate and barely acute, or the shorter ones acuminate: achenes 4-6 lines long, fusiform, truncate at the apex, not costate, but sometimes obscurely striate. Dry hillsides, eastern Oregon and Washington to Montana, Utah and Nevada.

C. rostrata Coville l. c. 564. Sparingly hirsute with glandless hairs, and more or less tomentose: stems 4-15 inches high, 1-3 from each caudex, striate-angled, bearing 1-3 heads: leaves oblong to broadly lanceolate in outline, 4-6 inches long, pinnately parted into linear-lanceolate entire or toothed lobes: involucre 6-8 lines high, more or less densely clothed with long glandless white hairs: achenes 4-5 lines long, not costate. the upper part contracted into a distinct beak 1-2 lines long. Rocky hillsides, eastern Oregon and Washington to Brit. Columbia.

C. barbigera Leiberg, Coville l. c. 565. Slightly tomentose with a minute somewhat flocculent tomentum, not at all hirsute: stems several from the crown of a thick perennial root, 1-2 feet high, sparingly leafy and bearing an ample corymbose cyme of rather small heads: leaves broadly lanceolate in outline, 4-10 inches long, runcinately toothed or deeply cut into linear-lanceolate lobes: involucre 5-7 lines high, of linear, mostly obtuse principal bracts and a few very small ovate or lanceolate acute ones at base, all canescent-tomentose and more or less bristly with setaceous white bristles. Dry ridges and rocky banks, eastern Oregon and Washington.

107 NABALUS Cass. Dict. Nat. xxxiv, 94.

Leafy-stemmed perennial herbs with alternate dentate or pinnatifid leaves, and usually numerous small mostly nodding heads of white yellowish or purplish flowers. Involucre 5-30-flowered. cylindric, usually narrow, unchanged in age, of 1 or 2 series of equal bracts and a few calyculate ones at their base. Receptacle flat, naked. Achenes terete or 4-5-angled, usually striate, sometimes striately pluricostate, truncate at summit. Pappus of copious rather rigid capillary bristles.

N. alatus Hook. Fl. i, 294, t. 102. *Prenanthes alata* Gray. Glabrous or nearly so: stems 1-2 feet high, the larger plants branching: leaves hastate-deltoid, acute or acuminate, sharply and irregularly dentate, abruptly contracted or some of the upper cuneately decurrent into a winged petiole, or small uppermost narrow and sessile by a tapering base: heads loosely and somewhat corymbosely paniced: involucre campanulate-oblong, of 8-10 often livid bracts, nearly or quite destitute of scarious margins, imperfectly calyculate by 2 or 3 loose linear accessory ones, 5-15-flowered: corollas purpish: achenes slender, 3-4 lines long, at least sometimes with tapering summit. On moist cliffs, Alaska to Oregon.

108 LYGOESMIA Don Edinb. Phil. Journ. vi, 305.

Smooth herbs with usually rush-like rigid or tough stems, linear or scale-like leaves and terminal or scattered erect heads of pink or rose-colored flowers. Heads 3-12-flowered. Involucre cylindric, its principal bracts 5-8, linear, scarious-margined, equal, slightly united at the base, with several very short outer ones. Receptacle flat, naked. Achenes terete, obscurely striate

or angled, usually linear or slender-fusiform. Pappus of copious and usually unequal soft or somewhat rigid bristles, from white to brownish.

L. juncea Don l. c. Perennial by a thick woody root: stems stiff, much branched, 8-18 inches high, striate-angled, not spinescent: lower leaves lanceolate, rigid, entire, acute or acuminate, $\frac{1}{2}$ -2 inches long; the upper similar but smaller, or reduced to subulate scales: heads mostly 5-flowered, solitary at the ends of the branches: involucre about half-inch high, its bracts usually gland-tipped: achenes narrowly columnar or shortly tapering to the summit: pappus light brown. Dry plains, eastern Idaho to Nevada and Minnesota.

L. spinosa Nutt. Trans. Am. Phil. Soc. vii, 444. Stems slender and rigid, low, much branched from an indurated and matted-woolly perennial base, otherwise glabrous: branchlets divergent, spinescent, bearing minute scales in place of leaves, and lateral very short-peduncled heads: lower cauline leaves linear, entire, thickish, above soon reduced to scales: involucre 3-5-flowered; its principal bracts not more numerous, rather loose, lanceolate; the unequal and more imbricated calyculate ones comparatively broad and large: achenes much shorter than the pappus, not at all narrowed upward, 4-5-costate: pappus white, of unequal bristles. Gravelly hills and plains, eastern Oregon to California, Nevada and Idaho.

109 AGOSERIS Raf. Fl. Loudv. 58.

Troximon Nuttall, not of Gærtner.

Acaulescent perennial or annual herbs with clustered radical leaves and mostly large heads of yellow flowers on simple scapes. Involucre campanulate or cylindraceous, the bracts mostly lanceolate, imbricated in few series, the outer loose and often somewhat foliaceous. Receptacle flat, naked. Achenes oblong or linear, terete, 10-ribbed, the apex contracted into a neck or prolonged into a beak, the broad base or basal callus to a narrow base more or less hollowed at the insertion. Pappus of copious white or whitish merely scabrous capillary bristles, which are either persistent on or separately deciduous from the dilated terminal areola.

§ 1 Achenes more or less linear, beakless, or tapering gradually into a beak on which the nerves or ribs of the body are produced to the apex: acaulescent perennials.

* No beak to the achene, its moderately short continued summit of the same texture as the body and equally 10-costate: involucre bracts somewhat equal, all tapering to a slender acumination: the outer from an oblong or ovate-lanceolate base, glabrous: pappus rigidulous.

A. alpestris Greene Pitt. ii, 177. *Troximon alpestre* Gray. Glabrous: rootstock or caudex elongated; leaves narrowly spatulate or lanceolate, pinnately lobed or incised, or parted into narrow linear divisions; scapes 2-3 inches high, weak: involucre campanulate, 7-8 lines high, the bracts in about 2 series: achenes 2-3 lines long, equalled by the slender pappus-bristles. In the Cascade Mountains of Oregon and Washington.

* * Achenes with apex tapering gradually into a rather stout and nerved beak which is shorter than the body.

A. barbellulata Greene l. c. *Troximon barbellulatum* Greene. Not

glaucous: scapes slender, 1-3 inches high: linear-lanceolate, laciniate-pinnatifid into a few short and narrow lobes, or some entire: involucre narrow, over half-inch high, rather few-flowered; its 10 or 12 bracts nearly equal, lanceolately acuminate, glabrous: flowers yellow: achenes 3 lines long, about the length of the soft distinctly barbellulate pappus. Grassy slopes, high mountains of southern Oregon and northern California.

A. tomentosa. More or less tomentose up to the involucre: scapes rather stout, 4-10 inches high: leaves lanceolate to linear in outline, irregularly and often retrorsely lobed or toothed, or some of the inner ones entire, acute, or acuminate, attenuate below to a short winged petiole, nearly as long as the scapes: involucre campanulate, 8-9 lines high, of rather numerous imbricated, lanceolate acuminate scarious-margined mostly glabrous bracts: achenes fusiform, short-beaked, much shorter than the brownish pappus. On grassy slopes, Stein Mountain southeastern Oregon.

A. parviflora Greene l. c. *Troximon parviflorum* Nutt. Glabrous throughout: scapes slender, much longer than the leaves 5-15 inches high: leaves narrowly linear, acuminate, entire, 3-8 inches long: 1-3 lines wide: heads an inch broad or less: involucre oblong-ovoid, becoming nearly hemispheric in fruit, 6-8 lines high; its bracts lanceolate and acuminate: achenes conspicuously beaked, about 4 lines long: pappus of numerous unequal very slender bristles. Plains, Idaho to Manitoba, Nebraska and New Mexico.

♂ 2 Achenes with a slender and mostly filiform nerveless beak and soft pappus: acaulescent perennials.

* Achenes acute or tapering at summit into a beak but little if at all longer than the cylindraceous or narrowly fusiform body.

A. aurantiaca. Greene l. c. *Troximon aurantiacum* Hook. Nearly glabrous, deep green and not at all glaucous: leaves oblanceolate, obtuse, entire, narrowed to a slender petiole: involucre 7-9 lines high: its bracts from broadly to narrowly lanceolate, acute, or the outer and looser ones oblong and obtuse: flowers orange, drying brownish or purple achenes thickish, tapering gradually to a short stout beak. High mountain prairies, Oregon to Alaska and the Rocky Mountains.

A. purpurea Greene l. c. Sparsely lanate when young, in age glabrate, more or less glaucous: scapes 6-20 inches high, enlarged and tomentose at the summit: leaves from linear to lanceolate saliently or often runcinately toothed or lobed: bracts of the involucre moderately well imbricated, 4-12 lines long, lanceolate and long-acuminate, or the outer ones oblong and obtuse: corollas deep saffron-color, drying purple: achenes black, fusiform, with a slender beak about as long as the body: pappus white. Mountain meadows, Oregon and Washington to the Rocky Mountains.

A. gracilenta Greene l. c. *Troximon gracilens* Gray Scapes slender, 10-18 inches high: leaves mostly entire, from lanceolate to nearly linear, or some narrowly spatulate: involucre bracts narrow: corollas deep orange: achenes fusiform-linear, 3-4 lines long; the very slender beak as long or longer: pappus soft but not flaccid. In the Cascade Mountains of Oregon and Washington to Wyoming.

A. elata Greene l. c. *Troximon Nuttallii* Gray. Robust; scapes 6-20 inches high: leaves thickish, from lanceolate to spatulate, and from sparingly dentate to pinnatifid, 6-12 inches long, glaucous: heads an inch or more high and broad: involucre bracts lanceolate, acute, more or less pubescent: corollas yellow: achene thickish, 3 lines long, with a beak as long or longer. Moist ground, eastern Oregon to California and Utah.

A. apargioides Greene l. c. *Troximon apargioides* Less. Low and tufted from a multicapital caudex, glabrate: leaves spatulate, obtuse, 2-3 inches long, narrowed below to a slender petiole, entire or with a few salient teeth or lobes, or pinnatifid with sparse linear divisions: scapes 6-12 inches high: heads half-inch high: involucre campanulate; the inner bracts linear-lanceolate, the outer oblong, acute, more or less tomentose: achenes and beak each about 2 lines long: pappus soft, dull-white. Sandy soil along the coast of Oregon and California.

* * Achenes oblong or short-fusiform, with a filiform or almost capillary beak 2-4 times as long: pappus soft and fine: flowers all yellow.

+ Pappus about as long as the beak.

A. hirsuta Greene l. c. *Troximon humile* Gray. Scapes 8-20 inches high, slender: leaves hirsutely pubescent, from lanceolate to spatulate in outline, and from repand-dentate or lyrate-pinnatifid to pinnately parted into linear lobes; involucre permanently villous: flowers exserted: filiform beak only about twice as long as the whitish achene. Near the coast. Washington to California.

+ + Pappus white, much shorter than the almost filiform beak.

A. laciniata Greene l. c. *Troximon laciniatum* Gray. Smooth and glabrous or with sparse soft pubescence: scapes 1-2 feet high: leaves elongated-lanceolate, lacinate-dentate or commonly deeply pinnatifid with linear lobes: involucre glabrous or glabrate, or the base of the outer of the lanceolate bracts tomentose: achenes 2, and beak 5-7 lines long. In low ground, Vancouver Island to California.

A. grandiflora Greene l. c. 178. *Troximon grandiflorum* Gray. Scapes stout, 1-2 feet high: leaves hirsutely or cinereous-pubescent, or glabrate: spatulate to lanceolate, sinuate-dentate to lacinate-pinnatifid or even pinnately parted: involucre broad, usually well imbricated: its bracts lanate or tomentose when young, often glabrate in age: heads in fruit 1-1½ inch high: achenes 2, and capillary beak 6-8 lines long. Plains and moist hillsides, Washington to California.

A. retrorsa Greene l. c. *Troximon retrorsum* Gray. Villous-tomentose when young: scapes stout, 12-18 inches high: leaves pinnately parted into linear-lanceolate usually retrorse lobes, the terminal lobe long and narrow; all callous-tipped: involucre narrowly oblong, 1½-2 inches high when mature: its linear-lanceolate bracts hardly surpassed by the soft white pappus: ligules short: achenes 3 lines long: abruptly contracted at summit; their filiform beaks 10-12 lines long. Open pine woods, southern Oregon to California and southern Idaho.

§ 3 Achenes fusiform, with filiform nerveless beak and soft pappus: subcaulescent annuals with yellow flowers.

A. heterophylla Greene l. c. *Troximon heterophyllum* Greene. Somewhat villous, or hirsutely pubescent or glabrate: scape-like peduncle 3-12 inches high: leaves from spatulate to linear-lanceolate, denticulate to pinnatifid: involucre oblong-campanulate, 6-9 lines high; its bracts erect, lanceolate or narrower; the outer decidedly shorter than the glabrous inner ones, more or less pubescent but not villous: achenes various, but at most only 2 lines long, usually fusiform; beak 3-4 lines long, mostly longer than the white or whitish pappus. Open places, Brit. Columbia to California.

Var. glabra. Glabrous throughout and more or less glaucous: small, 2-4 inches high. Hillsides near the Columbia river, eastern Oregon and Washington.

110 TARAXACUM Haller Stirp. Helv. i, 23.

Acaulescent perennial herbs with rosulate leaves, naked scapes that elongate in fruit, and mostly large heads of yellow flowers. Heads many-flowered, usually solitary at the summit of the simple hollow scapes. Involucre a single series of nearly equal narrow bracts that are slightly united at base, and several or numerous calyculate ones. Receptacle flat, naked. Achenes oblong-ovate or fusiform, 4-5-costate or angled, and usually with some intervening nerves, muricate or spinulose, at least near the summit which is abruptly contracted into a filiform beak. Pappus soft and capillary, dull white.

T. OFFICINALE Webber Prim. Pl. Holst. 56. Scapes and leaves from the crown of a thick vertical root: leaves from spatulate-oblong to lanceolate in outline, and from irregularly dentate to runcinate pinnatifid, 3-10 inches long: bracts of the involucre linear-lanceolate, not glaucous, the outer reflexed, all acute: achenes greenish-brown, fusiform, squamulose toward the summit, abruptly contracted into a conical apex which is prolonged into a filiform beak 2 or 3 times as long as the achene. Common in fields and waste places. Naturalized from Europe.

111 RAFINESQUIA Nutt. Trans. Am. Phil. Soc. vii, 429.

Leafy-stemmed annuals with pinnatifid leaves and rather large heads of white or flesh-colored flowers terminating the paniculate branches. Heads 15-30 flowered. Involucre conical or cylindrical, of 7-15 equal linear attenuate principal bracts and some loose calyculate ones. Receptacle flat and naked. Achenes terete, somewhat fusiform, obscurely few-ribbed, attenuate into a slender beak, the broad base hollowed but not callous-thickened at the insertion. Pappus of 10-15 capillary bristles, softly long-plumose from the base to near the tip.

R. Californica Nutt. l. c. Glabrous throughout: stem stout, much branched, 2-3 feet high: leaves oblong; the lower 4-6 inches long; the upper gradually reduced to small bracts: involucre becoming thick at base and more or less conical; its rather numerous calyculate bracts subulate and spreading: ligules short, white: achenes tapering into a very slender beak as long as the body: pappus dull white, the bristles fine and soft. Shady ground, eastern Oregon to California.

112 LACTUCA Tourn. Inst. t. 267. L. Gen. n. 909.

Tall herbs with alternate leaves and small paniced heads of yellow white or blue flowers. Involucre cylindrical, several to many-flowered, either calyculate or more regularly imbricated. Receptacle flat, naked. Achenes flat, 3-5-ribbed on each face, narrowed above, or contracted into a narrow beak, which is more or less expanded at the summit into a small disk that bears the copious white or brownish pappus bristles which fall separately.

§ 1 **SCARIOLA** DC. Prodr. vii, 133. Achenes very flat, orbicular to oblong. abruptly produced into a filiform beak which bears the soft white pappus on its dilated apex.

L. SCARIOLA L. Sp. ed. 2 1119. Biennial: glabrous throughout or hirsute at the base; green and glaucous: stem stout, 2-7 feet high, leafy, usually paniculately branched: leaves lanceolate to oblong, with spinulose-denticulate margins, sometimes sinuate-toothed or pinnatifid, sessile or auriculate-clasping, midrib below beset with weak prickles: heads small, 6-12 flowered, very numerous, in an open panicle: corollas pale yellow: achenes obovate-oblong, several-nerved, margined, about as long as the filiform beak. Becoming common in fields and waste places. Introduced from Europe.

L. SATIVA The common LETTUCE is common along the Rail Road in the southern part of Oregon but is hardly naturalized.

L. Canadensis L. Sp. ii, 796. Biennial or annual: glabrous and glaucescent: stem strict, 4-12 feet high, very leafy up to the elongated narrow panicle: leaves mostly sinuate-pinnatifid, 6-12 inches long, with margins entire or sparingly dentate, and midrib naked or rarely some sparse bristles, most of the cauline partly clasping by a sagittate or auriculate base: involucre half-inch or less high, 12-20-flowered: flowers yellow. achenes blackish, obscurely scabrous-rugulose, lightly 1-nerved on the middle of each face, broadly oval, with distinct thin margins, rather longer than the beak: pappus white. Moist woods, Oregon and Washington to the Eastern States.

L. sagittifolia Ell. Bot S. C. & Ga ii, 253. Glabrous; 3-6 feet high, leafy nearly to the usually loosely paniculate inflorescence: leaves oblong to lanceolate, 3-10 inches long, acute or acuminate, entire or denticulate, the lower sometimes pinnatifid, whitish beneath, midrib naked: involucre 5-7 lines high: flowers pale yellow or purplish: achenes oval, thin-margined longer than the beak. Open ground, Idaho to the Eastern States.

§ 2 **LACTUCASTRUM** Gray Syn. Fl. i, pt, 2, 443. Root perennial. Involucre well imbricated. Achenes lanceolate-oblong, flat, not margined, tapering into a beak not longer than the breadth of the body.

L. pulchella DC. Prodr. vii, 134. Very glabrous: stems 1-5 feet high. leafy up to the open corymbiform panicle: leaves from linear-lanceolate to narrowly oblong, entire or runcinate-dentate, or some lower ones pinnatifid; cauline sessile but not auriculate at base: branches of the loose panicle scaly: involucre 8 lines high, 12-15-flowered, its outer bracts ovate-lanceolate: flowers bright blue or violet-purple: achenes barely 2 lines long, striate-nerved, the tip of the short beak soft and usually whitish. Alluvial ground, Oregon to Brit. Columbia, Hudson Bay and Michigan.

§ 3 **MULGEDIUM** Gray l. c. Biennial or perennial herbs with usually bluish flowers, Achenes thickish, oblong, with some strong ribs and nerves: contracted at summit into a short stout beak, or into a mere neck under the dilated apex.

L. spicata Hitchc. *L. leucophæa* Gray. Stem usually stout, 3-12 feet high, leafy up to the panicle: leaves 3-12 inches long by 2-6 broad, sinuately or runcinately pinnatifid, coarsely and irregularly or doubly dentate; upper cauline sessile by a mostly narrow but auriculate or partly clasping base: heads in a pyramidal crowded panicle: involucre oblong, 5 lines high: flowers bluish: achenes narrowed at summit to a short but manifest neck. Moist ground, Oregon to Brit. Columbia and the E. States.

113 **SONCHUS** Tourn. L. Gen. n. 908.

Succulent herbs with leafy stems, alternate spinulose or cili-

ately dentate leaves and middle-sized heads of yellow flowers. Involucre campanulate, in age usually broadened and fleshy-thickened at base, becoming conical. Achenes obcompressed, without beak or neck or dilated disk. Pappus of very soft and fine flaccid bristles, which fall more or less in connection, and commonly one or more stronger ones which fall separately.

S. OLERACEUS L. Sp. 794. Fibrous-rooted annual: stem nearly simple, 1-10 feet high: lower leaves petioled, lyrate-pinnatifid, 5-10 inches long, the terminal segment commonly large and triangular, the margins denticulate with mucronate or scarcely spiny teeth; upper pinnatifid, clasping by an auriculate or sagittate base, the auricles acute: involucre 6-8 lines high: achenes flat, longitudinally ribbed and transversely rugose. Common in fields and waste places. Naturalized from Europe.

S. ASPER All. Fl. Ped. i, 222. Stem often stout. 1-6 feet high, from an annual root: leaves undivided, lobed or pinnatifid, spinulose-dentate; the lower spatulate to lanceolate, more or less distinctly petioled; the upper clasping by an auriculate base, the auricles rounded: involucre glabrous, about 6 lines high: achenes smooth, 3-nerved on each side. Common in fields and waste places. Naturalized from Europe.

ORDER LII, LOBELIACEÆ Juss.

Herbs, or rarely shrubs, with usually milky acrid juice, alternate leaves without stipules, racemose inflorescence and perfect 5-merous flowers. Calyx adnate to the whole or the lower half of the ovary, the limb cleft to the ovary into 5 lobes. Corolla inserted just where the calyx becomes free from the ovary, its lobes valvate or induplicate in the bud, commonly deeper cleft or completely split down between two of the lobes, the cleft mostly on the upper side in the open flower but becoming so by a twist; in the early bud the split looks toward the bract; the lobes sometimes disposed to separate from below upward and the limb to be bilabiate irregular. Stamens inserted with the corolla and mostly free; anthers 2-celled, introrsely dehiscent, firmly united around the top of the style into a ring or short tube. Ovary 2-celled, with placentæ projecting from the axis, sometimes 1-celled with two parietal placentæ. Style entire: stigma usually 2-lobed, girt with a rim of hairs. Ovules and seeds mostly indefinitely numerous, small, anatropous. Embryo straight, in the axis of fleshy albumen.

* Corolla cleft to the base on one side: capsule free at the apex.

1 **Lobelia** Calyx-tube short: capsule many-seeded, 2-valved at the top.

* * Corolla with a closed tube: capsule wholly inferior.

2 **Howellia** Calyx-tube linear-clavate: capsule 1-celled, few-seeded.

3 **Laurentia** Calyx-tube turbinate or oblong, corolla with tube as long as the limb: capsule short, 2-valved at summit.

4 **Bolelia** Calyx-tube very long: corolla tube very short: capsule very long, opening by 1-3 long fissures.

LOBELIA L. Gen. n. 1099.

Herbs, or rarely shrubs with alternate leaves, and red, yellow, blue or white flowers. Calyx-tube turbinate, hemispheric or ovoid, adnate to the ovary. Corolla-tube divided to the base on one side; the limb bilabiate, the lobe on each side of the cleft turning away from the other three, which are somewhat united. Stamens free from the corolla-tube, monadelphous, at least above, 2 or all of the 5 anthers with a tuft of hairs at their tips, 3 of them usually larger than the other 2. Ovary 2-celled, the 2 placentae many-ovuled. Stigma 2-lobed. Capsule loculicidally 2-valved.

L. Dortmanna L. Sp. 929. Aquatic perennial: glabrous throughout: stem slender, simple, erect, hollow, naked except a few fleshy bracts, 6-18 inches high: leaves all submersed and tufted at the base of the stem, terete, obtuse, 1-2 inches long, hollow and longitudinally divided by a partition: flowers blue, in a loose terminal raceme, 6-8 lines long, on filiform pedicels: calyx-lobes subulate: larger lip of the corolla glabrous or nearly so. Borders of ponds, northwestern Washington to subarctic America and the Northeastern States.

2 HOWELLIA Gray Proc. Am. Acad. xv, 43.

Aquatic or semiaquatic herbs with alternate leaves, at least below, and small white flowers. Flowers of 2 forms; the emersed with conspicuous corolla, the submersed with corolla undeveloped. Calyx with slender tube, adnate for its whole length to the ovary, and a limb of 5 nearly equal narrow lobes. Corolla not surpassing the calyx, its very short tube split nearly to the base on one side; its 5 lobes almost equal. Stamen-tube nearly free, and with the included style slightly incurved. Anthers oval, the two smaller trisetulose; the three larger naked. Ovary strictly 1-celled, with two filiform parietal placentae, each 3-5-ovulate, upper ovules ascending, the lower pendulous. Capsule membranaceous, at maturity bursting irregularly on one side. seeds few, large, smooth, callous-apiculate at the chalaza.

H. aquatilis Gray l. c. Aquatic annual: stem weak, 6-18 inches high, branching: submersed leaves linear-setaceous, 2-6 inches long, entire; emersed leaves linear to oblong, sometimes sparingly toothed: flowers axillary, short-peduncled; calyx-lobes subulate or filiform, 2-4 lines long; corolla white, its lobes oblong; capsule half-inch long, linear-clavate, bearing a few soft white seeds. In ponds, in the vicinity of Portland, Oregon.

3 LAURENTIA Neck. Elem. i, 131.

Small and diffuse or creeping herbs with alternate leaves and axillary blue flowers. Calyx-tube and adnate ovary turbinate or oblong, the 5 lobes narrow. Corolla with tube as long as the limb, and not split; its larger lip 3-cleft and widely spreading; the smaller of two more erect or diverging divisions. Filaments and anthers completely united; two of the latter minutely bristle-tufted at the apex, nearly included. Capsule 2-valved across the projecting free apex, 2-celled. Seeds oblong or almost fusiform.

L. carnosula Benth. Glabrous somewhat succulent annual: stems 1-5

inches long, rooting at the nodes: leaves oblong-linear or lanceolate, entire, sessile, 3-6 lines long: flowers axillary and above corymbose or racemose, long-pedicelled: calyx-lobes somewhat foliaceous, linear, obtuse, equalling the oblong-obconical or clavate tube: larger lip of the corolla 3-cleft into roundish-obovate lobes, blue with the 2-ridged palate yellow or whitish; the smaller lip of 2 lanceolate lobes: seeds smooth. Low and muddy places, southeastern Oregon to Wyoming and California.

4 BOLELIA Raf. Atl. Journ 120, 1832.

DOWNINGIA Torrey.

Glabrous annual herbs with sessile narrow leaves, the upper ones reduced to bracts, and axillary sessile flowers. Calyx-tube and adnate ovary very long and slender, 3-sided, usually twisted, its limb divided down to the ovary into five foliaceous lobes. Corolla with very short but entire tube and bilabiate limb; the smaller lip of two narrow recurved or spreading divisions, the other very broad and 3-lobed. Filaments and anthers both united into a somewhat curved tube; two of the latter bristle-tipped. Capsule very long and slender, early becoming 1-celled, with two filiform parietal placentae. remaining closed at the tip but the sides dehiscing by 1-3 long fissures.

B. elegans Greene Pitt. ii, 126. *Downingia elegans* Torrey. Stem simple or diffusely branched, 4-12 inches high: leaves ovate to lanceolate, acute, 3-15 lines long: calyx-lobes linear-lanceolate, 6-9 lines long: larger lip of the corolla 3-lobed, the lobes acute or acutish the other lobes lanceolate: capsule often two inches or more long: seeds short-oblong. In wet ground, Brit. Columbia to southern Oregon and Idaho.

B. pulchella Greene l c. *Downingia pulchella* Torrey, "Mostly lower or weaker-stemmed: leaves more linear and obtuse: large lip of the corolla deeply 3-lobed; the other two lobes oblong-ovate: seeds elongated-oblong. Wet banks, Oregon to California and Nevada "

ORDER LIII, CAMPANULACEÆ Juss. Gen. 163.

Herbs, rarely shrubs or trees, with bland milky juice, alternate simple leaves without stipules, regular 5-merous flowers, and 2-5-celled many-seeded capsules or berries. Calyx-tube adnate to the ovary; its 5-lobed persistent limb usually divided down to the ovary. Corolla valvate, induplicate or rarely imbricate in the bud, inserted on the calyx just where it becomes free from the ovary. Stamens inserted with the corolla and free or adnate at base: anthers with two parallel cells. Style one, almost always pubescent or puberulent for some distance below the 2-5 introrse stigmas. Ovules anatropous, on placentae projecting from the axis. Seeds small, usually smooth. Embryo straight, in the axis of fleshy albumen.

* Ovary and capsule long and narrow, or at least oblong

- 1 **Githopsis** Capsule opening at the top by a hole left by the falling away of the base of the style between the long calyx-lobes.
- 2 **Legouzia** Capsule opening on the sides by 2 or 3 little valves which leave small round perforations.

* Ovary and capsule short and broad.

- 3 **Heterocodon** Calyx-lobes very broad: capsule thin-walled, not dehiscent but bursting indefinitely between the ribs.
- 4 **Campanula** Calyx-lobes narrow: capsule opening on the side by 3-5 small valves leaving definite round perforations.

1 GITHOPSIS Nutt. Trans. Am. Phil. Soc. viii. 258.

Annual herbs with alternate leaves and blue flowers. Flowers all alike and corolliferous. Tube of the calyx club-shaped, strongly 10-ribbed, adnate up to the summit of the ovary: the limb of five long and narrow foliaceous lobes. Corolla tubular-campanulate. 5-lobed. Filaments short, dilated at the base: anthers linear. Ovary 3-celled. Stigma 3-lobed. Capsule clavate, coriaceous, crowned with the rigid calyx-lobes, strongly striate-ribbed, many seeded, opening where the base of the style falls away by a narrow hole. Seeds very numerous, smooth.

H. specularioides Nutt. l. c. Stem rigid, 2-10 inches high: leaves small, linear-oblong, coarsely toothed, sessile: flowers solitary terminating the stem or branches, or becoming lateral, strictly erect: corolla blue: rigid capsule tapering into a very short and stout peduncle. Open places, western Washington to California.

2 LEGOUZIA Durand Fl. Bourg, ii, 26. (1782.)

SPECULARIA Hiester.

Annual herbs with alternate leaves and axillary blue flowers. Flowers often dimorphous, the earlier ones smaller and with undeveloped corolla, and cross-fertilized in bud. Calyx-lobes in the early flowers 3 or 4, in the later ones 5, narrow. Calyx-tube narrow, more or less elongated. Corolla short and broad, rotate or nearly so when expanded, 5-lobed or 5-parted. Anthers linear. Stigmas and cells of the ovary 3-4. Capsule obconical or cylindrical, opening by one or more small valvular openings on the side, either near the summit or near the middle.

L. perfoliata Britton Mem. Torr, Club, v, 309. *Specularia perfoliata* A. DC. Stem 6-20 inches high, very leafy throughout, simple or branched from the base, hirsute or hispid on the angles: leaves round cordate and clasping, mostly crenate, veiny, 6-12 lines broad: flowers sessile, single or clustered in the axils: calyx-lobes of the early flowers 5-4 and short, of the corolliferous ones as long as the ovary: capsule oblong or somewhat conical, the 2 or 3 valvular openings at or below the middle: seeds lenticular. Open grounds and fields, Brit. Columbia to California and the Eastern States.

3 HETEROCODON Nutt. Trans. Am. Phil. Soc. viii, 255.

Slender annual herbs with alternate sessile leaves and blue flowers of two forms. The lower and earlier flowers with merely rudimentary corolla. Calyx with short tube and large foliaceous lobes. Corolla 5-lobed. Capsule obovoid, 3-angled, 3-celled, many-seeded, very thin and membranaceous, the delicate walls bursting indefinitely on the sides.

H rariflorum Nutt. l. c. Sparingly hirsute: stems filiform, leafy, diffusely spreading, 4-12 inches long: leaves orbicular, with cordate partly clasping base coarsely many-toothed, 4-8 lines long: flowers solitary, axillary and terminal: calyx with short ovoid or inversely pyramidal tube and foliaceous broadly ovate sparingly toothed veiny lobes: only the later flowers with developed pale blue corolla which barely equals the lobes of the calyx: seeds oblong, obscurely triangular. In wet places and fields, Brit. Columbia to California, and Idaho.

4 CAMPANULA L. Gen. n. 218.

Perennial or annual herbs with alternate leaves and usually showy blue or white flowers. Flowers all alike and corolliferous. Calyx with short and broad tube and 5-lobed limb. Corolla campanulate or nearly rotate, 5-lobed or 5-parted. Filaments dilated at base: anthers oblong or linear. Stigmas and cells of the ovary 3-5. Capsule mostly short, opening on the sides or near the base by 3-5 small uplifted valves or perforations.

* Root perennial: style not longer than the corolla, straight.

+ Openings of the capsule toward its summit.

C. Piperi. Glabrous: stems numerous from a multicapital caudex, 1-4 inches high, very leafy to the top, bearing one to several bright blue flowers: leaves cuneate to spatulate, narrowed below to broad petioles, coarsely and sharply serrate, or irregularly dentate, 1-18 lines long, those of the shoots withering and persistent for several years: calyx-tube short, obconic, the subulate or linear-lanceolate lobes 6-8 lines long, about equaling the open-campanulate corolla anthers linear: stigmas usually 3, strongly recurved: capsule almost globular. On cliffs, Mount Steele, Olympic Mountains, Washington. Distributed by Mr. Piper as *C. aurita*.

C. scabrella Engelm. Bot. Gaz vi, 237. Cinereous-puberulent or minutely scabrous to nearly glabrous: numerous stems from a multicapital caudex, 2-5 inches high, 1-4 flowered: leaves thickish; radical spatulate; upper cauline linear: lobes of the corolla ovate-lanceolate as long as its campanulate tube capsules oblong-turbinate, not narrowed at summit. Grassy slopes, Mount Adams Washington to the highest mountains of California

+ + Openings of the capsule near the base.

C. rotundifolia L Sp. 163. Stems slender, erect or diffuse, 6-30 inches long, one to several-flowered: lowest leaves orbicular or ovate to cordate, slender-petioled; cauline leaves all linear and sessile: flower-buds erect on the slender pedicels; flowers drooping or spreading; calyx-lobes subulate, spreading, longer than the short-turbinate tube; corolla blue, campanulate, 7-12 lines long: capsule obconic or ovoid nodding, opening by short clefts near the base. Common on rocky banks and creek-bottoms, Alaska to California and across the Continent Europe and Asia. A variable species, perhaps as here defined includes more than one species.

* * Root perennial: leaves sharply or laciniately serrate: inflorescence centrifugal and racemiform: style filiform and straight, exceeding the narrow-campanulate corolla: capsule hemispherical or short-turbinate, the openings near the middle or near the base.

C. Scouleri Hook. Fl. ii, t. 125. Glabrous or a little pubescent: stems slender, 6-13 inches long, often branched: leaves from ovate to lanceolate, 1-3 inches long, acute and acutely serrate, mostly tapering at base to a margined petiole: flowers more or less paniced, drooping, on long filiform pedicels, pale blue, the terminal one opening first: calyx with oblong tube

and setaceous-subulate lobes: corolla 6-8 lines long, its lanceolate acute lobes longer than the tube: capsule 3-4 lines long, strongly angled. Common in coniferous woods, Vancouver Island to California.

C. prenanthoides Durand Jour. Acad Philad. n. ser. ii, 93 Glabrous or roughish-puberulent: stem erect, 1-3 feet high: leaves numerous, 6-18 lines long, from ovate-oblong to lanceolate, the cauline mainly sessile: flowers racemose, scattered or clustered, generally numerous, bright blue, on short pedicels: corolla slender-cylindrical in bud, twice the length of the slender calyx-lobes, almost 5-parted, its lobes narrowly lanceolate, 2-4 times as long as the tube: capsule thin-walled and with broad and retuse base. Coniferous woods and open places, southern Oregon to California.

ORDER LIV, VACCINIACEÆ Lindl. Veg. Kingd. 757.

Shrubs or small trees, with alternate simple leaves, and small pink or white perfect flowers in clusters, or solitary. Calyx-tube adnate to the ovary, the limb 4-5-lobed or 4-5-cleft. Corolla gamopetalous, 4-5-lobed, or rarely divided into separate petals, deciduous. Stamens twice as many as the lobes of the corolla, epigynous, or inserted on the base of the corolla; filaments usually flattened, anthers dorsally attached, 2-celled, the connective entire or 2-awned. Ovary inferior, 2-10-celled, with placentae in the axis, with one to several anatropous ovules in each cell, crowned by the epigynous disk. Style filiform: stigma simple, or minutely 4-5-lobed. Fruit a berry or drupe in our genera. Seeds compressed. Embryo small, in fleshy albumen.

1 Vaccinium Corolla urceolate, subglobose, cylindric, or campanulate.

2 Oxycoccus Corolla deeply 4-cleft or 4-divided, the lobes reflexed.

1 VACCINIUM L. Sp. 349.

Branching shrubs or small trees with alternate often coriaceous leaves and small white pink or red flowers. Calyx-tube globose, hemispheric or turbinate, not angled, adnate to the ovary, the limb 4-5-toothed or lobed, persistent. Corolla urn-shaped, campanulate, cylindric, or subglobose, its limb 4-5-toothed or lobed. Stamens as many or twice as many as lobes of the corolla. Anthers awned or awnless, upwardly prolonged into tubes, opening by a terminal hole or slit of the tubular apex of each cell. Ovary 4-5-celled, or 8-10 celled by false partitions; ovules several or numerous in each cell.

§ 1 EUVACCINIUM Gray. Leaves deciduous. Flowers on drooping pedicels, solitary or 2-4 together, developing with or soon after the leaves. Corolla from ovate to globular, and more or less urn-shaped, 4-5-toothed. Filaments glabrous: anthers 2-awned on the back, included. Ovary and berry 4-5-celled, with no false partitions.

* Leaves quite entire and usually almost sessile: flowers 1-4 in a fascicle from a distinct scaly bud, more commonly 4-merous and 8-merous: limb of the calyx deeply 4-5-parted.

V. uliginosum L. Sp. 350. Glabrous or minutely puberulent: stem stiff, much branched, 6–24 inches high: leaves thickish, mostly pale or glaucescent, obovate oval or oblong-cuneate, obtuse or retuse, reticulate-veiny especially beneath, 5–12 lines long: corolla urn-shaped, globular or ovate, solitary or 2–4 together: berries dark blue with a bloom, 3–4 lines in diameter, sweet. Summits of the high mountains of Oregon to Alaska and across the Continent. Also in northern Europe and Asia.

Var. mucronatum Herder. Depressed-cespitose: leaves small, bright green both sides, conspicuously reticulated, usually roundish, abruptly mucronate or cuspidate. Along the coast, southern Oregon to Alaska.

V. occidentale Gray Bot. Cal. i, 451. Glabrous shrub, 1–3 feet high: leaves rather thin, glaucescent, obscurely veiny, from oval to obovate-oblong or oblanceolate, obtuse or acutish, 6–9 lines long: flowers mostly solitary: corolla oblong-ovate: berries small, 2–3 lines in diameter. In high-mountain marshes, Washington to California and Nevada.

* * Flowers solitary in the earliest axils, usually 5-merous and 10-androus: calyx less deeply or very slightly lobed.

+ Dwarf and cespitose: branchlets not angled.

V. cespitosum Michx. Fl. i, 234. Glabrous or nearly so 3–7 inches high: leaves from obovate to cuneate-oblong, obtuse or rarely acutish thickly serrulate, bright green both sides, reticulate-veiny; corolla ovate or ovoid-oblong: berries large, blue with a bloom, sweet. On the highest Mountains, Washington to Alaska and across the Continent.

Var. cuneifolium Nutt. Proc. Am. Phil. Soc. viii, 262. Stem 8–12 inches high, bushy: leaves spatulate-cuneate with rounded apex to spatulate-lanceolate and acute, the earliest not rarely entire. Mountains of Brit. Columbia to California, Colorado, Utah and Lake Superior.

V. arbuscula. *V. cespitosum* var. *arbuscula* Gray. Stem erect, 6–18 inches high, much branched: leaves obovate, 5–7 lines long, thickish, pale green: corolla oblong-ovoid: berries 2–3 lines in diameter, dark blue with a bloom, sweet. In open pine forests, Alaska to California.

+ + Low: branches sharply angled and green: leaves small.

V. Myrtilus L. Sp. i, 349. “A foot or less high, glabrous: leaves ovate or oval, thin, shining, serrate, conspicuously reticulated-veiny, and with a prominent narrow midrib (in ours half to two-thirds inch long): limb of calyx almost entire: corolla globular-ovate: berries black, nodding. Alaska to Idaho and the Rocky Mountains. Eu., Asia.”

V. microphyllum. *V. Myrtilus* var. *microphyllum* Hook. Stem erect, with numerous slender strict green branches and branchlets, 3–18 inches high: leaves ovate or oval, 2–4 lines long, bright green: corolla ovate, a line long: berries 1–2 lines in diameter, bright red, sweet. On the highest mountains, Washington to California and the Rocky Mountains.

+ + + Mostly tall with spreading branches.

V. membranaceum Dougl. Hook. Fl. ii, 32. *V. myrtilloides* Hook. not of Michx. Glabrous or glabrate, 1–5 feet high, with erect slightly angled branchlets: leaves ovate or oval to oblong, sharply serrulate, membranaceous, green both sides but not shining, loosely reticulate-veiny, 1–2 inches long, the larger and later ones mostly acute or acuminate: limb of the calyx entire: corolla depressed-globular or semi-globose-urceolate: pedicels erect in fruit: berries 3–4 lines in diameter, purplish-black, sweet. On the high mountains, Alaska to California, and east to Lake Superior.

Var. rigidum Hook. Branchlets slightly pubescent and more com-

pect: leaves rigid. In the mountains of Brit. Columbia and Washington

V. ovalifolium Smith in Rees's Cycl. No. 2. Glabrous and glaucescent, 4-12 feet high, straggling: branchlets more or less angled: leaves thin, oval to oblong, mostly obtuse or rounded at both ends, merely mucronulate, entire, or with a few irregular serratures, 1-2 inches long, pale and glaucescent: limb of the calyx minutely 10-toothed: corolla ovoid-urceolate-pedicels recurved in fruit: berries depressed-globose, 3-5 lines in diameter: blue with a bloom, acid but very good. Moist woods, Oregon to Alaska, Quebec and Michigan.

V. Alaskaensis. Stem erect, 2-12 feet high, with erect branches and spreading sharply angled branchlets: leaves thickish, 1-3 inches long when mature, mostly ovate or oblong, not rarely acute at both ends, mucronulate, on very short petioles, dark green above, paler beneath: limb of the calyx obscurely 10-toothed: corolla globular, 2 lines long: pedicels nodding in flower, erect in fruit: berries black, globular 4-6 lines in diameter, acid but fine for table use. In the Cascade Mountains of Oregon to Alaska.

V. parvifolium Smith l. c. 3. Stem 3-12 feet high, with straggling angled green branches and branchlets: leaves oblong or oval, obtuse or rounded at both ends, 3-8 lines long, entire, pale green, dull beneath, often sparse: limb of the calyx 5-lobed: corolla globular: pedicels nodding in fruit: berries bright red, acid, but fine for table use. Common in damp forests west of the Cascade Mountains, Oregon to Alaska.

§ 2 VITIS-IDÆA Koch. Leaves coriaceous and persistent. Flowers in short racemes or clusters from separate buds, bracteate and 2-bracteolate. Stamens with hairy filaments and awnless anthers.

V. Vitis-Idæa L. Fl. Dan. t. 40. Almost glabrous: branches tufted, 4-10 inches high from creeping stems: leaves crowded, obovate or oval, emarginate, shining above, pale and bristly dark-dotted beneath, 3-6 lines long, the margins revolute, entire or obscurely serrulate: flowers crowded in a short terminal secund and nodding bracteate raceme, 4-merous and 8-androus: bracts reddish, nearly persistent: limb of the calyx deeply 4-lobed: corolla white or rose-color, open-campanulate, rather deeply 4-lobed: berries dark red, acid and bitterish, edible when cooked. In marshes, northern Washington to Alaska and across the continent.

V. ovatum Pursh Fl i, 290. Stems erect or ascending, 2-8 feet high, with rather rigid branches; branchlets pubescent: leaves thick and firm, very numerous, from ovate to oblong-lanceolate, acute, minutely and acutely serrate, glabrous or nearly so, bright green both sides, 6-12 lines long: flowers in short and close axillary clusters: bracts and bractlets deciduous, usually red: corolla campanulate 2 lines long, rose-color or nearly white, barely thrice the length of the acute red calyx-lobes: berries black, acid. In moist woods near the coast, Brit. Columbia to California.

2 OXYCOCCUS Hill British Herbal, 324. (CRANBERRY.)

Low trailing or erect shrubs with alternate leaves, and axillary or terminal nodding flowers on long filiform pedicels. Calyx-tube adherent to the ovary, the limb 4-5-cleft, persistent. Corolla 4-5-parted, with long narrow reflexed segments. Stamens 8-10, the distinct filaments puberulent at base. Anthers connivent into a cone, awnless, upwardly prolonged into hollow tubes and opening by oblique pores at the top. Ovary 4-5-celled, destitute of false partitions. Fruit a many-seeded juicy berry.

O. palustris Pers. Syn. i, 419. *Vaccinium oxycoccus* L. Stems very slender, creeping, rooting at the nodes, 6-18 inches long; branches erect or ascending, 2-6 inches high, very leafy: leaves thick, evergreen, ovate, acute at the apex, rounded or cordate at base 2-5 lines long, green above, white beneath, the margins revolute, entire: flowers 1-5 in a fascicle from terminal thin-scaly buds, nodding on erect long filiform 2-bracteolate pedicels: corolla pink, about 4 lines broad, cleft nearly to the base; filaments fully half as long as the anthers: berries globose, 3-5 lines in diameter, often spotted when young. In cold bogs, Oregon to and around the sub-Arctic Zone.

Var. intermedium. *Vaccinium Oxycoccus* var. *intermedium* Gray. Leaves from ovate to oblong, mostly obtuse, 3-6 lines long: flowers strictly umbellate from the scaly bud, but this not rarely proliferous into a leafy shoot: berries 3-5 lines in diameter. Cold bogs in the Cascade Mountains, Oregon to Brit. Columbia.

ORDER LV. ERICACEÆ DC. Fl. Franc. iii, 675.

Shrubs trees or herbs with simple leaves without stipules, and mostly perfect flowers. Calyx inferior, free from the ovary, 4-5-parted or 4-5-cleft, mostly persistent. Corolla regular, or rarely somewhat irregular, usually 4-5-toothed or 4-5-lobed. Stamens hypogynous, usually as many or twice as many as lobes or divisions of the corolla: filaments mostly separate and free or nearly free from the corolla: anthers 2-celled, the cells often prolonged upwardly into tubes, opening by terminal pores or chinks, or longitudinally, often awned: the pollen composed of 4 united grains. Ovary 2-5-celled with placentae in the axis, the ovules usually numerous, sometimes solitary, anatropous: style single: stigma peltate or capitate. Fruit a capsule berry or drupe. Embryo small or minute, in fleshy albumen.

TRIBE I, ARBUTEÆ Fruit a berry or berry-like drupe. Corolla 4-5-toothed, deciduous.

- 1 **Arbutus** Ovary 5-celled, many-ovuled: fruit a many-seeded berry.
- 2 **Arctostaphylos** Ovary 5-10-celled, with a single ovule in each cell: fruit a 5-10-seeded drupe, or by abortion 3-9-seeded.

TRIBE II, ANDROMEDEÆ Fruit a loculicidal, chiefly 5-celled and many-seeded capsule. Corolla usually 5-toothed, deciduous.

* Calyx becoming fleshy and berry-like in fruit, enclosing the small capsule.

- 3 **Gaultheria** Corolla campanulate and 5-lobed, or urceolate, 5-toothed.
* * Calyx remaining dry under the naked capsule.

- 4 **Andromeda** Low shrubs with moderately broad leaves: calyx valvate or open in bud: corolla from globular-urceolate to cylindraceous: capsule 5-celled.

- 5 **Cassiope** Small fruticlose plants with small thick or acerose mostly imbricated leaves: calyx of ovate imbricated sepals: corolla open-campanulate, 4-5-lobed or parted: capsule 4-5-valved, the valves 2-lobed.

TRIBE III, RHODOREÆ. Fruit a septicidal capsule, the valves in dehiscence separating from the persistent placentiferous col-

umella. Corolla deciduous, its lobes or petals imbricated in bud.

* Anthers opening by a pore or chink at the apex of each cell.

+ Corolla gamopetalous: scaly leaf-buds none: flowers from the axils of mostly coriaceous-persistent bracts: capsule globular, 4-5-valved from above.

- 6 Phyllodoce** Leaves narrow and imbricated: corolla ovoid.
- 7 Bryanthus** Leaves narrow, alternate but crowded: corolla open-campanulate, 5-lobed or parted.
- 8 Kalmia** Leaves comparatively broad and ample, persistent: corolla saucer-shaped, 5-lobed and 10-saccate below the limb.
- + + Flower-buds scaly-strobilaceous, the thin or scarious scales caducous or deciduous: corolla gamopetalous: capsule 4-5-valved from apex to base.
- 9 Menziesia** Shrubs with deciduous leaves: corolla from globular-urceolate to cylindraceous, 4-toothed or lobed: stamens not exerted.
- 10 Azaleastrum** Shrubs with deciduous leaves: corolla subcampanulate, regular, 5-lobed: stamens not exerted.
- 11 Azalea** Shrubs with deciduous leaves: corolla funnellform, slightly irregular: stamens exerted.
- 12 Rhododendron** Shrubs with evergreen leaves: corolla campanulate, slightly irregular.
- + + + Corolla polypetalous or very nearly so.
- 13 Ledum** Shrubs with evergreen leaves: flowers umbellate from separate scaly buds: capsule 5-valved from the base.
- * * Anthers opening from the apex nearly or quite to the base of the cell: corolla of distinct petals or deeply 5-cleft: capsule 2-5-valved from above.
- 14 Cladothamnus** Erect shrubs with deciduous leaves: flowers from leafy shoots of the season, solitary: capsule 5-6-celled.

Tribe 1 Arbutæ DC. vii 581. Trees or shrubs with scaly buds and alternate evergreen leaves. Corolla urn-shaped or globular, 5-toothed or rarely 4-toothed, deciduous. Stamens twice as many as lobes of the corolla, included. Fruit fleshy, either a berry or drupe.

1 ARBUTUS L. Gen. n. 552. (MADRONO).

Low trees or shrubs with thick evergreen leaves and small pink or white flowers in panicles that terminate the branchlets. Calyx small, 5-lobed, persistent. Corolla ovate, globular, or urn-shaped, 5-toothed, the teeth recurved. Stamens 10, included: anthers flattened, furnished with a pair of reflexed awns on the back below the summit; the cells opening by terminal pores. Ovary raised on a hypogynous disk, 5-celled: ovules numerous on a fleshy placenta projecting from the inner angle of each cell. Style rather long: stigma obtuse. Berries with a rough or granular surface, maturing several seeds in each cell.

A. Menziesii Pursh. Hook. Fl. ii, 36. A tree 20-100 feet high, and

a trunk 6-30 inches in diameter: bark close and smooth by exfoliation, on large trees becoming rough near the base, turning brownish-red: leaves oval or oblong, entire or serrulate, green with more or less red veins above, pale and finely reticulated beneath, 3-5 inches long by 1-3 inches broad, firm-coriaceous: branches of the panicle minutely pubescent: calyx-lobes broadly ovate, about a line long: corolla globular, 3-5 lines long: berries somewhat drupaceous, reddish-orange, 3-5 lines in diameter. On dry hill-sides, Vancouver Island to southern California: west of the Cascade Mts.

2 ARCTOSTAPHYLOS Adans. Fam. Pl. ii, 165. (MANZANITA.)

Shrubs or small trees with alternate broad coriaceous evergreen leaves which are usually vertical by a twist of the petiole, and small white to light red flowers in terminal, usually pendulous, racemes or panicles. Pedicels bracteate and bracteolate. Calyx deeply 5-parted. Corolla urn-shaped, with 4 or 5 recurved lobes. Stamens 8 or 10; filaments dilated and hairy at base; anthers with 2 reflexed awns on the back, the cells opening by a hole at the top. Ovary 4-10-celled, with a single pendulous ovule in each cell, in fruit becoming a 4-10-celled, and by abortion, 1-7-seeded stone or patumen, or the cells distinct or more or less coalescent at the ventral edge. Seeds with a slender erect radical and small cotyledons in fleshy albumen.

* Depressed and trailing or creeping, green, glabrous or minutely pubescent, no bristly hairs: flowers rather few in simple small clusters: ovary and fruit glabrous: nutlets 1-nerved on the back.

A. Uva-ursi Spreng. Syst. ii, 287. (KINNIKINIC.) Diffusely much branched and rooting at the nodes, forming depressed patches several feet in diameter from a single main root: leaves oblong-spatulate, obtuse or retuse, an inch or less long, tapering into a short petiole, bracts ovate, acute, somewhat foliaceous: flowers few, in short racemes, white; corolla ovoid, constricted at the throat, about 2 lines long: drupe globose, red, glabrous, 3-5 lines in diameter, containing 5 coalescent nutlets. In open woods, California to the Arctic Circle and across the Continent.

A. intermedia Greene Pitt. ii, 171. Diffusely branching, the main divisions of the stem procumbent, a foot or two long; leafy branches ascending or erect, less than a foot high: leaves obovate-cuneiform, about an inch long, obtuse, puberulent beneath: racemes terminal, subsessile, few-flowered: fruit globose, slightly depressed, 3-4 lines in diameter; nutlets 5-7, firmly consolidated. On dry gravelly ground, Mason Co. Washington.

A. Nevadensis Gray Syn. Fl. ii, 27. Stems loosely branching from the base, the branches decumbent, 1-2 feet long: leaves ovate or oval to lanceolate-spatulate, cuspidate-mucronate, abruptly petioled, 6-12 lines long: racemes few-flowered: corolla white, oblong, 2-4 lines long: drupes dull red, 3-4 lines in diameter: nutlets mostly separate. On the high mountains, Washington to California.

** Erect low shrubs: leaves at most an inch long: flowers on short, mostly clustered, racemes or spikes, only a line or two long.

A. hispidula. Stems 4-6 feet high, with very dark colored bark, rather strictly branched; branchlets glandular-hispidulous, very leafy: leaves oblong or oblong-ovate or some oblong-lanceolate, with indistinct cartilaginous margins acute at both ends, cuspidate, green and glabrous, with round pubescent petioles: bracts glabrous, triangular with a very broad base, acuminate, not foliaceous: pedicels glabrous, longer than the

bracts: corolla rose-color, 2-3 lines long: filaments sparingly hairy: ovary glabrous: fruit not seen. On bottom lands along Smith river at Gasque Del Norte Co. California: no doubt in adjacent Oregon.

A. intricata. Stem erect, 3-6 feet high with very dark-colored bark, irregularly and intricately branched, the branchlets tomentose and glandular: leaves oblong to ovate, acute and cuspidate, usually abruptly contracted below to a short glandular-hispid petiole, bright green, minutely tomentose, the margins ciliate: bracts acuminate-ovate with a broad base, hispid-ciliate, somewhat foliaceous: pedicels very short, glandular: corolla bright rose-color, about 3 lines long: filaments loosely hairy: ovary densely tomentose: fruit not seen. On stony hillsides near Smith river west of Gasque, Del Norte Co. California; no doubt in adjacent Oregon.

A. cinerea. Erect, 3-6 feet high, densely branched from the base, with rather light-colored bark and cinereous branchlets: leaves oblong or obovate, obtuse or acutish to acute, cuspidate, whitish-green, tapering below to a stout flat cinereous petiole, smooth: bracts not foliaceous, acuminate-lanceolate with a broad base, minutely cinereous; pedicels longer than the bracts, minutely tomentose: corolla dark rose-color to nearly white: filaments densely hairy: ovary hairy at the top: fruit globose, flattened at each end: some of the nutlets coalescent. Rocky hillsides along the eastern base of the Coast Mountains near Waldo, Oregon.

* * * Erect shrubs or low trees: leaves 1-3 inches long: flowers 3-4 lines long, on short clustered racemes: drupes obcompressed-globose: some of the nutlets coalescent.

A. oblongifolia. Densely branching from the base, with reddish-brown bark and cinereous branchlets, 4-6 feet high: leaves oblong or the lowest obovate, obtuse, cuspidate, usually abruptly contracted below to a rather long round petiole, whitish-green, smooth: bracts somewhat foliaceous, acuminate-lanceolate with a broad base, minutely pubescent: pedicels longer than the bracts, minutely pubescent and sparingly glandular: corolla white tinged with red: filaments very sparingly if at all hairy: ovary pubescent at the top. Rocky hillsides, eastern base of the Coast Mountains near Waldo, Oregon.

A. parvifolia. Stems branching from the base, with light reddish bark and minutely white-tomentose branchlets: leaves small, oblong or cuneate-oblong, obtuse or acutish, minutely cuspidate, whitish-green, on flattish petioles: bracts triangular, short-acuminate, minutely pubescent: pedicels not longer than the lower bracts, minutely pubescent: filaments sparingly hairy: ovary glabrous. On the high hills near Andersons, Josephine Co. Oregon.

A. pulchella. Arborescent, 6-12 feet high, branching from the base, with dark-colored bark and minutely pubescent branchlets: leaves obovate to oblong, obtuse, obscurely mucronate, smooth, cinereous-green: bracts acuminate-ovate with a very broad base, minutely pubescent: pedicels much longer than the bracts, sparingly glandular: filaments slightly hairy: ovary glabrous. On the mountains of Josephine Co. Oregon.

A. viscida Parry Proc. Cal. Acad. ii, 496. Arborescent, intricately branched from the base, with dark-colored bark and glabrous branchlets: leaves orbicular to ovate or oblong, acutish to rounded at the apex, with or without a small cusp, ashy-green and glabrous: bracts broadly triangular, shortly acuminate: pedicels much longer than the bracts, densely viscid-glandular: filaments densely hairy: ovary glabrous. Common in Josephine and Jackson Counties Oregon and adjacent California.

A. Manzanita Parry l. c. ?. Arborescent, 6-10 feet high, with reddish brown bark and the young branchlets black-glandular: leaves ovate to

obovate, obtuse or acutish, usually abruptly contracted below to a slender petiole, not at all cuspidate, glabrous, dark green both sides: bracts acuminate-lanceolate, green and glandular: pedicels shorter than the bracts, glabrous: filaments tomentose: ovary glabrous. Top of the Siskiyou Mountains and southward.

A. bracteata. Strictly branched from the base, 4-6 feet high, with tomentose branchlets: leaves oblong, obtuse, obscurely cuspidate, minutely tomentose, contracted below to a flattish petiole: bracts foliaceous, lanceolate: pedicels pubescent, shorter than the bracts: filaments and ovary densely hairy. Near Waldo, Josephine Co. Oregon.

A. strigosa. Erect and loosely branching, 8-10 feet high, with densely white-tomentose branchlets: leaves oblong or ovate, obscurely cuspidate, usually rounded at the apex, minutely white-tomentose, light green, abruptly contracted below to a round petiole: bracts foliaceous, lanceolate, strigose pubescent: pedicels shorter than the bracts, pubescent: filaments sparingly hairy: ovary densely pubescent. In the mountains of Josephine Co. Oregon.

A. tomentosa Dougl. Lindl. Bot. Reg. t. 1791. Erect, 2-10 feet high with tomentose and setose-hispid branchlets: leaves oblong-ovate or oblong, acute and cuspidate, densely tomentose, contracted below to a short setose-hispid and tomentose petiole: bracts foliaceous, narrowly lanceolate, tomentose and ciliate: pedicels shorter than the bracts, tomentose: filaments sparingly hairy: ovary densely tomentose. Rocky and sandy places, Brit. Columbia to Oregon and perhaps farther south.

Tribe ii, Andromedæ DC. Prodr. vii, 588. Shrubs with chiefly alternate evergreen leaves. Corolla gamopetalous, deciduous. Stamens twice as many as lobes of the corolla, more or less included. Anthers opening at the top. Fruit a loculicidal chiefly 5-celled and many-seeded capsule, the valves usually bearing the partitions, which separate from the persistent placentiferous axis or columella.

3 GAULTHERIA L. Gen. n. 551.

Shrubs or undershrubs with broad evergreen leaves, and small nodding flowers either solitary in the axils, or in axillary racemes. Calyx 5-cleft or lobed, persistent. Corolla urn-shaped to campanulate. Stamens 10: filaments dilated toward the base: anther-cells usually 2-pointed or 2-awned, and opening by a pore at the top. Capsule 5-celled, depressed and umbilicate, many-seeded, enclosed at maturity in the calyx, which enlarges and becomes fleshy and berry like after the corolla falls.

* Corolla short-campanulate, 5-lobed: filaments glabrous: apex of the anthers obscurely 4-pointed.

G. Myrsinites Hook. Fl. ii, 35, t. 129. Cespitose-procumbent or depressed, glabrous, the flowering branches 1-5 inches long: leaves oval or rounded, mostly only half-inch long: pedicels solitary in the axiles, very short, 3-5-bracteolate: corolla depressed-campanulate, little surpassing the calyx: fruit scarlet, 2-3 lines in diameter. In forests on the high mountains, Washington to California and the Rocky Mountains.

G. ovatifolia Gray Proc. Am. Acad. xix, 84. Depressed-trailing with ascending branches, with some at length rusty hairs, at least on the calyx: leaves broadly ovate, or even subcordate, the largest an inch and a half long, serrulate, dark green and shining; corolla campanulate, twice the

length of the calyx-lobes: pedicels solitary in the axils, usually 4-bracteolate: fruit scarlet. Cascade Mountains, Oregon to Brit. Columbia.

* * Corolla ovate or urceolate, 5-toothed: filaments hairy: anthers 4-awned at the summit.

G. Shallon Pursh Fl. i, 284, t. 12. (SALAL) Shrubby, 1-6 feet high, with rather stout spreading stems: branches, pedicels and even the corollas glandular-hairy or pubescent: leaves ovate to cordate, often acuminate, strongly serrulate, 1-4 inches long: flowers in open bracteate many-flowered secund racemes, from axillary and terminal chartaceous-scaly buds: pedicels 2-bracteolate below the middle: corolla urn-shaped, 3-5 lines long, 5-toothed, viscid: fruit black, 3-6 lines in diameter, edible. Very common in forests, Alaska to California.

4 ANDROMEDA L. Sp. 393.

Low shrubs with coriaceous, linear or oblong evergreen leaves, and small white to flesh-colored flowers in terminal umbels. Calyx deeply 5-parted, persistent but not becoming fleshy in fruit. Corolla globose-urceolate, 5-toothed, the teeth recurved. Stamens 10, included; filaments hairy; anthers attached to the filaments at about the middle, ovate, obtuse, the cells opening by large terminal pores, each with a recurved awn. Ovary 5-celled. Capsule subglobose, 5-angled, the top intruded, loculicidally 5-valved, many-seeded. Placenta borne near the top of the columella, the seeds spreading in all directions.

A. polifolia L. l. c. Stem 6-18 inches high, simple or branched: leaves firm-coriaceous, glabrous and glaucous, linear to lanceolate-oblong, with strongly revolute margins, white beneath: flowers in a small terminal umbel: pedicels from the axils of ovate persistent scaly bracts, naked: calyx small, deeply 5-parted, early open; corolla globose-urceolate, 3-4 lines long: anthers short, each cell surmounted by a slender ascending awn: seeds smooth and shining. Wet bogs, northern Washington to Alaska and across the Continent.

5 CASSIOPE D. Don Edinb. New Phil. Journ. xvii, 157.

Fruticulose evergreens with small or minute imbricated or crowded, entire and veinless, often opposite or whorled leaves and solitary flowers nodding on the summits of erect naked pedicels. Calyx ebracteolate, of 4 or 5 imbricated sepals that are thickened at base. Corolla open-campanulate, 4- or 5-lobed or parted. Anthers short, attached nearly by their summits, the cells each opening by a large terminal pore, and tipped by a slender recurved awn. Style thickened at base, or conical. Placentæ many-ovuled, pendulous from the summit of the short columella. Capsule globose or ovoid, dry, loculicidally 4- or 5-valved, the valves 2-cleft. Seeds minute, with a thin close coat.

C. Stelleriana DC. Prodr. vii, 610. Diffusely spreading: leaves oblong-linear, obtuse, widely spreading, flattish, obscurely serrulate, 2-3 lines long: peduncle terminal, very short: corolla 4- or 5-parted: style conical. Washington to Alaska.

C. lycopodioides Don l. c. Stems filiform, very low and creeping: leaves barely a line long, roundish on the back, not ciliate, closely imbricated.

cated in 4 ranks: pedicels filiform: corolla 5-lobed: style slender, slightly thickened downward. In the Blue Mountains of Oregon to the Aleutian Islands and Siberia.

C. Mertensiana Don l. c. Rather stout, with rigid ascending stems and fastigate branches, a foot or less high: leaves 1-2 lines long, glabrous, carinate and not furrowed on the back, imbricated in four ranks: pedicels rather short: corolla 5-lobed: style slender, slightly thickened downward. On the highest mountains, California to Alaska and the Rocky Mountains.

C. tetragona Don l. c. Stems erect or ascending 4-12 inches high, with fastigate branches: leaves 1-2 lines long, thick and with a deep furrow on the back, imbricated in four ranks, often pubescent when young: flowers sometimes four-merous: peduncles 5-12 lines long: style slender, slightly thickened below. Higher parts of the Cascade Mountains in Oregon to the Arctic regions and across the Continent.

Tribe 3, Rhodoreæ Don. Corolla deciduous, its lobes or petals imbricated in the bud. Anthers without awns or appendages. Stigma not rarely surrounded by a ring or border. Fruit a septical capsule: the valves (in ours) in dehiscence separating from the persistent placentiferous columella.

* *Anthers opening by a pore or chink at the apex of each cell.*

+ *Flowers from the axils of coriaceous-foliaceous persistent bracts, or rarely from those of ordinary leaves. Corolla gamopetalous. Filaments and style filiform. Capsule globular, 4- or 5-valved from above.*

6 PHYLLODOCE Salisb. Parad. Lond. t. 36.

Low branching more or less glandular shrubs with small linear evergreen leaves and white to purple or blue flowers in terminal umbels. Pedicels bracted at the base. Calyx 5-parted, persistent. Corolla ovoid, contracted at the throat, 5-toothed, Stamens 10, included: filaments filiform; anthers attached by their backs, oblong, obtuse, the cells opening by terminal oblique chinks. Ovary 5-celled; ovules numerous; style filiform, included; stigma obscurely 5-lobed or capitate. Capsule subglobose or globose-oblong, 5-valved to about the middle. Seeds minute, the testa coriaceous.

P. glanduliflora. *Bryanthus glanduliflorus Gray.* Stems rather rigid, fastigiate branched, 3-12 inches high: leaves numerous and crowded but somewhat spreading, linear-oblong, obtuse, 3-6 lines long, thick, with a white line through the centre below and a deep furrow above, narrowed at base to a short petiole, the margins thick and scabrous: pedicels 6-12 lines long, glandular-hirsute: sepals lanceolate, acutish to acuminate 2 lines long, glandular-hirsute: corolla yellowish, ovoid, 3-4 lines long, the short lobes glabrous. On rocky banks and cliffs near perpetual snow, Oregon to Alaska and the Rocky Mountains.

7 BRYANTHUS Gmel. Fl. Siber. iv, 132.

Small evergreen shrubs with much crowded, linear alternate leaves and showy rose-color to purple flowers umbellate or racemose-crowded at the ends of the branches, Calyx 4-6-toothed or

parted, persistent. Corolla campanulate, 4-6-lobed, the lobes short, recurved, simply imbricated in bud. Stamens 8-12: filaments filiform: anthers oblong, opening by oblique chinks at the top. Capsule subglobose, 4-6-celled. Seeds small, with a firm coat.

B. empetriformis Gray Proc. Am. Acad. vii, 377. Densely much branched from the base, 1-2 feet high, often forming clumps 1-3 feet in diameter: leaves 3-7 lines long, with strongly revolute thickened and rough margins: pedicels several, somewhat umbellate, subtended by foliaceous and rigid bracts: corolla rose-color, 2-4 lines long, campanulate, barely 5-lobed, the lobes much shorter than the tube: stamens included. On the highest mountains, northern California to Vancouver Island and the Rocky Mountains.

8 KALMIA L. Gen. n. 545.

Shrubs with entire evergreen coriaceous leaves and umbellate clustered or rarely scattered showy flowers. Calyx 5-parted or of 5 sepals, imbricated in the bud. Corolla saucer-shaped, with a short narrow tube, 5-lobed and 10-saccate below the limb, which is strongly 10-carinate in the bud from the pouches upward, the salient keels running to the summit of the lobes and sinuses, the limb imbricated in the bud. Stamens 10; the short anthers free and on erect filaments in the early bud, in the full grown bud received in the pouches of the corolla and the filaments bent over as the corolla enlarges and still more when it expands, straightening elastically and incurving when disengaged, thereby throwing out the pollen. Anther-cells opening by a large pore; sometimes extending into a chink. Stigma depressed. Capsule globular, 5-celled, tardily septicidal. Placentæ pendulous or porrect from the upper part of the small columella. Seeds with a thin and mostly close coat.

K. glauca Ait. Hort. Kew. ii, 64, t. 8. Shrub 6-18 inches high: glabrous throughout and mostly glaucous: leaves all opposite, or rarely in threes, almost sessile, ovate to linear-oblong, or appearing narrower by the usually strong revolution of the margins, dark green above, glaucous white beneath, 6-20 lines long: flowers in terminal fascicles, lilac-purple, 6-8 lines in diameter; bracts large; sepals ovate, scarious-margined, much imbricated, persistent. In marshes near the coast, Oregon to Alaska and across the Continent.

Var. microphylla Hook. Fl. ii, 41. Stems 6-12 inches high: leaves oval barely half-inch long: flowers only 2-6 in the clusters, smaller. High mountain marshes, California to Brit. Columbia.

→ → *Buds scaly-strobilaceous; the thin or scarious scales caducous or deciduous. Calyx often much reduced or obsolete. Corolla gamopetalous. Capsule 4- or 5-valved from apex to base. Seeds mostly scobiform, having the loose coat produced or appendaged at both ends.*

9 MENZIESIA Smith Incon. Ined. iii. t. 36,

Shrubs with alternate deciduous leaves and small, mostly dull-

colored flowers on nodding pedicels, developed at the same time as the leaves from separate strobilaceous buds that terminate the branches of the preceding year. Calyx bristly-hirsute, usually 4-lobed. Corolla from globular-urceolate to cylindraceous, 4-toothed or lobed. Stamens not exerted, usually 8: filaments subulate: anthers mostly linear-sagittate, the cells opening by an oblique pore or short chink. Style not exerted: stigma truncate. Capsule short. Placentæ attached to the whole length of the short columella.

M. ferruginea Smith l. c. Erect straggling shrub 6-8 feet high with strigose chaffy ferruginous scales on the young parts: leaves oblong or lanceolate-obovate, acute or acutish at both ends, prominently glandular, mucronate, ciliate with glandular bristles, rusty strigose-hirsute above, merely pale beneath: pedicels bristly-glandular: corolla oblong-ovate, becoming cylindraceous: filaments glabrous: capsule ovate: seeds merely apiculate, or very short tail ed. In the high mountains and along the coast; Oregon to Alaka.

M. glabella Gray Syn. Fl. ii, 39. Erect shrub 6-8 feet high, without strigose chaffy scales, or very few on the young petioles and midrib beneath: leaves obovate, mostly obtuse, barely mucronate-tipped, glaucescent and glabrous or nearly so beneath, sprinkled with some small appressed hairs above, an inch long, the obscurely serrulate margins minutely ciliate: pedicels naked or somewhat glandular: corolla ovoid-campanulate: filaments more or less ciliate below: capsule oblong or ovoid, erect, smooth and naked or nearly so: seeds with appendages at each end as long as the nucleus. In damp forests, Oregon to Brit. Columbia and east to Lake Superior.

10 AZALEASTRUM

RHODODENDRON & *AZALEASTRUM* Maxim.

Shrubs with thin deciduous leaves, and rather large white or light-colored flowers. Inflorescence lateral, the flowers from separate 1-3-flowered lateral buds below the leaves. Bud-scales caducous. Calyx 5-parted, the divisions more or less foliaceous, persistent. Corolla almost rotate, regular. 5-lobed. Stamens 10, not declined: filaments filiform: anthers erect, opening by a hole at the apex of each cell. Style filiform: stigma capitate. Capsule 5-valved from the summit. Seeds numerous and small, with a loose chaff-like coat.

A. albiflorum. *Rhododendron albiflorum* Hook. Stems erect, 2-6 feet high with slender branches, pubescent with slender straight or silky and some short glandular hairs when young, nearly glabrous in age: leaves membranaceous, oblong or narrower, obscurely undulate, 1-2 inches long, pale green: flowers 1-3 in the fascicles, nodding on short pedicels; sepals oblong, obtuse, 3-4 lines long, somewhat foliaceous: corolla open-campanulate, 8-10 lines long, 5-lobed, bright white: filaments bearded at base: stigma peltate, 5-lobed: capsule ovoid, 3-4 lines long. On the highest mountains of northern Oregon to Brit. Columbia and the Rocky Mountains.

11 AZALEA L. Gen. n. 212.

Erect branching shrubs with alternate thin deciduous leaves, and large flowers in terminal umbels developed from scaly buds that terminate the growth of the previous year and surrounded at

the base by lateral and smaller leaf-buds. Bud-scales and bracts caducous or early deciduous. Calyx small or minute, 5-parted. Corolla funnelform, glandular-viscid outside, with narrow tube and 5-lobed, often more or less 2-lipped limb. Stamens 5, rarely 10, exserted, usually declined: anthers attached to the filaments by their backs, the cells opening by terminal pores. Style slender, declined exserted. Ovary 5-celled, many-ovuled. Capsule oblong or narrower, 5-valved from the summit. Seeds minute, with a loose chaff-like coat.

A. occidentalis T. & G. Pacif. R. Rep. iv. 116. *Rhododendron occidentale* Gray. Stems erect, 2-10 feet high, much branched: leaves obovate-oblong, nearly or quite glabrous at maturity but minutely ciliate, bright green and shining above, paler beneath, 1-2 inches long, tapering below to a short petiole, tipped with a short red gland: calyx 5-lobed, the oblong or ovate lobes glandular and ciliate, about a line long, corolla cream-white with orange stripes, 2 inches long, with conspicuous funnelform tube, slightly irregular limb and acute lobes, glandular-viscid outside: stamens 5, exserted and declined: filaments hairy below; style long-exserted, curved upward; capsule oblong, 8-12 lines long. About springs and along streams, south-western Oregon and California.

12 RHODODENDRON L. Gen. n. 548.

Shrubs or small trees with alternate evergreen coriaceous leaves and mostly large showy white to rose-colored or purple flowers in terminal umbels or corymbs from scaly buds, the thin scales deciduous when the flowers open. Calyx small or minute, 5-lobed or 5-parted, persistent. Corolla campanulate, 5-lobed, nearly regular. Stamens usually 10, little exserted declined or equally spreading: anthers erect, attached by their backs, the cells opening by terminal pores. Capsule short or elongated, mostly woody, 5-20-valved from the summit. Seeds very numerous and small, with a loose chaff-like coat.

R. Californicum Hook. Bot. Mag. t. 4863. Stems 3-12 feet high, with stout erect branches, glabrous: leaves broadly oblong, 3-6 inches long, dark green and shining above: flowers very numerous in the fascicles: calyx minute, slightly 5-lobed: corollas large and showy, rose-color, a little irregular, broadly campanulate more than an inch in diameter, the 5 broad lobes undulate: stamens 10, not exserted, ovary rusty-hirsute: capsule 10-18 lines long. On mountains and along the coast, California to Brit. Columbia.

R. macrophyllum Don Syst. iii, 843. "Shrub 10 to 15 feet high: leaves oblong, acute at both ends, 5 to 8 inches in length, thinnish: corolla white, less than an inch long: its lobes oblong: ovary bristly hirsute. Woods, Puget Sound Washington to Brit. Columbia."

+ + + *Corolla polypetalous or very nearly so. Filaments filiform. Placentæ borne on the summit of the persistent columella. Seed scobiform or linear.*

13 LEDUM L. Gen. n. 546.

Low shrubs with alternate persistent, more or less resinous-dotted slightly fragrant leaves, and fascicles of white flowers de-

veloped from separate mostly terminal buds with well imbricated caducous scales and bracts. Calyx 5-lobed or 5-parted, persistent. Petals 5, widely spreading. Stamens 4-10: filaments filiform: cells of the anthers opening by terminal pores. Style filiform, persistent. Pedicels recurved in fruit. Capsule oval or oblong, septicidally 5-valved from the base upward: placentæ pendulous. Seeds slender, with a loose coat.

* Leaves densely tomentose beneath, the wool soon ferruginous and the margins strongly revolute: inflorescence all terminal.

L. Grœnlandicum Eder Fl. Dan. t. 567. *L. latifolium* Ait. Stems erect or ascending, 1-4 feet high, the branchlets rusty-tomentose: leaves oblong, obtuse, 1-2 inches long, green and slightly rugose above: flowers 4-5 lines broad, umbellate or short-corymbose, numerous: pedicels brown-canescenscent, 10-12 lines long, recurved in fruit: stamens 5-7: capsule oblong, canescenscent, 3-4 lines long. In cold marshes, northwest Washington to Alaska and across the Continent.

* * Leaves glabrous both sides: inflorescence terminal or sometimes lateral.

L. glandulosum Nutt. Trans. Am. Phil. Soc. viii. 270. Stout, 2-6 feet high: leaves oblong or oval, 1-2 inches long, green above, white and resinous atomiferous beneath: inflorescence often compound and crowded: flowers numerous, white, 3-4 lines in diameter: calyx 5-parted: capsule oval, retuse. In wet places, California to Brit. Columbia and the Rocky Mountains.

* * *Leaves entire. No thin-scaly strobilaceous buds. Corolla of distinct petals or 5-cleft. Anthers opening longitudinally from the apex nearly or quite to the base of the cells, or by terminal pores. Capsule 2-5-valved from above.*

14 CLADOTHAMNUS Bong. Veg. Sitk. 37, t. 1.

Erect branching shrubs with alternate deciduous leaves and solitary terminal or axillary reddish flowers from leafy shoots of the season. Sepals 5, somewhat foliaceous, as long as the five spreading petals, persistent. Stamens 10: filaments dilated below: anthers oblong, opening longitudinally from the apex nearly or quite to the base of the cells. Style long, declined and incurved, thickened at the apex, and annulate around the discoid stigma. Capsule depressed-globose, 5-6-celled; septicidally 5-valved from above, many-seeded. Seeds oval, with a loose cellular coat.

C. campanulatus Greene Eryth. iii, 65. "Shrub 4 to 5 feet high, with few and stoutish ascending branches: leaves lanceolate, 1 to 3 inches long, tapering to a short petiole which, together with the veins beneath, is more or less strigose-hirsute with red hairs: flowers solitary or in pairs or in threes, from lateral buds, on pedicels $\frac{1}{2}$ inch long, these setose-hispid with red hairs: sepals ovate-oblong, densely ciliate with short gland-tipped hairs: corolla light salmon-color, campanulate, the petals joined together at base into a short tube; anthers opening only by a pair of large round terminal pores. High mountains of Washington and British Columbia; hitherto confused with the typical species, which belongs to Alaska."

ORDER LV A. PYROLACEÆ Agardh Cl. Pl. 18.

Low mostly evergreen perennials with petioled leaves, and

white pink or red. perfect and nearly regular flowers solitary or in racemes or corymbs. Calyx 4- or 5-lobed. Corolla very deeply 4- or 5-parted, or of 5 petals. Stamens twice as many as the divisions of the corolla. Anthers introrse in the bud, inverted when mature, opening by pores or short slits. Pollen of 4 united grains. Ovary superior, 4- or 5-celled. Style short or slender, often declined. Ovules very numerous, anatropous. Fruit a loculicidally dehiscent capsule. Seeds minute, with a loose cellular coat much larger than the nucleus.

- 1 **Pyrola** Flowers several or numerous, racemose on a scape-like peduncle: style long and usually declined.
- 2 **Moneses** Flower solitary, on a scape: style long and straight.
- 3 **Chimaphila** Flowers few to numerous, in a corymb or umbel on a leafy stem.

1 PYROLA L. Gen. n. 554.

Acaulescent or subcaulescent perennials with all radical evergreen leaves and rather small white, greenish, or red flowers in racemes on simple scaly-bracted scapes. Calyx 5-parted, persistent. Petals 5, concave, or incurved and more or less converging, sessile and deciduous. Stamens 10, declined, or straight and connivent: filaments subulate, glabrous: anthers erect in the bud, emarginate or 2-beaked at the base, mostly reversed at maturity, each cell opening by a basal but apparently apical pore. Style straight or declined: stigma annulate, 5-lobed or 5-toothed. Capsule subglobose, the apex and base intruded, 5-lobed, 5-celled, loculicidally 5-valved from the base, the valves woolly on the margins when opening.

P. minor L. Sp. 396. Scapes 6-10 inches high, 7-16 flowered: leaves orbicular to oval, rather thin, obscurely serrulate or crenulate, 9-18 lines long, rounded or slightly narrowed or subcordate at base: pedicels recurved, rather crowded: flowers white or pinkish, 3-4 lines broad: calyx-lobes mostly triangular-ovate and acute: petals orbicular, naked at the base, globose-connivent: stamens equally connivent around the pistil: anthers not narrowed below the openings: style straight, much shorter than the ovary, included: stigma large, peltate, obscurely 5-lobed. In the Cascade mountains of Oregon to Alaska and across the Continent.

P. secunda L. Sp. 396: Somewhat caulescent from a branching base: scape-like peduncles slender, 4-10 inches high: leaves ovate to oval, mostly thin, acute, or rarely obtuse at the apex, rounded or narrowed at the base: crenulate-serrate, 1-2 inches long; flowers numerous, in a second raceme: pedicels at first merely spreading, in fruit recurved: petals greenish, with a pair of glands at the base of each, campanulate-connivent: stamens equally connivent around the pistil; anthers not narrowed below the openings: style straight, as long or longer than the petals; stigma peltate, 4-lobed, the lobes at length radiately projecting beyond the border. In mountainous districts, California to Alaska and across the Continent. Europe and Japan.

P. chlorantha Swartz Act. Holm. 1810, 190, t. 5. Scapes 6-12 inches high, 3-10-flowered: leaves small, 6-12 lines in diameter, orbicular or nearly so, coriaceous, not shining, shorter than their petioles: flowers nodding, 6-7

lines broad; calyx-lobes short, ovate, or triangular-ovate, acute or obtuse: petals very obtuse, greenish-white: stamens declined; anthers distinctly contracted below the openings, with distinctly beaked tips: style declined, and toward the apex curved upward, longer than the petals. In dry woods, Idaho to Brit. Columbia and the northern States.

P. elliptica Nutt. Gen. i, 273. Scapes 6-10 inches high, loosely 7-16-flowered: leaves elliptic to oval, 1-2 inches long, acute or merely roundish at base, plicate-crenulate with very low teeth, membranaceous, dark green, longer than their petioles: calyx-lobes ovate-triangular, acute or acuminate, about one fourth as long as the greenish-white, obtuse petals: stamens declined: anther-tips hardly if at all beaked: style declined, and toward the apex curved upward, exerted. In rich, mostly dry woods, Idaho to Brit. Columbia and the eastern States.

P. rotundifolia L. Sp. 396. Scapes 6-20 inches high, several to many-flowered, scaly-bracteate: leaves orbicular or broadly oval, 1-2 inches long, obscurely crenulate or entire, shining above, coriaceous, mostly shorter than the petioles: bracts lanceolate or ovate-lanceolate: calyx-lobes lanceolate or ovate-lanceolate, lax or with spreading tips, usually half as long as the white or flesh-colored obtuse petals: stamens declined; anthers with long cells, contracted into a very short neck under the openings, the mucro at base very short or obsolete: style declined and exerted. In dry woods, California to Alaska and the eastern States.

Var. incarnata DC. Prodr. vii. 773. "A rather small form: flowers from flesh-color to rose-purple: calyx-lobes triangular-lanceolate." Bogs, Idaho to Alaska and northern New England.

P. bracteata Hook. Fl. ii 49. Scapes 10-16 inches high, usually many-flowered, scaly-bracteate: leaves oval to ovate or oblong, acutish, not shining above, often variegated with whitish bands, 1-3 inches long, on slender petioles: bracts broadly lanceolate, acuminate, large and conspicuous: calyx-lobes acuminate-lanceolate, more than half as long as the red petals: stamens declined; anthers with long cells contracted under the openings into a short neck: style declined, exerted. In wet places in the mountains, California to Brit. Columbia.

P. picta Smith Rees Cycl. xxix. Scapes 6-12 inches high, 7-16-flowered: leaves firm-coriaceous, dull-colored or whitish, commonly veined or blotched with white above, pale or sometimes purplish beneath, 1-3 inches long, from broadly ovate to spatulate or narrowly oblong, the blades all longer than their petioles: rootstock rigid and often branched or clustered: bracts few and short: calyx-lobes ovate, not half the length of the greenish-white petals: stamens little if at all declined: anthers with a distinct neck under the orifice: style strongly declined. Under Pine trees in sparsely wooded districts, Nootka Sound to California, Idaho, Wyoming and Utah.

P. aphylla Smith l. c. Scapes 8-12 inches high, strictly erect, reddish or lurid, from deep scaly-toothed branched rootstocks, usually leafless, several to many-flowered: bracts subulate: calyx-lobes ovate, acute, very much shorter than the obovate whitish petals: stamens but slightly if at all declined: anthers tubular-beaked under the orifice: style almost straight, strongly declined. In coniferous woods, Alaska to California.

Var. paucifolia. With or without one or two small orbicular leaves at base: bracts larger, broadly lanceolate. In dense forests of the Cascade Mountains.

2 MONESES Salisb. in S. F. Gray Nat. Arr. Brit. Pl. ii, 403.

A low perennial with opposite or verticillate evergreen leaves and a solitary drooping white or pink flower at the summit of a

slender scape. Calyx 4-5-parted, persistent. Petals 4 or 5, widely spreading, sessile. Stamens 8 or 10, glabrous: anthers 2-beaked at the base, reversed when mature, each cell opening by a basal but apparently apical pore. Style straight: stigma peltate, large, with 4 or 5 narrow lobes. Capsule subglobose, 4-5-lobed, 4-5-celled, loculicidally 4-5-valved from the summit; the valves glabrous on the margins. Seeds numerous, minute, the testa reticulated, produced at both ends.

M. uniflora Gray Man. 273. Stem very short and decumbent, leafy: leaves orbicular to ovate, petioled, serrulate, 6-20 lines long; scape 2-6 inches high: flower white to rose-color, 6-10 lines broad: calyx-lobes ovate, obtuse, about one-fifth the length of the broadly ovate or orbicular petals: capsule erect, 3-4 lines in diameter. In forests, Oregon to Alaska and across the Continent. Europe and Asia.

3 CHIMAPHILA Pursh Fl. i, 279.

Low perennials with opposite or verticillate evergreen leaves and spreading or nodding white or purplish flowers in terminal corymbs. Calyx 5-parted or 5-cleft, persistent. Petals 5, concave, sessile, spreading or recurved. Stamens 10; filaments short, dilated, and mostly hairy in the middle; cells of the anthers oblong, with a short narrow neck. Style very short, obconic, immersed in the umbilicate summit of the globose ovary: stigma orbicular-peltate, barely 5-crenate. Capsule erect, globose, 5-lobed, 5-celled, loculicidally 5-valved from the top, the valves not woolly on the margins. Seeds very numerous, the testa reticulated, produced at both ends.

C. umbellata Nutt. Gen. i, 274. Stem stout, 4-12 inches high, very leafy, often branched: leaves cuneate-oblanccolate with tapering base, sharply serrate, not spotted, bright green and shining, 1-3 inches long: flowers several, umbellate or subcorymbose, white or pinkish: bracts narrow, deciduous: filaments hairy on the margins only. In dry woods, California to Alaska and across the Continent.

C. Menziesii Spreng. Syst. ii, 317. Slender, 3-10 inches high, sparingly branched from the base: leaves from ovate to oblong-lanceolate, acute at both ends, small, sharply serrate, the upper surface often mottled with white: peduncle 1-3-flowered: bracts ovate or roundish: filaments slender, with a round dilated portion in the middle villous: flowers about half-inch in diameter; petals dull white. In forests, California to Brit. Col.

ORDER LVI. MONOTROPACEÆ Lindl. Nat. Syst. ed. 2, 219.

Leafless fleshy herbs with the flowers in spikes, racemes, capitata, or solitary. Flowers regular and perfect. Calyx of 2-6 erect lobes or segments or imbricated sepals, free from the ovary. Corolla 4-5-lobed, or of 3-6 petals, rarely wanting, imbricated. Stamens 6-12, hypogynous: filaments equal, distinct, or connate at base: anthers 2-celled, or confluent 1-celled, attached to the filaments by the back or base, opening by longitudinal slits: pollen grains simple. Style short or longated: stigma capitata or peltate. Ovary superior, 4-6-

lobed, 1-6-celled; with the placentæ projecting from a central columella, or parietal and 2-lamellate: ovules numerous, anatropous. Fruit a loculicidally 4-6-valved many-seeded capsule. Seeds minute, the testa reticulated.

TRIBE I. Ovary 4-5-celled, with the placentæ on a thick central columella.

- 1 **Allotropia** Calyx of 5 roundish marcescent sepals, corolla wanting.
- 2 **Pterospora** Calyx deeply 5-parted: corolla globular-urceolate.
- 3 **Sarcodes** Calyx of 5 erect persistent sepals: corolla cylindraceous-campanulate.
- 4 **Monotropia** Calyx of 2-4 deciduous sepals: petals 5-6, not saccate at base, tardily deciduous.
- 5 **Hypopitys** Sepals 3-5, commonly as many as petals: petals saccate at base.

TRIBE II. Ovary 1-celled or spuriously 4-5-celled; the 4 or 5 placentæ parietal and 2-lamellate.

- 6 **Pleuricospora** Calyx complete, of 4 or 5 scale-like fimbriate-laciniate sepals: corolla of 4 or 5 plain petals: ovary strictly 1-celled.
- 6 **Newberrya** Calyx incomplete, of 2 bract-like entire sepals: corolla tubular-urceolate 4-5-lobed, marcescent: ovary spuriously 5-celled.

Tribe I Eumonotropææ Gray Syn. Fl. ii, 18. Ovary 5-celled, or sometimes 4-celled, the placentæ projecting from a thick central columella.

1 ALLOTROPA T. & G. Bot. Wilkes 385.

Scapose red or whitish scaly-bracted herbs with numerous small flowers in a virgate spike. Calyx of 5 rounded sepals, marcescent under the capsule. Corolla none. Stamens 10: anthers didymous on long and slender filaments, extrorse in the bud, becoming introrsely pendulous; cells opening by a chink from the apparent apex to the middle. Style short; stigma peltate-capitate. Capsule globose, very many-seeded. Seeds minute, scobiform, the loose coat produced at both ends. A single known species.

A. virgata T. & G. l. c. Stems several from a deep-seated perennial rootstock, 6-12 inches high or more, deep red or yellowish, thick and densely scaly at base, more sparingly scaly above; lower scales ovate, acuminate, the upper lanceolate passing into the linear bracts of the virgate many-flowered spike: pedicels erect or spreading, 2-bracteolate: calyx erosely dentate, shorter than the filaments. On dry wooded ridges of the Cascade Mountains, Washington to California.

PTEROSPORA Nutt. Gen. i, 269.

Tall scapose scaly-bracted plants with red or yellowish flowers in a long raceme. Calyx deeply 5 parted, persistent. Corolla gamopetalous, globular-urceolate, with 5 short recurved lobes, persistent. stamens 10, not exerted: filaments subulate-filiform: anthers ovate-didymous, introrse, erect or in the bud horizontal-inflexed, attached near the base, there dorsally 2-awned, the

slender awns deflexed, the cells opening lengthwise. Style short: stigma 5-lobed. Capsule depressed-globose, 5-lobed, the thin walls persistent after dehiscence, being attached by the partitions to the columella. Seeds very numerous, the nucleus ovoid, with a close thin coat, apiculate at both ends, the upper apiculation bearing a broad thin wing. A single known species.

P. Andromedeæ Nutt. l. c. Stems several from a shallow seated perennial root, 1-3 feet high or more, light brown or purplish, glandular and viscid-pubescent throughout, bearing numerous lanceolate or linear scales, and many flowers in a long raceme: pedicels slender, spreading, soon recurved, 3-10 lines long: sepals oblong, 1-2 lines long: corolla white, 3 lines long, viscid. Under Pines, California to Brit. Columbia and the eastern States.

3 SARCODES Torr. Smithson. Contrib. iii, 17, t.10.

Low fleshy plants with numerous scale-like bracts and many red flowers in a short terminal raceme. Sepals 5, erect, persistent. Corolla cylindraceous-campanulate, with 5 barely spreading lobes. Stamens 10, shorter than the corolla; anthers linear-oblong, erect attached above the base, the 2 cells confluent throughout, the whole apex opening by a large introrsely oblique terminal pore. Ovary low-conical, 5-lobed. Style columnar, rather long: stigma capitate, somewhat 5-lobed. Capsule depressed, 5-lobed. Seeds very numerous, oval, the coat reticulated, closely fitted to the nucleus except a small conical protuberance at the apex. A single known species

S. sanguinea Torr. l. c. Whole plant bright red: stem stout, 6-12 inches high, thickly clothed with, when young, well imbricated, firm fleshy scales; lower scales ovate; upper narrower and more scattered, and above passing into the linear bracts of the thick raceme which subtend the red flowers, all ciliate: pedicels erect, the upper ones very short: sepals oblong, 6-8 lines long, ciliate, a little shorter than the glabrous corolla. On the high mountains, of southern Oregon, California and Nevada.

4 MONOTROPA L. Gen. n. 536, in part.

Low fleshy plants with many scattered scale-like bracts and a solitary nodding white flower. Calyx of 2-4 irregular sepals, or perhaps bracts, the lower ones rather distant from the flower, deciduous. Petals 5, rarely 6, erect, not saccate at base, tardily deciduous. Stamens twice as many as petals: filaments filiform-subulate: anthers somewhat reniform, opening at first by two transverse chinks, at length 2-valved, the valves almost equal, and equally spreading. Style short and thick: stigma funnel-form, with naked edge. Capsule ovoid, erect in fruit. Seeds small, very numerous, scobiform, the nucleus minute in the loose-cellular elongated coat. A single species.

M. uniflora L. Sp. 387. Bright white and glabrous throughout: stems clustered, 6-12 inches high, rising from a thick and matted mass of fibrous rootlets, 1-flowered, scaly: scales broadly lanceolate, entire: petals 4-6, puberulent within, 6-10 lines long: filaments pubescent. In damp woods, throughout North America. Japan and India.

5 HYPOPITYS Adans. Fam. Pl. ii, 443.

Low fleshy scaly-bracted plants with red or yellow flowers in a loose terminal raceme. Sepals 3-5, nearly equal, erect, deciduous. Petals 4-5, longer than the sepals, saccate at base, erect with spreading tips, deciduous. Stamens 6-10; filaments filiform-subulate; anthers reniform, the cells completely confluent into one, which opens by very unequal valves, the larger broad and spreading, the other remaining erect and contracted. Style columnar: stigma funnellform, glandular or hairy on the margin. Capsule ovoid, the columella thick and fleshy. Seeds very numerous, small, scobiform; the nucleus minute in the loose-cellular coat. Only the following species known.

H. lutea Dill. *Monotropa Hypopitys* L. Red yellowish or white stems 6-12 inches high: bracts ovate-lanceolate, entire or slightly erose, densely imbricated at the base, scattered above: flowers 3-20, in a loose drooping at length erect raceme, 5-7 lines long, the terminal one 5-merous, the others usually 3-4-merous. In forests, Brit. Columbia to California and the eastern States. Europe and Asia.

H. fimbriata. *Monotropa fimbriata* Gray. Stems 6-12 inches high, red or yellowish, somewhat hairy: upper scales and bracts obovate to cuneate, erosely or laciniately fimbriate: lateral flowers often 3-petalous and 6-androus: sepals spatulate, laciniate. In forests of the Cascade and Coast Mountains of Oregon.

Tribe 2 Pleuricosporeæ Gray Syn. Fl. ii, 18. Ovary 2-celled or spuriously 4-5-celled: the 4 or 5 placentæ parietal and 2-lamellate. Disk none or obscure. Anthers linear or oblong, erect, introrse, attached by the base to the long and slender filaments, opening longitudinally

6 PLEURICOSPORA Gray Proc. Am. Acad vii, 369.

Low fleshy white or yellowish herbs with fimbriate scales and petals, and white flowers in a short terminal raceme. Calyx complete, of 4 or 5 scale-like sepals. Corolla of 4 or 5 plain petals resembling the sepals. Stamens twice as many as petals: filaments ligulate-filiform: anthers linear, apiculate, the cells opening from base to apex into two equal valves. Ovary strictly one-celled. Style columnar: stigma depressed-capitate, or somewhat funnellform. Seeds ovate, with a smooth or polished coat.

P. fimbriolata Gray l. c. Stout and erect, 3-10 inches high, glabrous or nearly so, clothed with imbricated scales; lowest scales ovate, firm, entire; upper passing into the narrower and lanceolate scarious margined and lacerate fringed bracts of the dense and erect cylindraceous raceme: sepals and petals white, oblong or oblong-lanceolate fimbriate-lacerate, not exceeding the bracts. In the Cascade and Coast Mountains of Oregon and the Sierra Nevadas of California

P. longipetala. Stem rather slender, 4-6 inches high: scales well imbricated, lanceolate, more or less acuminate, laciniately toothed: flowers white or yellowish, numerous, in a dense oblong raceme: sepals lanceolate, acute or acuminate, sparingly laciniate-toothed, about equalling the bracts:

petals narrowly spatulate, 6 lines long, much longer than the sepals, the obtuse apex laciniately fimbriolate. In dense forests of the Cascade Mountains near the hot springs in Clackamas Co. Oregon. Rare.

7 NEWBERRYA Torr. Ann. Lyc. N. Y. viii, 55.

Low fleshy erect plants with red or brownish flowers in a terminal cluster. Calyx incomplete, of two bract-like entire sepals. Corolla tubular-urceolate, 4- or 5-lobed, persistent. Stamens twice as many as lobes of the corolla; filaments filiform, long-hairy above the middle; anthers oblong, the cells opening from apex to base into two unequal valves. Ovary ovate, contracted at the apex into a long style; stigma depressed-capitate, umbilicate. Placentæ 4, with broad divergent lamellæ which meet adjacent edges, ovuliferous both sides, giving the appearance of 4 exterior cells surrounding a central larger one.

N. congesta Torr. l. c. Whole plant brownish, glabrous, 4-8 inches high: scales crowded or loosely imbricated, obtuse, thinnish, with obscurely erose margins; the upper forming similar bracts of the densely crowded glomerule of flowers: lobes of the corolla ovate, one third the length of the cylindraceous or slightly urceolate tube: filaments equalling the slender style: anthers narrowly oblong, the line of dehiscence close to the connective. In the high mountains of Washington to California.

ORDER LVII ARMERIACEÆ

Somewhat woody plants with alternate leaves and regular symmetrical 5-merous perfect flowers: chiefly of saline soils. Calyx costate at the sinuses, persistent. Corolla with claws to the nearly distinct petals, or these united into a tube, convolute or rarely imbricated in the bud. Stamens as many as divisions of the corolla and opposite to them: the filaments adnate only to their base, or completely hypogynous: anthers 2-celled, opening longitudinally. Disk none. Ovary free, one-celled, with a solitary anatropous ovule pendulous on a slender funiculus which rises from the base of the cell. Styles 5, distinct or united. Fruit dry, utricular or achene-like, somewhat dehiscent by a lid, or by valves. Seed with a straight embryo, and with or without mealy albumen.

1 ARMERIA Willd. Enum. Hort. Berol 333.

Acaulescent perennials with narrow persistent leaves in close tufts and naked scapes with a reversed sheath under the compact head of red flowers which are surrounded and subtended by scarious bracts and bractlets. Calyx funnelform, regularly 10-costate at base, the limb scarious. Corolla of 5 nearly distinct long-clawed petals, each with a stamen attached to its base. Styles 5, filiform, united only at the very base, stigmatose above along the inner side. Utricle at length bursting irregularly at the base.

A. vulgaris Willd l. c. Scapes 8-12 inches high: leaves narrowly linear, flat or flattish, 1-3 inches long: bracts very obtuse: calyx at base simply decurrent on the pedicel; the tube 10-nerved, hairy at least on the

stronger nerves or angles; the lobes blunt or cuspidate. Along the coast, California to the Arctic regions and the Atlantic coast. Europe and Asia.

ORDER LVIII PRIMULACEÆ Vent. Tabl. ii, 285.

Herbs with simple leaves and symmetrical flowers. Calyx 4-8-lobed or 4-8-parted, free, or rarely adnate to the base of the ovary, imbricated in the bud, usually persistent, Corolla hypogynous, except in *Samolus* in which it coheres below with the base of the ovary, 4-8-lobed or 4-8-parted, rarely none. Stamens as many as the lobes of the corolla and opposite to them, inserted on the tube or base of the corolla, rarely perigynous: anthers introrse. Ovary one-celled, with a free central placenta. Fruit capsular. Seeds with small straight embryo and copious albumen.

TRIBE I. Ovary wholly free: ovules amphitropous or half-anatropous.

* Scapose or tufted: flowers chiefly 5-merous, umbellate or solitary: capsule dehiscent by valves, at least at the apex.

+ Stamens connivent in a cone around the pistil, monadelphous.

1 **Dodecatheon** Corolla 5-parted, its division reflexed: filaments shorter than the anthers.

+ + Corolla salverform or funnellform: stamens distinct, included, with short filaments and short and blunt anthers.

2 **Primula** Corolla with tube surpassing or at least equalling the calyx, and spreading, mostly obcordate or emarginate lobes: capsule many-seeded.

3 **Douglasia** Corolla with tube equalling or surpassing the calyx, and entire lobes: ovary 5-ovuled: capsule 1-3-seeded.

4 **Androsace** Corolla short, its tube shorter than the calyx: ovules and seeds numerous or few.

* * Leafy stemmed: corolla rotate or somewhat so and the divisions convolute or sometimes involute in the bud, wanting in *Glaux*.

+ Capsules mostly globose, dehiscent vertically by valves, or irregularly.

5 **Trientalis** Leaves clustered at the summit of a simple stem: flowers mostly 7-merous: corolla completely rotate, without a tube, deeply parted: filaments long and filiform, united at base into a ring.

6 **Steironema** Leaves opposite, without dots: flowers 5 merous on slender drooping peduncles: corolla rotate, with no proper tube, deeply parted; the divisions each wrapped around a stamen.

7 **Naumburgia** Stems leafy throughout, the herbage glandular-dotted: flowers 5-7-merous, on stout axillary peduncles: corolla without proper tube, the lobes not wrapped around the stamens.

8 **Glaux** Stems leafy throughout: flowers solitary in the axils of the opposite leaves, 5-merous; corolla none: stamens inserted on the base of the calyx.

+ + Capsule globose, the top falling off as a lid: seeds numerous.

- 9 **Anagallis** Corolla completely rotate, 5-parted.
 10 **Centunculus** Corolla with a globular tube and 4-5-lobed limb, shorter than the calyx.

TRIBE II. Ovary connate at base with the base of the calyx.

- 11 **Samolus** Leaves alternate: flowers 5-merous: corolla nearly campanulate: capsule 5-valved at the apex.

Tribe 1 Primulæ Endl. Gen. 730. Ovary wholly free: ovules fixed by the middle amphitropous or half anatropous.

§ *Scapigerous or tufted. Flowers chiefly 5-merous, umbellate or solitary: lobes of the corolla imbricated in bud. Capsule dehiscent by valves sometimes obscurely so.*

* *Stamens connivent in a cone around the style, monadelphous*

1 DODECATHEON L. Gen. n, 200.

Low acaulescent perennial herbs with entire leaves and few or numerous flowers in an umbel terminating a naked scape. Calyx deeply 5-lobed, the lobes reflexed in flower, erect in fruit. Corolla 5-parted, with very short tube and dilated thickened throat, the long and narrow divisions reflexed. Stamens inserted on the throat of the corolla: filaments short and flat, monadelphous, but separable in age. Style filiform, exserted: stigma small. Placenta columnar, many-ovuled.

* Filaments distinct.

D. dentatum Hook. Fl. ii, 119. Glabrous throughout: leaves ovate, the blade 2-4 inches long by 1-2 inches broad, irregularly dentate, usually abruptly contracted below to a margined petiole nearly as long as the blade: scapes 4-8 inches long, few-flowered: involucre bracts linear, acuminate: calyx lobes triangular, acuminate, a line or more long: lobes of the corolla white with two purple spots at the base of each, linear-oblong, obtuse, 4-6 lines long: filaments very short; anthers linear-lanceolate, 2-toothed at the apex, brownish-red: capsule but little longer than the calyx, early opening from the apex by valves: seeds flat. In wet places on the bluffs of the Columbia river, and in Idaho.

D. campestrum. Glabrous throughout: leaves oblong, obtuse or acutish, 1-2 inches long, tapering below to a broad petiole: scapes 3-6 inches high, 1-3-flowered: involucre bracts lanceolate, acuminate, 1-3 lines long: pedicels 4-6 lines long: calyx-lobes lanceolate, acute, 2 lines long: lobes of the corolla narrowly oblong, abruptly narrowed near the apex, 6-7 lines long, a line or more broad, pink above, with blue centre and white base: filaments very short; anthers linear-oblong, obtuse, pink with dark purple base: capsule oblong, opening by persistent valves. In prairies on the Klickitat hills, Klickitat Co. Washington.

** Filaments more or less joined together into a tube:

+ Capsule opening by an operculate tip.

D. viviparum Greene Eryth. iii, 38. "Rootstock stout, horizontal or ascending short, simple or with a few branches, bearing coarse white fibrous roots beneath, and rather large bulblets above: leaves 6-10 inches long, oblong-lanceolate, tapering to a winged petiole, acute or obtuse at apex, the whole margin coarsely and regularly but not deeply crenate,

with a callous point in each sinus, or the crenation reduced to the callous point only: scapes 10-20 inches high, stout, bearing a many-flowered umbel: the stoutish pedicels and deeply parted calyx somewhat glandular-pubescent: flowers deep purple throughout: stamens distinct to the very base: capsule ovate-oblong, coriaceous, circumscissile near the apex, afterwards parting into 10 valves whose tips are closely recurved. At and a little below the limit of trees on Mount Rainier Washington."

D. tetrandrum Suksdorf, Greene l. c. 40. Glabrous, or the inflorescence minutely glandular: leaves spatulate to lanceolate or oblanceolate, 3-12 inches long by 1-2 inches broad, tapering below to a winged petiole: scapes stout, 6-20 inches high: umbel few to many-flowered: involucrel bracts setaceous: pedicels 1-3 inches long, enlarging at the summit: flowers mostly 4-merous: calyx-lobes lanceolate, acuminate, 3 lines long: corolla purplish with a yellow ring near the base, its lobes lanceolate, acute, 6-8 lines long: staminal tube very short; anthers linear-oblong, obtuse, dark purple: capsule surpassing the calyx, circumscissile very near the apex, then splitting into 10 short recurving valves: seeds oblong, flat, with a marginal wing all around. In wet places in the Cascade Mountains.

D. Jeffreyi Moore in Van Houtte Fl. des Serres xvi, 99, t. 1662. Glabrous except the hirsute and glandular inflorescence: leaves oblanceolate, erect, 5-10 inches long, entire, acutish, mucronate: scapes 12-18 inches high: umbel many-flowered: segments of the corolla ample, deep red-purple: stamens dark purple, usually only 4; anthers emarginate: style very distinctly hispidulous: capsule not surpassing the calyx, opening by valves from the very apex. In wet places in the mountains of eastern Oregon and California.

D. alpinum Greene l. c. *D. meadia* var. *alpina* Gray. Glabrous throughout: leaves oblong-lanceolate to spatulate, obtuse, 1-3 inches long, tapering below to a short petiole: scape 4-10 inches high 1 to several-flowered: involucrel bracts lanceolate, acute, 1-2 lines long: lobes of the calyx about as long as the tube, narrowly lanceolate: corolla-lobes narrowly oblong abruptly contracted near the apex, 6-8 lines long, purple with brownish-yellow base: staminal tube very dark, a line long: anthers oblong, often apiculate. On wet banks and margin of lakes, Washington to California.

D. conjugens Greene Eryth. iii, 40. "Short crown with a dense fascicle of fleshy fibrous roots that are deciduous from it after the flowering: whole plant glabrous: leaves obovoid and elliptic, 2 to 5 inches long including the distinct petiole, obtuse, entire: scape stoutish 3 to 8 inches high: umbel few-flowered; flowers large, 4-merous, rarely 6-merous: corolla deep purple, varying to rose red and to white: anthers distinct, obtuse, the connective lanceolate, acuminate to a linear point, delicately rugulose throughout all but the linear tip: fruit unknown. Dry hills, southeastern Oregon and Montana.

D. Hendersoni Gray Bot. Gaz. xi, 235. Glabrous throughout or the inflorescence minutely glandular: leaves elliptical to obovate, 1 inch or more long narrowed below to a short petiole: scape 4-16 inches high, rather few-flowered: involucrel bracts triangular, acuminate: calyx-lobes triangular, acuminate, twice as long as the short tube: corolla-lobes dark purple with yellowish base: staminal tube a line long, dark purple: anthers oblong, obtuse, short-apiculate: capsule ovoid, much longer than the calyx, opening by a flat operculum and splitting downward into 10 valves: seeds globular, minutely tuberculate. Common throughout the Willamette Valley and into California.

+ + Capsule dehiscent by valves from the apex.

D. pauciflorum Greene Pitt. ii, 72. Glabrous throughout: leaves

$\frac{1}{4}$ - $\frac{1}{3}$ as long as the scape: involucre bracts lanceolate: segments of the corolla rich lilac-purple the undivided part yellow, with a scalloped ring of deep purple midway between the base of the segments and the stamen tube: stamen-tube often nearly as long as the anthers, yellow: anthers purple: capsule crustaceous, 6 lines long, nearly cylindrical, acute, opening by 5 short teeth. At middle elevations, eastern Oregon to the Rocky Mountains and New Mexico.

D. Cusickii Greene l. c. More or less pubescent and glandular: leaves broadly to narrowly lanceolate, entire, or dentate toward the apex, usually obtuse, 1-2 inches long, narrowed below to a winged petiole: scapes 3-4 inches high, few-flowered: bracts of the involucre narrowly lanceolate, 1-2 lines long: lobes of the calyx lanceolate, acute, but little longer than the tube: corolla-lobes dark purple with yellow base and a dark purple line at the mouth of the tube: stamen tube less than a line long, almost black: anthers yellow with a black stripe through the centre: capsule ovoid, acute, scarcely surpassing the calyx, 5-valved from the apex. Dry hillsides, eastern Oregon and Brit. Columbia.

* * *Corolla salverform or funnellform: stamens included, distinct, with short filaments and short blunt anthers.*

2 PRIMULA L. Gen. n. 197.

Perennial scapose herbs with all radical leaves and large or small flowers umbellate or in involucre or bracted racemose whorls at the summit of a scape. Calyx tubular, funnellform or campanulate, persistent, often angled, 5-lobed, the lobes imbricated. Corolla funnellform or salverform, the tube longer than or at least equalling the calyx. Stamens 5, distinct, inserted on the tube or at the throat of the corolla. Style filiform: stigma capitate. Capsule 5-valved at the summit, many-seeded. Seeds peltate: the testa punctate.

P. Broadheadæ Jones Zoe iii, 306 "2 to 4 inches high; 1 to 4 flowered; scape 2 to 4 inches long; leaves 1 to 4 inches long, narrowly elliptical rounded at apex, glabrous, rather thick, smooth, entire, narrowed at base to a winged petiole an inch or less long; flowers purple, about 5 lines wide, lobes orbicular or nearly so, notched, with a very short claw 2 lines long, tube exceeding the calyx by 2 lines; funnellform above the calyx; calyx-lobes $1\frac{1}{2}$ lines long and subulate lanceolate, barely acute, equalling the tube of the calyx; pod nearly spherical; pedicels of the lateral flowers about a line long the terminal one 2 to 6 lines long; bracts oblong to ovate lanceolate, entire or toothed at apex, 1 to 6 lines long; base of plant covered with the dead sheaths of former leaves. Marshy places at Ketchum Idaho."

Var. minor Jones l. c. "Leaves an inch long or less, elliptical oblanceolate and acute, thin: lobes of the corolla as large as the type, but obovate; lobes of the calyx longer than the tube; flowers 1 to 2 on the scape; bracts long; plant 2 inches high. Bayhorse Idaho.

P. Cusickiana Gray Syn. Fl. Supp. 399. Leaves oblong-spatulate or narrower, 2 inches long, entire, or rarely denticulate: scapes 2-6 inches high, 1-4-flowered: involucre of 2 or 3 conspicuous unequal bracts: calyx green with a whitish line down from the sinuses of the campanulate tube; its lobes from lanceolate to subulate, about the length of the tube and nearly equalling the tube of the corolla: lobes of the corolla retuse. On rocky hillsides, Union Co. Oregon.

3 DOUGLASIA Lindl. in Brande. Journ. Sci. 1827.

Depressed and tufted little herbs with suffrutescent or at least persistent stems, imbricated or crowded leaves and solitary or somewhat umbellate small flowers. Calyx campanulate, 5-lobed, persistent. Corolla tube equalling or surpassing the calyx, somewhat inflated above; the throat more or less contracted and 5-fornicate beneath the sinuses. Stamens included, distinct, with short filaments and blunt anthers. Ovary 5-ovuled: style filiform. Capsule turbinate, 1 or 2-seeded.

D. dentata Watson Proc. Am. Acad. xvii, 375. Canescent with a firm mostly dense pubescence: rather stout, branching: leaves rosulate at the nodes, oblong, obtusish, mostly with 1-3 blunt teeth on each side toward the summit, 4-6 lines long: peduncle an inch long, bearing a simple, few-flowered umbel; pedicels very unequal: calyx narrowed at base, 3 lines long in fruit: the acuminate lobes nearly as long as the tube: capsule oblong, slightly stipitate, equalling the calyx-tube. On high ridges, Yakima Co. Washington.

D. lævigata Gray Proc. Am. Acad. xvi, 105. Depressed cespitose: leaves glabrous or with a few minute and scurfy deciduous branched hairs, not at all ciliate, entire, or with 1 or 2 teeth toward the summit, oblong-lanceolate, obtuse, mainly in rosulate radical or simply proliferous clusters, 2-3 lines long: peduncles short, scurfy-pubescent, 1-5-flowered: bracts of the involucre oval or ovate, short: corolla bright red, its tube almost twice as long as the ovate acute lobes of the calyx. On bluffs along the Columbia river from Bridal Veil to near Hood River: blooming in early spring.

4 ANDROSACE Tourn. L. Gen. n. 196.

Small annual or perennial herbs with tufted leaves and small white or pink flowers. Calyx persistent, 5-lobed to 5-parted. Corolla salverform or funnelform; the tube short, not longer than the calyx; the limb 5-lobed, imbricated in bud. Stamens 5, included, distinct, with short filaments and short blunt anthers. Style mostly short: stigma capitellate. Capsule short, 5-valved from the apex, few to many-seeded.

A. septentrionalis L. Sp. 203. Leaves all rosulate at the summit of the slender annual root, lanceolate or oblong-lanceolate, narrowed at base, often into a winged petiole, from irregularly denticulate to lacinate-toothed, 6-12 lines long: scapes usually numerous, 2-10 inches high, several to many-flowered: bracts of the small involucre subulate: pedicels filiform, 1-2 inches long: calyx-tube obpyramidal, white or reddish, with subulate acute green lobes mostly shorter than the tube and rather shorter than the obovate lobes of the corolla: capsule ovoid, shorter than the calyx: seeds ovate, flattish. In open places, Brit. Columbia to California and the Rocky Mountains. Europe and the Arctic sea coast.

A. filiformis Retz. Obs. ii, 10. ? Annual: leaves ovate, obtuse, narrowed at base to a winged petiole, entire, 2 lines long: scapes filiform, 1-10 inches high: bracts of the involucre minute, subulate: pedicels filiform, an inch long or less: calyx-tube hemispherical, green, with short triangular lobes: tube of the corolla at length much longer than the calyx; the short ovate lobes closely reflexed: capsule ovoid, much longer than the calyx: seeds globular, minutely tuberculate. Edge of water near Forest Grove Oregon.

§ § *Leafy-stemmed. Leaves entire. Corolla rotate or somewhat so; the divisions convolute or sometimes involute in the bud, wanting in Glaux.*

* *Capsule mostly globose, dehiscent longitudinally by valves or irregularly.*

5 TRIENTALIS L. Gen. n. 461

Low and glabrous perennial herbs with a simple stem, simple leaves mostly clustered at the summit and white or pink flowers on filiform pedicels. Flowers 5-7-merous, usually 6-merous. Corolla completely rotate, without a tube, deeply parted, the divisions convolute in the bud. Filaments long and slender, united at base into a short ring; anthers linear, recurving when old. Style filiform. Capsule about 5-valved. Seeds few, rather large, covered with a white cellular-reticulated pellicle, remaining for some time fast on the placenta in a globular mass.

T. latifolia Hook. Fl. ii, 121. Stem slender, 2-6 inches high, from a small subterranean tuber: bracts subulate to lanceolate: leaves from lanceolate to ovate, usually abruptly acuminate, 1-3 inches long, narrowed below to a short petiole: pedicels filiform shorter than the leaves: calyx-lobes linear-lanceolate, acute or acuminate: corolla-lobes lanceolate, acuminate one third longer than the calyx. Common in forests, California to Vancouver Island.

T. arctica Fischer in Hook. l. c. *T. Europæa var. arctica* Ledeb. Stem very slender, 1-4 inches high, with small scattered obovate leaves below; upper leaves obovate-lanceolate to lanceolate, 1-12 lines long: pedicels filiform, longer than the leaves: lobes of the calyx linear, very acute, 2-3 lines long: lobes of the corolla lanceolate, acuminate and tipped with a slender bristle, nearly twice as long as the calyx. In high mountain marshes and along the coast, Oregon to Alaska and Behring Straits.

6 STEIRONEMA Raf. Ann. Gen. Phys. vii, 192.

Leafy-stemmed perennial herbs with opposite or verticillate simple leaves and axillary yellow flowers nodding on slender pedicels. Flowers 5-merous. Corolla rotate with no proper tube, deeply 5-parted, the sinuses rounded; the divisions ovate, cuspidate-pointed, each separately involute or convolute around its stamen. Stamens 5, alternating with 5 sterile filaments; distinct or nearly so, inserted on a ring at the base of the corolla. Capsule 10-20-seeded.

S. ciliatum Raf. l. c. Glabrous throughout except the petioles: stems erect, 2-4 feet high, mostly simple: leaves ovate-lanceolate to oblong-ovate, gradually acuminate, 2-5 inches long, mostly with rounded or subcordate base, minutely ciliate, membranaceous, pinnately veined; their long petioles hirsutely ciliate: calyx-lobes linear-lanceolate, acuminate: lobes of the corolla obovate, obtuse, nearly twice as long as the calyx, erose-denticulate, 4-6 lines long: capsule longer than the calyx. Low grounds, Oregon to Brit. Columbia and across the Continent.

S. lævigatum. Stems slender, 1-3 feet high, white and smooth, paniculately branched above: leaves lanceolate to linear-lanceolate, all petio

late, not at all ciliate except a few hairs at the base of the clasping petiole, the lower ones often subcordate at base: lobes of the calyx lanceolate, acuminate, about 4 lines long: lobes of the corolla obovate, but little longer than the calyx. In marshes along the Rogue river near Grant's Pass Or.

7 NAUMBURGIA Mœnch Meth. Supp. 32.

Erect perennial herbs with opposite entire leaves, the lower reduced to scales, and small yellow flowers in short axillary spikes. Calyx 5-7-divided, the sepals linear, slightly imbricated. Corolla deeply 5-7-parted, with very short tube and narrow segments. Stamens 5-7, exserted; filaments slender, glabrous, slightly united at base, alternating with as many small tooth-like staminoidea at each sinus of the corolla. Style slender, equalling the stamens: stigma capitate. Capsule 5-7-valved, few-seeded.

N. thyrsiflora Duby in DC. Prodr. viii, 60. *Lysimachia thyrsiflora* L. Glabrous or becoming so: stem 1-2 feet high, from a slender rootstock: leaves lanceolate, sessile, 1-2 inches long, the lower smaller and the lowest reduced to ovate scales: peduncles from only 2 or 3 pairs of leaves near the middle of the stem, axillary, shorter than the subtending leaf, bearing several or numerous small flowers in a dense head or oblong spike: lobes of the calyx linear-lanceolate, acute, half as long as the narrow purple-dotted lobes of the corolla: capsule globose, glandular dotted, few-seeded. In wet bogs, Oregon to Alaska and the eastern States. Europe, Asia and Japan.

8 GLAUX Tourn. L. Gen. n. 291.

Small leafy-stemmed herbs with opposite entire leaves and small axillary white or pink apetalous flowers. Calyx 5-parted, the lobes petaloid, imbricated in the bud, about as long as the campanulate tube. Stamens 5, inserted at the base of the calyx and alternate with its lobes: filaments subulate-filiform: anthers cordate, attached by their backs to the filaments. Capsule 5-valved at the top, few-seeded.

G. maritima L. Sp. 207. Glabrous and glaucous or pale: stems slender, 6-12 inches high from slender perennial rootstocks, very leafy: leaves from oval to oblong-linear, 3-6 lines long, entire, sessile: flowers usually in the middle axils only, solitary and very nearly sessile, white or pink: calyx-lobes oval, 1-2 lines long: seeds oblong, brown. In salt marshes, California to Alaska and across the Continent. Europe and Asia.

* * *Glabrous, capsule circumscissile; the top falling like a lid. Seeds numerous.*

9 ANAGALLIS Tourn. L. Gen. n. 206.

Low annual or perennial herbs with usually opposite leaves and small red, white or blue axillary flowers. Calyx 5-parted, persistent. Corolla completely rotate, 5-parted, the rounded lobes convolute in the bud. Stamens 5, inserted on the base of the corolla: filaments bearded or pubescent: anthers broadly oblong. Style filiform. Capsule globose, many-seeded. Seeds minute.

A. ARVENSIS L. Sp. 148. Glabrous throughout: stems diffuse, usually much branched, 4-sided, 4-12 inches long from an annual root: leaves opposite or in threes or sometimes the upper ones alternate, ovate, sessile, 6-12 lines long: flowers scarlet, 2-3 lines broad, solitary, on long filiform

peduncles that recurve in fruit: lobes of the corolla lanceolate, acute, minutely denticulate or glandular-ciliate, but little longer than the calyx: seeds minute. California to Oregon and the Atlantic States. Naturalized from Europe and Asia.

10 CENTUNCULUS Dill. L. Gen. n. 145.

Low glabrous annuals with mostly alternate leaves and minute solitary flowers in the axils of the middle leaves. Calyx 4-5-parted into linear acute lobes, longer than the corolla, persistent. Corolla small, with subglobose tube and 4 or 5 acute entire teeth. Stamens 4 or 5; inserted on the throat of the corolla, with distinct short filaments and broadly ovate to cordate obtuse anthers. Style filiform: stigma capitate. Seeds minute, numerous.

C. minimus L. Sp. 116. Stems ascending, 2-6 inches long, simple or branched: leaves ovate, obovate or spatulate-oblong, tapering at base, 2-3 lines long, all but the lowest sessile: flowers 4-5-merous: calyx-lobes lanceolate, acuminate, fully as long as the capsule. In moist places, California and Oregon to Brit. Columbia, Minnesota and Illinois. Europe and S. Am.

Tribe 2 Samoleæ Endl. Gen. 734. Ovary connate at base with the base of the calyx.

11 SAMOLUS Tourn. L. Gen. n. 222.

Low glabrous caulescent herbs with alternate entire leaves and small white flowers in simple or paniced racemes. Flowers 5-merous. Calyx persistent, its tube adnate to the ovary below. Corolla perigynous, nearly campanulate; the rounded lobes imbricated in the bud. Fertile stamens 5, inserted on the tube of the corolla; with short filaments and cordate anthers: staminoidea 5, in the sinuses of the corolla, or wanting. Style short or slender: stigma obtuse or capitate. Capsule ovate or globular, 5-valved at the top, many seeded. Seeds minute.

S. floribundus H. B. K. Nov. Gen. ii, 224. Stems erect or ascending, 6-18 inches high, diffusely branched, leafy up to the racemes: leaves ovate to spatulate, 1-3 inches long, tapering to a short petiole: flowers usually numerous, less than a line broad, in loose paniculate racemes: pedicels filiform, spreading, 4-12 lines long, bracteolate near the middle: calyx adherent to the middle of the ovary and capsule, the lobes ovate, half as long as the short-campanulate corolla: sterile filaments in the sinuses reflexed. In wet places, California to Brit. Columbia, Canada, Florida and Texas.

ORDER LIX OLEACEÆ Lindl. Nat. Syst.

Trees or shrubs, rarely almost herbaceous, with colorless bland juice, opposite, rarely alternate, leaves without stipules and perfect or dicecious regular flowers. Flowers gamopetalous, 2-4-petalous, apetalous or even achlamydeous. Stamens 2, sometimes 4, fewer than the parts of the corolla, distinct. Ovary two-celled, with one or two pairs of anatropous ovules in each cell. Style one or none. Fruit a capsule, samara, berry or drupe. Seeds with a rather large embryo in firm fleshy al-

bumen, or exalbumenous. Cotyledons flat, or plano-convex.

1 FRAXINUS Tourn. L. Gen. n. 1160.

Trees with rather light tough wood, chiefly opposite and odd-pinnate leaves, and small flowers in panicles, appearing with or before the leaves from separate buds. Flowers dioecious or polygamous, sometimes perfect. Calyx very small, 4-cleft or irregularly toothed or entire or wanting. Petals, when present, 4, induplicate-valvate in the bud, either separate or united in pairs at the very base, often wanting. Stamens 2, sometimes 3 or 4. Ovary 2-celled, with a pair of ovules at the summit of each cell. Stigma 2-lobed. Fruit an entire dry indehiscent samara, with the wing mainly terminal, and suspended seeds.

F. Oregana Nutt. Sylv. iii, 59, t. 99. (OREGON ASH.) A tree 20-100 feet high and 1-4 feet in diameter: leaves and young branchlets villous-pubescent; leaflets 5-7, lanceolate-oblong to oval, usually acuminate, entire or nearly so, 2-4 inches long, veiny, the upper surface soon glabrous: flowers dioecious; all with a minute calyx and no petals; staminate panicles dense, with oblong anthers; pistillate in ample, at length rather loose panicles: fruit with nearly clavate and slightly compressed body, the margined edges gradually widened upward into the oblanceolate, wing, an inch or more long. By streams and swales, California to Brit. Columbia.

ORDER LX APOCYNACEÆ Lindl. Nat. Syst. ed. 2, 299.

Perennial herbs, shrubs or trees with mostly acrid milky juice, opposite, verticillate, or alternate entire leaves without stipules, and perfect regular 5-merous flowers. Calyx free, or in ours adherent to the very base of the ovaries. Corolla convolute and often twisted in the bud. Stamens 5, borne on the corolla and alternate with its lobes: anthers 2-celled, disposed to cohere with the stigma: pollen-grains simple, often glutinous. Ovary of 2 distinct carpels with the styles or stigmas united, or 1-celled with 2 parietal placentæ, or 2-celled. Ovules few to numerous. anatropous or amphitropous. Seeds often bearing a coma. Embryo large, in sparing albumen.

1 APOCYNUM Tourn. L. Gen. n. 305

Perennial herbs with branching stems, opposite mucronate tipped leaves and small white or rose-colored flowers in terminal and axillary small cymes. Calyx 5-parted, its short tube coherent by the disk with the base of the ovaries. Corolla campanulate, 5-cleft, toward the base bearing a triangular scale-like appendage opposite each lobe. Stamens borne on the base of the corolla: filaments very short: anthers of firm texture, sagittate, conniving around the solid stigma, to a ring of which the broad summit of the connective adheres. Proper style none. Ovaries two, ovoid, in fruit becoming a pair of long slender follicles. Glands 5, around the base of the ovaries.

A. androsæmifolium L. Sp. 213, Stem erect with divergent branch-

es, 6-18 inches high, from deep-seated perennial roots: leaves ovate or roundish, 1-4 inches long, abruptly and setaceously callous-mucronate, conspicuously petioled, pale and more or less pubescent beneath: flowers very fragrant, in open cymes: pedicels 2-3 lines long, subulate-bracted at the base; corolla open-campanulate, about 4 lines broad, its tube much longer than the ovate acute lobes of the calyx, its short lobes recurved; mature follicles 3-5 inches long. In dry open woods, California to Alaska and the eastern States.

Var. pumilum Gray Syn. Fl. ii, 82. Low: leaves roundish. Brit. Columbia to California.

A. cannabinum L. Sp 213. Stems erect or ascending, 1-6 feet high, with ascending branches, glabrous, or sometimes soft-pubescent, leafy to the top: leaves from oval to oblong or even lanceolate, with rounded or subcordate base, short petioled or sessile 2-6 inches long: cymes erect, densely flowered: corolla greenish-white or slightly flesh-colored its lobes almost erect, the tube not longer than the lanceolate calyx-lobes: follicles slender, 2-3 inches long. Moist meadows, California to Brit. Columbia and the eastern States.

ORDER LXI ASCLEPIADACEÆ Lindl. Nat. Syst. ed. 2, 302.

Mostly herbs with milky juice, usually opposite leaves without stipules, and regular perfect flowers in terminal or pseudo-axillary or sometimes axillary cymes; often umbelliform. Calyx free from the ovary or nearly so, imbricated in the bud. Corolla 5-merous, convolute, or often nearly valvate in the bud. Stamens 5, borne on the tube of the corolla and alternate with its lobes: anthers surrounding the stigma. Pollen in 1 or 2 waxy masses, in ours all the pollen in each cell in one mass and attached to the stigmatic disk by the glands that alternate with the anthers. A crown of 5 parts or lobes usually present between the corolla and the mostly monadelphous stamens, and adnate either to the one or the other. Ovary of 2 cells that become follicles, or by abortion, one several to many-seeded follicle. Seeds almost always bearing a long and soft coma. Embryo nearly as long as the seed, in mostly thin, cartilaginous albumen.

Flowers with a hooded appendage behind each anther.

- 1 **Asclepias** An incurved horn or projecting crest from the cavity of each hooded appendage.
- 2 **Gomphocarpus** Hooded appendages without horns or crests.

1 ASCLEPIAS L. Gen. n. 306.

Herbs with erect or merely spreading stems from deep and thickened perennial roots, opposite or sometimes verticillate or alternate leaves and terminal and lateral umbellate inflorescence. Calyx 5-parted, commonly bearing some minute processes at the base within. Corolla rotate, 5-parted, dextrorsely valvate-convolute in the bud. Crown consisting of 5 distinct cucullate or hollowed nectariferous appendages, opposite the anthers, that are involute or complicate and bearing a horn or crest-like process from the back or toward the base within, either sessile or elevat-

ed on a column which is shorter than the anthers. Anthers tipped with an inflexed or sometimes erect membrane; the polliferous cells lower than the stigma. Pollen masses suspended, attached in pairs to the glands of the stigmatic ring.

A. speciosa Torr. Ann. Lyc. N. Y. ii, 218. Finely canescent-tomentose, rarely glabrous with age: stem stout, 2-6 feet high: leaves from subcordate-oval to oblong, thickish transversely veined, 3-8 inches long, short petioled: peduncles shorter than the leaves: calyx-lobes densely tomentose, lanceolate, 2 lines long, closely reflexed: lobes of the corolla oblong, more than twice as long as the calyx, reflexed: hoods 4-6 lines long, spreading, the dilated body and its short inflexed horn not surpassing the anthers, but the centre of its truncate summit abruptly produced into a lanceolate-ligulate thrice longer termination: staminal column hardly any: wings of the anthers notched and obscurely corniculate at base: follicles echinate with soft spinose processes, densely tomentose, 2-4 inches long. Along streams, California to Washington, Nebraska and Arkansas.

A. cryptoceras Watson Bot. King 283 t. 28. Glabrous: stem decumbent, 6-10 inches long, simple: leaves 3-4 pairs, rounded-ovate, 1-2 inches long, on very short petioles: umbel solitary and terminal, sessile, few-flowered: corolla-lobes ovate-lanceolate, spreading, greenish-yellow, 5 lines long: hoods of the crown 3 lines long, equalling the disk, purple, ovate, abruptly pointed with 2 short recurved beaks; horns short, incurved, not at all exserted: follicles 1-2 inches long. Eastern Oregon to Utah and Nev.

A. Mexicana Cav. Ic. i, 42, t. 58. Glabrous: stems erect, 3-5 feet high: leaves in whorls of 2-6, sometimes also in axillary fascicles, petioled, linear or narrowly lanceolate, 3-6 inches long by 2-6 lines broad: umbels densely flowered: pedicels and flowers softly puberulent: calyx-lobes ovate-lanceolate, reflexed: corolla-lobes oblong, 2 lines long: hoods broadly ovate, entire, shorter than the anthers, exceeded by the stout subulate horn: follicles smooth, narrow, 2-3 inches long. Along streams, Washington to California, Arizona and Nevada.

2 GOMPHOCARPUS R. Br. in Mem. Wern. Soc. i, 37.

Our species herbs with erect stems, opposite leaves and numerous flowers in terminal and axillary umbels. Differing from *Asclepias* only in not having horns nor crests to the hoods. Calyx 5-parted, the divisions soon reflexed. Corolla rotate, 5-parted, dextrorsely valvate-convolute in the bud, soon reflexed. Crown consisting of 5 distinct cucullate appendages, destitute of crest or horn and more or less elevated on a column. Body of the stigma 5-angled.

G. cordifolius Gray Bot. Cal. i, 477. Glabrous: stems rather stout, 2-3 feet high: leaves ovate or ovate-lanceolate, with cordate clasping base, acute, 2-5 inches long: umbels loosely many-flowered: slender pedicels long and filiform, equalling or shorter than the peduncle: calyx villous-pubescent: corolla dark red-purple, the lobes oval or oblong, 3-4 lines long: hoods erect on the summit of the short column, purplish, thin, ventricose, with dorsally truncate summit, produced at the margins into subulate slender ascending cusps, equalling the anthers, a narrow fissure down the ventral side: follicles ovate-lanceolate, smooth and glabrous, erect on the deflexed pedicel. On dry hillsides, southern Oregon and California.

ORER LXXII GENTIANACEÆ Dumort. Anal. Fam. 20.

Smooth herbs with bitter colorless juice, opposite, rarely alternate or verticillate, leaves without stipules, and perfect regular flowers. Calyx mostly 4-12-lobed or -toothed, often marcescent. Corolla gamopetalous, 4-12-lobed or -toothed, convolute or imbricated and usually twisted in the bud, often marcescent. Stamens as many as lobes of the corolla, alternate with them, inserted on its tube; the 2-celled anthers opening longitudinally. Ovary free, one-celled, rarely 2-celled; with two parietal placenta, or the whole parietes ovuliferous. Style single, with usually two-lobed or two-lamellate stigma. Capsule dehiscent through the placenta. Seeds indefinitely numerous, rarely few, commonly small, anatropous, with a minute embryo in fleshy albumen.

SUBORDER I GENTIANEÆ Leaves always simple and entire. Lobes of the corolla never valvate in the bud.

* Style filiform, usually deciduous from the capsule.

1 **Microcala** Calyx 4-toothed and 4-angled: anthers cordate-ovate and unchanged in age.

2 **Erythræa** Calyx 5-parted, or sometimes 4-parted: anthers oblong or linear, twisting spirally in 1 or 2 turns in age.

** Style short or subulate and persistent, or none.

+ Corolla without nectariferous pits or large glands.

3 **Gentiana** Corolla funnelform, campanulate or salverform: seeds very numerous and small.

+ + Corolla with 1 or 2 nectariferous pits or spots, or an adnate scale to each lobe.

4 **Swertia** Corolla rotate, usually 5-parted: capsule ovate: seeds comparatively large.

5 **Frasera** Corolla rotate, 4-parted: seeds comparatively few and large.

SUBORDER II MENYANTHEÆ Leaves often crenate or trifoliate, all alternate and petioled. Corolla induplicate-valvate in the bud.

6 **Menyanthes** Corolla somewhat funnelform or campanulate, 5-cleft.

Suborder 1, Gentianeæ DC. Prodr. ix 38. Leaves always simple and entire, sessile, never alternate except in Swertia. Corolla never valvate in the bud.

1 MICROCALA Link & Hoffm. Fl. Port., i, 359.

Little annuals with opposite entire sessile leaves and yellow flowers. Calyx 4-toothed and 4-angled. Corolla short-salverform bearing the 4 short stamens in its throat: anthers cordate-ovate, unchanged in age. Style filiform, deciduous: stigma as if compressed-capitate but of 2 fan-shaped lobes that are at first connivent, but at length separate. Seeds numerous, with close and foveolate coat.

M. quadrangularis Griseb. DC. Prodr. ix, 63. Stem filiform, simple or branched, 2-3 inches high: leaves 2-3 pairs, oval or oblong, 2-3 lines long: flowers solitary at the summit of the stem or branches: calyx at first oblong-campanulate, in fruit broader, truncate at top and bottom, strongly 4-angled; the teeth short and subulate: corolla saffron-yellow, 3 lines long: capsule ovoid. In prairies, Umpqua Valley Oregon to Calif.

2 ERYTHRÆA Neck. Elem. ii, 10.

Low herbs with sessile entire leaves, and small or middle sized commonly numerous pink white or yellow flowers in cymes or spikes. Flowers 5-merous, sometimes 4-merous. Corolla salverform with either a short or rather long tube; the lobes often contorted and becoming narrower with age. Filaments slender. Anthers oblong or linear, commonly exerted, twisting spirally in one or two turns after opening. Style filiform: stigma 2-lobed, the lobes from oblong to fan-shaped. Ovary 1-celled: the placenta more or less intruded. Capsule from oblong-ovoid to fusiform, 2-valved.

E. Muhlenbergii Griseb. DC. Prodr. ix, 60. "A span or less high, at length fastigiately branched from the base, cymosely flowered at summit: leaves oblong, obtuse; the floral lanceolate: pedicels short or hardly any in the forks; the lateral often as long as the flower, but 2-bracteolate at summit: lobes of the rose-red corolla oval, very obtuse or retuse, in age merely oblong, 2 or almost 3 lines long, much shorter than the tube: anthers oblong: seeds short-oval." Western Oregon and California.

E. Douglasii Gray Bot. Cal. i, 480. Stem slender, 6-12 inches high, loosely and paniculately branched usually sparsely flowered: leaves from oblong to linear, mostly acute: flowers all on strict and slender peduncles or pedicels: lobes of the pink corolla oblong, obtuse, at most 3 lines long, mostly half the length of the tube: anthers oblong: stigma fan-shaped: seeds globular. In moist places, Oregon and California to Utah and Wyoming.

E. Nuttallii Watson Bot. King 276, t, 29. Stem erect, loosely branched, 3-12 inches high: leaves linear-oblong, 6-12 lines long, acute: panicle dichotomous, few-flowered: flowers on elongated slender peduncles: lobes of the pink corolla elliptic-oblong, 2-3 lines long, acute: stigma somewhat cup-shaped, slightly 2-lobed: capsule 4-7 lines long, becoming nearly twice the length of the calyx: seeds oblong. Nevada to Idaho and Utah.

E. minima. Stem filiform, simple or sparingly branched, 1-2 inches high: leaves lanceolate, acute, 1-3 lines long: flowers racemosely disposed, all pedicellate: lobes of the pink or white corolla lanceolate, acute, 2 lines long, more than half as long as the tube: anthers oblong: lobes of the style fan-shaped seeds globular, strongly pitted. In wet places, throughout western Oregon.

E. curvistamenea Wittrock. Stem slender 2-4 inches high, simple or sparingly branched: leaves oblong-lanceolate or the upper ones linear, acute: flowers on long slender pedicels: lobes of the light red corolla linear-lanceolate, 2 lines long, half as long as the tube: summit of the filaments curved downward with the anthers in a tangled mass about the stigma: seeds not seen. Lincoln County Washington.

3 GENTIANA Tourn. L. Gen. n. 322.

Erect herbs with chiefly sessile opposite leaves and conspicuous flowers that usually open only in sunshine. Calyx common-

ly with a membranous or spathaceous tube. Corolla funnellform or campanulate to salverform or rotate, without pits large glands or scales; the sinuses with or without pleats or appendages. Stamens as many as lobes of the corolla and inserted on its tube, included: anthers connate into a tube or separate, remaining straight after opening. Style very short or none: stigma of two spreading or rarely united lamellæ, persistent. Seeds very numerous, often covering the whole inner walls of the thin 2-valved capsule.

§ 1 *GENTIANELLA* Gray Syn. Fl. ii, 116. Corolla without extended pleats or lobes or teeth at the sinuses. Anthers usually versatile. Stigmas distinct or only causally united.

* Flowers large or middle sized, solitary on a naked peduncle terminating the stem or branches, not bracteate at base, mostly 4-merous: corolla campanulate-funnelform, its lobes usually fimbriate or erose, not crowned: a row of glands alternating with the base of the filaments.

G. serrata var. *holopetala* Gray Bot. Cal. i, 481. Slender, 2-16 inches high, with comparatively long peduncles: leaves linear or lanceolate-linear: calyx-lobes ovate-acuminate, acutely carinate, the 2 exterior longer and narrower than the others: corolla an inch or more long, its oblong lobes entire or merely erose-denticulate around the summit: capsule short-stipitate: seeds squamulose-roughened. In the high Sierra Nevada Mountains and northward to Oregon.

G. simplex Gray Pacif. R. Rep. v, 87, t. 16. Stem 2-10 inches high, simple, bearing 2-4 pairs of lanceolate or linear-oblong leaves 3-9 lines long, and a single blue flower on a slender peduncle: calyx-tube and lobes hardly at all angled or carinate; the lobes nearly equal and similar: corolla an inch long, its oblong spatulate lobes entire or erose-dentate, and sometimes a fringe of a few bristly teeth low down on the sides: capsule raised on a short stipe: seeds smooth but longitudinally striate, narrow, wingless when mature except a cellular appendage at both ends. Higher parts of the Cascade and Sierra Nevada mountains.

** Flowers small, 4-5-merous: corolla somewhat funnellform or salverform when expanded, the lobes entire.

G. tenella Rothb. Act. Hafn. x, 436, t. 2, fig. 6. "An inch to a span high: leaves (2 to 6 lines long) oblong or the lowest spatulate: calyx deeply 5- (sometimes 4-) parted; the lobes foliaceous, oblong to ovate, usually unequal: corolla 2½ to 4 lines long, double the length of the calyx (more lengthened in fruit), blue; its lobes ovate-oblong, rather obtuse, little shorter than the tube: fimbriate crown conspicuous at the throat." High mountain summits, Idaho to the Rocky Mountains.

G. acuta Michx. Fl. i, 177. *G. Amarella* var. *acuta* Herder. Stem leafy, slightly wing-angled, simple or branched, 6-20 inches high: lower leaves obovate to spatulate, obtuse, the upper lanceolate, acute or acuminate at the apex, rounded or subcordate at base, sessile or somewhat clasping, 6-24 lines long: flowers numerous, racemose-spicate, 5-8 lines high: pedicels 2-6 lines long, leafy-bracted at base: calyx usually almost 5-parted, its lobes lanceolate or linear, equal or one or two of them longer: corolla longer than the calyx, usually blue, its lobes oblong, acute or becoming obtuse: crown in the throat of few setae: capsule sessile. In the high mountains California to Alaska and across the Continent.

G. stricta. *G. Amarella* var. *stricta* Watson. Stem strict, 1-4 feet high, with strict branches, remotely leafy: leaves thickish, the cauline lanceolate-linear: flowers numerous, usually 4-merous: calyx deeply cleft, the lobes unequal: corolla whitish, 3-5 lines long, but little longer than the calyx: crown in the throat of few setae or wanting. Mountains of Idaho, Wyoming and Nevada.

§ 2 PNEUMONANTHA Neck. El. ii, 12. Flowers almost always 5-merous. Corolla plicate at the sinuses, the pleats more or less extended into thin-membranaceous teeth or lobes: without crown or glands. Stigmas distinct. Capsule more or less stipitate.

* Perennial by offsets or propagula: leaves marginless: flowers cymose: calyx short, 5-cleft: anthers oblong-linear, introrse, remaining erect.

G. Douglasiana Bong. Veg. Sitka, 38, t. 6. Stem 2-10 inches high, cymosely branched: leaves ovate, the lowest rosulate, the cauline of few remote pairs and somewhat cordate, 2-4 lines long: corolla yellow, 4-6 lines long, its lobes oblong, shorter than the funnellform tube, not twice as long as the conspicuous and equally broad 2-cleft lobes in the sinuses: capsule stipitate, obovate, two-edged above: seeds elongated-oblong, a line long, apiculate at both ends; coat close. In wet places, Oregon to Alaska.

* * Root perennial: flowers comparatively large, mostly short-peduncled or sessile, usually two-bracteate below: anthers linear, or oblong, unconnected, seldom connivent, more or less extrorse, remaining erect.

+ Dwarf; 1-5-flowered: cauline leaves only 2-4 pairs.

G. Newberryi Gray Proc. Am. Acad. xi, 84. "Stems 1-flowered, 2-4 inches long, and ascending from the axils of the rosulate-radical leaves: these obovate or spatulate, an inch or more long; cauline leaves much smaller, connate-sheathing; the lowest obovate, the uppermost lanceolate: calyx-lobes lanceolate or oblong, nearly the length of the oblong-campanulate tube: corolla broadly funnellform, inch and a half long, pale blue, white within, greenish dotted; its lobes ovate, mucronate; the interposed appendages 2-cleft or laciniate, subulate-tipped: seeds round-oval, smooth, broadly winged. Sierra Nevada, California, in or near the alpine region, from Mariposa Co. north to S. Oregon.

+ + Low: stems several from the same caudex: cauline leaves 6-16 pairs, more or less connate or even sheathing at base, the uppermost involucrate around the sessile terminal flower or 3-5-flowered cluster.

G. bisetæa. Stems decumbent or ascending, 8-16 inches long: leaves rather thick, oval to oblong, or the uppermost lanceolate, all rounded at the apex; narrowed and connate-sheathing below, about an inch long, the uppermost pair close to the solitary flower: calyx-lobes lanceolate, acute, 4-5 lines long by a line broad, about as long as the tube, strongly nerved: lobes of the blue corolla oblong, acute, not half as long as the campanulate tube; appendages in the sinuses two setae from a rather broad base: capsules stipitate: seeds oblong, with a broad wing all around, usually widest on one side. In marshes, eastern base of the Coast Mountains near Waldo, Oregon.

G. calycosa Griseb. Gent. 251. Stems erect, 6-12 inches high, leaves ovate, 6-15 lines long, commonly equalling or exceeding the internodes, the lowest pairs smaller and with connate-sheathing base, the upper hardly so; the uppermost involucrate and somewhat exceeding the calyx of the commonly solitary flower: lobes of the calyx ovate or oblong, or even subcordate, about as long as the turbinate tube: corolla oblong-funnelform, its appendages in the sinuses triangular-subulate, laciniate or 2-cleft at

tip, shorter than the broadly ovate lobes: seeds lanceolate, acuminate, wingless. On the highest mountains, Washington to California and the Rocky Mountains.

G. Parryi Engelm. Trans. Acad. St. Louis ii, 218, t. 10. Stems numerous from the crown of a somewhat woody root, 10-15 inches high: leaves glaucescent, thickish, ovate, varying to oblong-lanceolate, 9-18 lines long, most of the pairs with somewhat sheathing base; the upper 2 or 3 pairs involucrate around the 1-5 flowers, concealing the calyx and sometimes almost equalling the bright blue corolla: lobes of the calyx small, moderately or much shorter than the campanulate tube: appendages in the sinuses of the corolla narrow, deeply 2-cleft, but little shorter than the obovate lobes: seeds lanceolate, wingless, with obtuse or acatish edge. Alpine and subalpine in the Cascade and Rocky Mountains.

G. Gormanii. Stems erect, 10-18 inches high: lowest leaves small, with connate-sheathing base; the middle ones broadly ovate to nearly orbicular, with very short sheathing base, about an inch long, shorter than the internodes, the uppermost one or two pairs cordate or subcordate and involucrate around the usually solitary flower: calyx-lobes only 2, broadly ovate, acute or acuminate, longer than the tube: corolla bright blue, an inch long, nearly campanulate, its broadly ovate lobes short-acuminate: appendages in the sinuses very short, nearly entire: seeds oblong or lanceolate, apiculate. Moist subalpine meadows, northeastern Washington to Alaska.

+ + + Stems either tall or low, many-leaved flowers not involucrate: style manifest.

Corolla oblong-campanulate, with broadly, ovate lobes more or less narrowed at base and the intervening plaits entire: calyx lobes usually from ovate to lanceolate, equalling or longer than the tube.

G. Menziesii Griseb. Gent. 191. "Stems a foot or less high slender: leaves from narrowly oblong to lanceolate (inch and a half or less long), somewhat 3-nerved: flowers one or two, short-peduncled or sessile: calyx according to Grisebach spathaceous and the lobes obsolete, in our specimens with oblong-lanceolate foliaceous lobes (5 lines long) equalling the turbinate-oblong tube: corolla an inch long; its lobes 3 lines long and wide; its plaits truncate and obscurely 3-crenate: seeds ovate-lanceolate or oblong, barely acute or both ends obtuse.—Bogs, W. Oregon to Mendocino Co., California."

G. sceptrum Griseb l. c. Stems erect, 2-4 feet high, simple, or short branched above, few to several-flowered: leaves ovate to oblong-lanceolate indistinctly 3-7-nerved: calyx-lobes unequal, lanceolate to ovate-oblong: corolla 1-2 inches long, its lobes nearly 4 lines long and wide, its plaits truncate or with barely rounded entire summit: seeds narrowly lanceolate with scarious acumination. Western Oregon to British Columbia.

G. Orfordii. Stems slender, 1-2 feet high, several from a thick perennial root: leaves linear-lanceolate, 3 nerved, 1-3 inches long, below reduced to connate-sheathing bracts: flowers on rather stout peduncles: calyx-lobes linear-lanceolate, acuminate 5-6 lines long, longer than the tube: corolla blue finely specked within, an inch or more long, its short lobes acutish; appendages in the sinuses rounded: seeds minute cylindrical, not appendaged. Port Orford, Oregon, Oct. 1892 *Joseph Howell*.

+ + Corolla funnellform, with ovate lobes not narrowed at base: the plaits extended into conspicuous laciniate-toothed or cleft appendages: margins of the leaves scabrous: seeds surrounded by a distinct and rather broad wing' ovate or oblong.

G. Oregona Engelm. in herb. Stems erect and rather stout, 1-2 feet high: sometimes more slender and ascending: leaves ovate, to ovate-oblong or lanceolate 1-2 inches long: flowers few at the summit or sometimes several and racemose-scattered: bracts oblong or ovate: calyx-lobes from oblong to ovate-lanceolate as long as the tube: corolla broadly funnellform over an inch long, its short lobes roundish. Brit. Columbia to California and Idaho.

G. affinis Griseb. Gent. 191. Stems clustered, 8-12 inches long, mostly ascending: leaves from oblong to lanceolate or linear: flowers from few to numerous and thyrsoïd-racemose: bracts lanceolate or linear: lobes of the calyx linear or subulate, unequal and variable, the longest rarely equalling the tube, the shorter sometimes minute: corolla an inch or less long, rather narrowly funnellform, its lobes ovate, acutish or mucronulate-pointed, spreading. Brit. Columbia to California and the Rocky Mountains.

G. anisosepala Greene Pitt. iii, 309. "Annual, erect, slender, simple, 5-10 inches high, with a few small flowers terminal and in the upper axils: leaves in a few pairs, the lowest obovate, the middle pairs oval, the uppermost cordate-oval, all obtuse, sessile, $\frac{1}{2}$ to more than $\frac{3}{4}$ inch long: the few flowers about 4 lines long; calyx parted almost to the base into 5 narrowly elliptical very acute segments of unequal length, the shortest hardly equaling the tube of the corolla, the longest almost equaling the full length of the corolla; corolla broadly funnellform, the segments shorter than the tube, rather obtuse, almost equalled by the longer setae of the crown. Nez Percés Co. Idaho, Heller, July 1896 (n. 3440)."

+ + *Calyx 4-5-parted. Corolla with one or two nectariferous pits, or spots or an adnate scale to each lobe. Seeds comparatively large.*

4 SWERTIA L. Gen. n. 321.

Simple-stemmed perennial herbs with mostly opposite petioled leaves. and blue or white flowers in summer. Corolla rotate, 5-parted; the lobes dextrorsely convolute in the bud. Style none or very short: stigma 2-lamellate or 2-lobed. Capsule ovate: the placenta not intruded.

S. obtusa Ledeb. Mem. Acad. St. Petersburg. v, 526. *S. perennis* Pall. not of L. "A span to a foot or more high: lowest leaves oblong or obovate-spatulate (2 to 4 inches long), tapering into a long petiole; upper cauline few and narrower, sessile; some commonly alternate: inflorescence racemiform or narrowly paniculate, few-many-flowered: flowers 5-merous: sepals narrowly lanceolate: lobes of the corolla (4-6 lines long) oblong-ovate becoming lanceolate, the base bearing a pair of nectariferous pits which are crested with a fringe. Subalpine in the Blue Mountains of Oregon to the Rocky Mountains, Alaska and Siberia.

5 FRASERA Walt. Fl. Carol. 87.

Smooth herbs with erect stems, opposite or verticillate leaves and numerous flowers in thyrsoïd or paniculate cymes. Corolla rotate, 4-parted, the lobes dextrorsely convolute in the bud, bearing a single or double fringed gland, and sometimes a fimbriate crown at base. Stamens inserted on the very base of the corolla: filaments subulate, often united at base, occasionally with some interposed small bristles or scales. Ovary ovate, tapering into a distinct and often slender persistent style: stigma small, 2-lobed

or nearly entire. Capsule coriaceous, commonly flattened; the placentae or edges of the valves not intruded. Seeds comparatively few, compressed, commonly smooth and margined.

* Leaves marginless: sepals narrow, almost as long as the corolla: corolla with a single round gland upon each lobe; no crown at base: capsule strongly flattened parallel with the valves: seeds orbicular, wing margined: stem large and stout.

F. thyrsoflora Hook. Kew Jour. Bot. iii, 288. "Stems 2 or 3 feet high: leaves in pairs or threes, oblong or spatulate-obovate, the cauline 3 or 4 inches long: flowers in a dense interrupted thyrus: sepals subulate-linear (4 lines long): lobes of the pale blue corolla ovate-oblong, thin, bearing the gland near the base: style short and conical, in some flowers hardly any. Idaho and interior of Oregon on the tributaries of the Columbia."

** Leaves not margined: sepals linear, equalling the corolla: a pair of oblong glands on each corolla-lobe and a separate crown below them: capsule compressed contrary to the almost conduplicate valves: seeds oblong, flat margined.

F. speciosa Dougl. Griseb. Gent. 329. Stem stout, 2-5 feet high, very leafy: leaves in fours and sixes, nervose; the radical and lowest cauline obovate or oblong, 6-10 inches long, the upper lanceolate and at length linear: flowers very numerous in a long leafy thyrus: the peduncles and slender pedicels at length strict: lobes of the greenish-white or barely bluish and dark-dotted corolla oblong, acutish, half inch long, bearing the pair of contiguous and densely long-fringed glands about the middle, and a distant transversely inserted and setaceous multifid scale-like crown near the base, usually some minute setæ between the bases of the filaments: style subulate, shorter than the ovary. In the mountains, eastern Oregon to California, Wyoming and New Mexico.

*** Leaves with cartilaginous white margins, thickish, lanceolate or linear and grass-like, merely opposite, the cauline only 3-5 pairs: inflorescence a virgate interrupted thyrus of 3-7 pairs of sessile or short-peduncled dense cymes, forming a series of glomerate clusters: pedicels very short: sepals subulate-lanceolate, about equalling the oblong or ovate lobes of the blue corolla: fringed glands solitary, elongated, extending from the base of the lobe to near the middle, saccate and with a longer and coarser fringe at base: crown staminal, consisting of a conspicuously laciniately parted or nearly entire scale between the filaments: style slender, twice the length of the ovary: capsule compressed parallel with the flat or flattish valves, few-seeded: seeds as far as known flat, smooth, acute-angled.

F. nitida Benth. Pl. Hartw. 322. Completely glabrous: stems slender, 1-2 feet high, simple: leaves linear-lanceolate; the radical ones 6-8 inches long; those subtending the upper flower clusters reduced to small bracts: sepals linear-lanceolate, acuminate, scarcely margined with white, entire: corolla blue, sometimes spotted with greenish dots, the lobes barely acute, bearing an elongated-oblong obtuse gland: thin scales between the filaments ovate or oblong-linear, entire or sparingly lacinate, longer than the ovary. Common from Brit. Columbia to California, east of the Cascade Mountains.

F. cusickii Gray Proc. Am. Acad. xxii, 310. Glabrous: stems slender, 2-8 inches high, but little longer than the radical leaves: thyrus either of simple glomerules or interrupted spiciform: corolla large; its lobes nearly half-inch long, oval, obtuse: scales between the filaments large, orbicular, concave, nearly entire, surpassing the ovary. Hillsides of the

Grande Ronde Valley, eastern Oregon.

F. albicaulis Dougl. Griseb. l. c. Very minutely pruinose-puberulent: stems 10-18 inches high: radical leaves linear-spatulate, 2-4 inches long, attenuate below to a petiole: lobes of the corolla subulate, long acuminate, white margined, entire: lobes of the corolla lanceolate, acuminate: glands linear, closed below into a kind of pocket: scales between the filaments oblong, laciniately cleft at the summit. Eastern Oregon and Washington to Idaho.

Suborder 2. Menyantheæ Griseb. Gent. 336. Marsh or aquatic perennials with heterogonous flowers. Leaves all alternate and mostly petioled. Corolla induplicate-valvate in the bud. Seed-coat crustaceous.

6 MENYANTHES Tourn. L. Gen. n. 202.

Perennial herbs with chiefly radical leaves, and white flowers on erect scapes or scape-like peduncles. Calyx 5-parted. Corolla somewhat funnellform or campanulate. 5-cleft, the lobes widely spreading, fimbriate or crested on the inner face. Stamens 5, inserted on the tube of the corolla; filaments filiform; anthers sagittate, versatile. Ovary one-celled; style long and slender; stigma bilamellate. Capsule oval, indehiscent, but bursting irregularly across the top. Seeds rather few and large, orbicular and compressed; the close crustaceous coat smooth.

M. trifoliata L. Sp. 145. Scapes and leaves stout, 6-10 inches long, from a thick underground scaly stem or rootstock: leaves trifoliolate; long-petioled; leaflets oblong or obovate, entire or repand, obtuse at the apex, narrowed to a sessile base, pinnately veined, 1-3 inches long: raceme borne on a long scape-like naked peduncle, 10-20-flowered: pedicels stout, 3-12 lines long, bracteolate at the base: flowers 5-7 lines long: corolla white or tinged with rose, the tube longer than the calyx, the upper surface of the lobes copiously fimbriate-bearded: capsule ovoid, obtuse, about 4 lines long. In bogs, Alaska to California and across the Continent.

ORDER LXIII POLEMONIACEÆ DC. Fl. Franc. iii, 645.

Herbaceous or rarely shrubby plants with bland colorless juice, simple or divided leaves without stipules and perfect regular flowers with a free ovary and hypogynous disk. Calyx 5-parted or 5-lobed, imbricated in the bud, persistent. Corolla 5-lobed, dextrorsely convolute and not plicate in the bud. Stamens 5, distinct, inserted on the tube of the corolla, alternate with its lobes. Style one, 3-lobed, or 3-cleft and stigmatic down the inner face. Fruit a 3-celled loculicidal capsule, usually with a thick placental axis; and few or many small amphitropous or nearly anatropous seeds with a thin or soft coat, commonly developing mucilage when wetted. Embryo straight and rather large, in the axis of a fleshy or harder albumen. Cotyledons flat or flattish and rather broad.

* Leaves opposite and entire: seeds not mucilaginous when wet.

1 **Phlox** Stamens unequally inserted and included in the narrow tube

of the salverform corolla.

* * Leaves palmately 3-7-parted, the divisions rigid and pungent : seeds not mucilaginous when wet.

- 2 **Cantua** Woody-stemmed, at least at base : flowers solitary and sessile, or few in a cluster at the summit of short branches or branchlets.

* * * Leaves mostly alternate and entire : seeds mucilaginous and throwing out spiral threads when wet.

- 3 **Collomia** Stamens unequally inserted in or below the throat of the funnellform or salverform corolla : filaments slender, often exerted.

* * * * Leaves various : seeds almost always mucilaginous when wet.

+ Leaves either opposite or palmately divided to the sessile base, usually both : seed-coat mucilaginous when wetted but destitute of spiral threads.

- 4 **Linanthus** Low glabrous annuals with opposite leaves.

+ + Leaves alternate and pinnately incised cleft or divided, rarely entire : seed coat mucilaginous and sending out spiral threads when wet.

- 5 **Navarretia** Low and much branched annuals, not floccose-woolly, mostly glandular and viscid : flowers capitate-crowded and densely foliaceous-bracted : lobes of the calyx rigid and acerose-pungent or spinulose : corolla tubular-funnelform.

- 6 **Hugelia** Floccose-woolly annuals, neither glandular nor viscid : flowers capitate-glomerate and foliaceous-bracted ; lobes of the calyx acerose or subulate and cuspidate or pungent.

- 7 **Ipomopsis** Biennials : not woolly : flowers thyrsoïd paniculate : lobes of the calyx subulate : corolla narrowly tubular-funnelform.

- 8 **Gilia** Flowers scattered, crowded, or capitate-glomerate : corolla from funnellform to nearly rotate.

- 9 **Polemonium** Mostly smooth perennials with pinnate leaves and thyrsoïform or cymulose-paniculate inflorescence : lobes of the calyx foliaceous, enlarging in fruit.

PHLOX L. Gen. n. 214.

Herbs or suffrutescant plants with opposite entire leaves, and showy red, white or blue flowers in terminal cymes or cymose panicles. Calyx tubular or tubular-campanulate, 5-cleft and 5-ribbed, the lobes acute or acuminate, mostly scarious-margined and the sinuses commonly scarious, not enlarging in fruit but often bursting when the seeds mature. Corolla strictly salverform, with slender tube and narrow orifice, the limb 5-lobed. Stamens 5, straight, inserted irregularly on the tube of the corolla ; filaments very short ; anthers not exerted. Ovary oblong or ovoid, 3-celled ; with 1-4 ovules in each cell. Capsule ovoid, 3-valved. Seeds not mucilaginous nor emitting spiral threads when wet. Ours all belong to a peculiar section that is

Suffruticulose or suffrutescant, rarely herbaceous to the ground ; chiefly with narrow or minute and thick-margined leaves, and one-flowered branchlets or peduncles.

* Densely caespitose and depressed, mostly forming cushion-like evergreen mats or tufts: the short leaves crowded up to the solitary and sessile or short-peduncled flower: ovules solitary in each cell.

+ Leaves subulate or acerose, somewhat rigid, more or less beset or ciliate with cobweb-like or woolly hairs: plants forming broad mats 2-4 inches high.

P. Hoodii Richards. Frankl. Journ. Appx. t. 28. Sparsely or loosely lanate, becoming glabrate: leaves subulate, rather rigid, erect, somewhat loosely imbricated: tube of the corolla not exceeding the calyx; its lobes obovate, entire, 2-3 lines long. Sandy plains and hillsides, Wyoming and perhaps Idaho to Nebraska and the Saskatchewan.

+ + Leaves rigid, 4-6 lines long, destitute of woolly or cobwebby hairs, the margins naked, or ciliate with rigid or rather soft hairs: plants either densely or loosely tufted.

P. caespitosa Nutt. Journ. Acad. Philad. vii, 41, t. 6, fig. 1. Stem tufted, 2-4 inches high: leaves linear, subulate or oblong-linear, commonly much crowded, hispid-ciliate, otherwise glabrous or with some short glandular-tipped rigid hairs: corolla with tube somewhat longer than the calyx; it obovate entire lobes 3 lines long. On the highest mountains, Oregon to California and the Rocky Mountains.

P. Douglasii Hook. Fl. ii, 73, t. 158. Stems rather slender, ascending or erect, 2-8 inches long, rather loosely tufted: leaves acerose to linear-subulate, pubescent to nearly glabrous, often ciliate near the base, 3-6 lines long, loosely imbricated, sometimes spreading, usually fasciated at the nodes: flowers sessile or short-peduncled, 6-8 lines long: calyx pubescent; its subulate lobes as long as the tube; corolla with tube longer than the calyx, and obovate entire lobes 3-4 lines long. Eastern Oregon and Washington to Brit. Columbia and Nebraska.

Var andicola Britton Mem. Torr. Club, v, 269. Leaves longer, 8-12 lines long, less fasciated at the nodes. Range of the type.

P. diffusa Benth. Pl. Hartw. 325. *P. Douglasii* var. *diffusa* Gray. Depressed and diffusely branched, forming mats 6-18 inches in diameter: leaves linear or acerose, 6-12 lines long, very acute sometimes ciliate near the base with woolly hairs: flowers usually sessile: calyx loosely tomentose, the broad-subulate lobes longer than the campanulate tube: corolla pink or purple to white; with a broad tube longer than the calyx, and entire or obscurely crenulate obovate lobes 4-5 lines long. On the high mountains, California to Alaska.

** Loosely tufted, or many-stemmed from a merely woody-persistent base, or wholly herbaceous, with linear or lanceolate or rarely ovate spreading leaves which are little if at all fasciated in the axils: flowers slender-peduncled, solitary or somewhat cymose.

+ Calyx-tube between the strong ribs scarious, inclined to be membranaceous and more or less replicate, forming intervening angles; the narrowly-subulate and mostly rigid teeth shorter than the tube of the corolla: style long and slender, often equalling the tube of the corolla.

P. linearifolia Gray Proc. Am. Acad. viii, 255. Glabrous, sometimes minutely hirsute above, corymbosely much branched from a woody base, 6-10 inches high: leaves very narrowly linear, 1-2 inches long by less than a line wide: tube of the calyx saliently 5-angled from the base by the strong replication of the white-membranaceous sinuses; the lobes nearly acerose: tube of the corolla longer than the calyx; the obovate-cuneate lobes

entire or barely retuse, 6 lines long: ovules 2 in each cell. Along the Columbia river from The Dalles eastward.

P. longifolia Nutt. Jour. Acad. Philad. vi, 41. Nearly glabrous to pubescent, much branched or many-stemmed from a woody base, 3-8 inches high: leaves mostly narrowly linear, 1-3 inches long: calyx more or less angled by the white-membranaceous replicate sinuses: lobes of the corolla obovate or oblong-cuneate, entire or retuse, 3-5 lines long: ovules almost always solitary in the cells. Dry plains, eastern Oregon to Brit. Columbia and the Rocky Mountains.

P. Stansburyi Heller *P. longifolia* var. *Stansburyi* Gray. Conspicuously pubescent throughout, or sometimes glabrate, generally stoutish and somewhat open in growth, 6-8 inches high: leaves from linear to linear-lanceolate, 1-3 inches long: pubescence of the branchlets and calyx viscid or glandular: tube of the corolla about twice the length of the calyx; its obovate lobes entire or barely retuse: ovules 1 or 2 in each cell. Dry prairies, eastern Oregon and Washington to the Rocky Mountains.

P. adsurgens Torr. in Herb. Gray l. c. 256. Glabrous except the glandular-pubescent slender pedicels and calyx: stems slender, trailing or ascending, 6-20 inches long: leaves ovate to broadly lanceolate, acute, 5-12 lines long by half as broad, all but the lowest shorter than the internodes: tube of the corolla nearly twice as long as the calyx; its obovate entire or retuse lobes 5-6 lines long: ovules solitary in the cells. In dry open forests, southwestern Oregon.

+ + Calyx-tube cylindraceous, the thin membranous portion between the ribs not projecting into salient angles: style very short, mostly shorter than the ovary.

P. speciosa Pursh Fl. 149. Stems 1-3 feet high; the branches ascending from a shrubby base, somewhat viscid-puberulent or glandular above: leaves lanceolate or linear, 1-3 inches long, very acute above, sessile with a broad base: flowers corymbose: corolla rose color or pink to white; its tube but little longer than the calyx; its obcordate lobes 5-6 lines long: ovules solitary in the cells. Dry ridges and rocky banks, California to Brit Columbia and the Rocky Mountains.

Var. Sabini Gray l. c. Lobes of the corolla entire or barely retuse: obovate with a narrowed cuneate base. Spokane river Washington.

2 CANTUA Juss. Gen. 136.

Very leafy commonly tufted perennials or undershrubs with the leaves all alternate, rarely opposite, and showy flowers either solitary and sessile or few in a cluster at the ends of short branches or branchlets. Calyx tubular to campanulate, the lobes short-subulate, pungent. Corolla salverform; the tube more or less exceeding the calyx; the throat somewhat funnelform. Filaments short, inserted in or below the throat: anthers short, included. Ovules numerous in each cell. Seeds with a close coat, developing neither mucilage nor spiral threads when wetted.

C. pungens Torr. Ann. Lyc N. Y. ii, 26. *Gilia pungens* Benth. Puberulent, glabrate, or somewhat viscid: stems woody, usually much branched or tufted, 6-8 inches high: leaves sessile, palmately divided into 3-7 rigid and pungent subulate segments, 4-8 lines long, often with smaller ones fascicled in their axils: calyx cylindraceous; its subulate lobes $\frac{1}{2}$

the length of the tube; corolla rose white or yellow, 8-12 lines long, the narrowly oblong lobes 4-5 lines long: ovules 8-10 in each cell. Dry plains of eastern Oregon to California, Arizona and Colorado.

Var. Hookeri. *Gilia Hookeri Benth.* Taller, with sparser and more rigid leaves and viscid-pubescent flowering shoots. Eastern Oregon to California.

Var. squarrosa. *Gilia pungens var. squarrosa Gray.* A foot or two high with virgate branches beset with stouter and more rigid recurved-spreading pungent leaves. Dry interior of Washington and Idaho to Nev.

3 COLLOMIA Nutt. Gen. i, 126.

Annual or rarely perennial herbs with mostly entire alternate leaves and purple white or yellow flowers in capitate clusters or cymes. Calyx obpyramidal, 5-cleft, scarious in the sinuses accrescent in fruit, not distended nor ruptured by the maturing capsule; its lobes erect and entire; the sinuses often at length enlarged into revolute lobes. Corolla tubular-funnelform or salverform: the limb 5-lobed. Stamens unequally inserted on the tube of the corolla: the filaments unequal. Ovules few or solitary in each cell. Seeds developing both mucilage and spiral threads when wetted.

* Annuals with strict and leafy stems, entire or merely toothed leaves and numerous flowers in capitate-crowded terminal leafy clusters.

C. grandiflora Dougl. Lindl. Bot. Reg. t. 1174. Stems erect, 6-20 inches high, simple or sparingly branched: leaves lanceolate to linear, entire or coarsely serrate, acute or acuminate, 1-3 inches long, sessile or nearly so: flowers yellow or salmon color, numerous in a dense capitate leafy-bracted cluster: bracts broadly lanceolate to ovate: calyx somewhat funnelform, the triangular lobes about half as long as the tube, glandular: corolla nearly an inch long with a long filiform tube; the oblong lobes about as long as its funnelform throat: ovules solitary in the cells. Common in open woods, California to Brit. Columbia and the Rocky Mountains.

Conwall
June 10, 11

C. linearis Nutt. Gen. i, 126. Viscid-puberulent annual: stem erect, 4-12 inches high, simple or branched: leaves narrowly lanceolate to linear-oblong, entire or few-toothed or few-lobed, acute at the apex, narrowed below, sessile, or the lower short-petioled, 1-2 inches long: flowers numerous, in a close capitate cluster, 5-7 lines long: calyx-lobes triangular-lanceolate, acute: corolla purple to nearly white, with a very slender tube longer than the calyx and but little enlarged throat, the rounded lobes 1-2 lines long: ovules solitary in the cells. Eastern Oregon to Brit. Columbia, Manitoba, Minnesota, Arizona and California.

Var. subulata Gray Proc. Am. Acad. viii, 258, "A low and slender form, diffusely branching from the base: leaves narrow and acute: flowers few in the lower forks: calyx-lobes attenuate-subulate, the tips almost awn-like from a broad base, rather longer than the tube. Nevada and adjacent parts of California and Oregon.

** Annuals usually branching from the base, the flowers in nearly or quite bractless small clusters in the axils and at the ends of the branches.

C. tinctoria Kellogg Proc. Cal. Acad. iii, 17, t. 2. *Gilia aristella* Gray. Stem slender, 2-10 inches high, few-leaved, diffusely branched, minutely pubescent and glandular above: leaves lanceolate-linear, tapering to both ends, 6-14 lines long: flowers 1-3 in the forks and upper axils: calyx cam-

panulate; the lobes attenuate from a broad base to a slender awn: corolla purple, with filiform tube 4-6 lines long and small oblong lobes: capsule obovate, with attenuate base, 3-lobed. On open hillsides in mountains, Brit. Columbia to California.

C. heterophylla Hook. Bot. Mag. 2895. *Gilia Sessei* Don. Diffusely branched from the base, 3-16 inches high, soft pubescent throughout: leaves thin mostly pinnatifid with the lobes again incised, or bipinnatifid, some of the uppermost less cut or even entire and bract-like subtending the flower-clusters: calyx acute at base, cleft barely to the middle the lobes ovate-lanceolate, acuminate: corolla light purple to pink, slender, 5-6 lines long, 2-3 times as long as the calyx: stamens very unequally inserted: ovules 1-3 in each cell. Common in open woods, Brit. Columbia to California west of the Cascade Mountains.

* * * Perennials with exserted and declined stamens.

C. Mazama Coville Proc. Biol. Soc. of Wash. xi, 35. Glabrous or with a few arachnoid viscid hairs on the stem and leaf-margins, the inflorescence glandular-hairy: stems few to many from a slender perennial tap-root, 6-15 inches high, usually simple: leaves oblong-lanceolate to lanceolate, 1-2 inches long, acute at both ends, acutely and somewhat laciniately 3-5-toothed toward the apex, the upper entire and sessile, the lower often oblanceolate and petioled: inflorescence subcapitately cymose: calyx commonly 4-5 lines long; the triangular-lanceolate acuminate lobes about as long as the tube, enlarging in fruit: corolla about 7 lines long, deep blue to violet-purple, funnelform; the narrowly oblong-obovate obtuse lobes 2-3 lines long: anthers and style slightly exserted: seeds linear-oblong, solitary in the cells. On Mount Mazama southern Oregon.

C. debilis Greene Pitt. i, 127. *Gilia debilis* Watson. Minutely pubescent or hirsute and viscid: stems loosely tufted, 2-8 inches long leafy to the top: leaves pedately 3-7-parted or the upper ones 3-cleft, attenuate below to a petiole; the lobes 2-6 lines long, linear-oblong, or the larger more dilated and 2-3-cleft: flowers subsessile and solitary in the forks and axils: calyx cylindraceous; the short subulate teeth but half as long as the tube; corolla funnelform, 6-8 lines long, with elongated tube and deeply cleft limb, light purple to blue: capsule a line long; the cells 1-seeded. In loose volcanic sand on the highest mountain peaks, Oregon and Washington to California and Utah.

C. glutinosa Benth. Bot. Reg. 1833. Slightly pubescent, and glandular above: stem loosely branching, erect or diffuse, 1-2 feet long: leaves nearly simple, or cut or parted into lanceolate or narrowly oblong divisions: flowers loose or scattered: calyx obtuse or rounded at base, deeply cleft; the lobes subulate: stamens moderately unequal in insertion: ovules 1 or 2 in each cell: capsule globular. In open woods, California and Oregon to Washington.

4 LINANTHUS Benth. Bot. Reg. xix, t. 1622.

Erect and slender annuals with opposite leaves and small flowers solitary and terminal or in the forks of the branches. or in capitate leafy-bracted clusters. Tube of the calyx cylindraceous, white-scarious except the ribs which are prolonged into acerose-linear teeth, not enlarged in fruit but usually ruptured by the maturing capsule. Corolla rotate, campanulate, funnelform, or salverform. Stamens equally inserted on the tube of the corolla. Seeds numerous or rarely few in the cells, developing mucilage when wetted.

§ 1 DACTOPHYLLUM. *Gilia* § *Dactophyllum* B. & H. Flowers loose or scattered on slender pedicels. Corolla funnellform or almost rotate. Stamens inserted in the throat of the corolla: anthers oval.

L. pharnaceoides Greene Pitt. ii; 254. *Gilia liniflora* var. *pharnaceoides* Gray. Stem slender with diffuse filiform branches, 6-10 inches high: leaves palmately 2-5-parted into acerose pubescent segments, 2-6 lines long; flowers paniculate, on filiform pedicels: calyx campanulate, 2 lines long; the triangular acute lobes not as long as the tube: corolla almost rotate, the broad tube hardly as long as the calyx; the broad lobes obovate, rounded at the apex, 2-3 lines long: ovules 6-8 in each cell: capsule shorter than the calyx. Dry sandy plains, eastern Oregon and Washington to California.

L. Harknessii Greene l. c. 256. *Gilia Harknessii* Curran. Stem erect, diffusely branched, 3-10 inches high: seed-leaves oblong-linear: leaves divided to the base into filiform segments, 2-10 lines long: flowers paniculate, on filiform pedicels 6-12 lines long: calyx minutely pubescent; its lanceolate lobes as long as the tube: corolla white, 1-2 lines long; the tube but little longer than the calyx and about as long as the lobes: capsule oval, exceeding the calyx; seeds solitary in the cells, smooth, turgid, oblong, a line long. In bare places on the high mountains, Washington to California.

L. filipes Greene l. c. *Gilia filipes* Benth. Stem slender, 2-4 inches high, diffusely branched: cotyledon leaves obovate: leaves 2-5 lines long, divided to the base into filiform segments: flowers panicked, on capillary pedicels an inch or more long: calyx campanulate, pubescent; its triangular acute lobes not longer than the tube: corolla 2-3 lines long, exceeding the calyx: ovules 3-5 in each cell: capsule about equalling the calyx. On dry plains, eastern Oregon to Nevada and California.

L. Bolanderi Greene l. c. *Gilia Bolanderi* Gray. Stem almost filiform, 2-10 inches high, dichotomously branched: cotyledon leaves oblong, narrowed below to a broad petiole: leaves 2-5 lines long, divided to the base into linear or spatulate segments: flowers on filiform pedicels 1-2 inches long: calyx cylindraceous, pubescent and glandular; its subulate lobes shorter than the tube; corolla 6 lines long; the slender tube exceeding the calyx, much longer than the funnellform throat and obovate obtuse lobes: capsule oblong, shorter than the calyx: seeds 1-5 in each cell. Dry plains, Oregon to California.

§ 2 LEPTOSIPHON *Gilia* § *Leptosiphon* Endl. Mostly low or slender, with opposite leaves, and small flowers crowded into a capitate leafy-bracted cluster. Corolla salverform, with the tube mostly filiform and elongated: the very short throat commonly more or less cyathiform-dilated. Stamens inserted in the throat or orifice; anthers short. Ovules numerous in each cell.

* Leaves commonly with smaller ones fascicled in their axils and all palmately 5-7-parted into linear segments: filaments slender, exerted more or less from the throat of the corolla, but shorter than its entire lobes: ovules 6-10 in each cell.

L. bicolor Greene l. c. *Gilia tenella* Benth. Rough-pubescent throughout: stem slender, 1-3 inches high, simple or sparingly branched: cotyledon leaves petioled: divisions of the leaves acerose or some of them linear-spatulate, 2-6 lines long: tube of the calyx short, cylindraceous; its subulate lobes several times longer: tube of the corolla filiform, 10-12 lines long,

much longer than the bracts and calyx, abruptly widened into the obconic throat and oblong obtuse lobes: flowers purple to pink or straw-color; with yellow throat. Common on dry open hillsides, Puget Sound to California.

L. ciliatus Greene l. c. 260. *Gilia ciliata* Benth. Rough-pubescent throughout: stem rigid, 4-12 inches high, virgate: divisions of the leaves acerose, 2-8 lines long: tube of the calyx cylindraceous, half as long as the subulate pungent lobes: tube of the corolla filiform, 4-6 lines long, but little if any longer than the hispid-ciliate bracts and calyx: throat of the corolla funnelform, yellow, nearly as long as the oblong rounded lobes. In groves, southern Oregon to California.

* * Wholly glabrous: very dwarf: leaves entire: anthers sessile in the throat of the corolla, the cuneate lobes of which are sometimes undulate-toothed or 1-3-dentate at the apex: ovules 10-16 in each cell.

L. nudicaule. *Gilia nudicaulis* Gray. Very glabrous: stem 1-10 inches high, at length branching from the base, leafless from the cotyledons to the inflorescence which is a close head or glomerule subtended by an involucre of several ovate-lanceolate or lanceolate foliaceous bracts: corolla white, pink or yellow; the tube 3-4 lines long, about 3 times as long as the calyx, rather longer than the lobes. Sandy plains, interior of Oregon to Nevada and Colorado.

5 NAVARRETIA Ruiz & Pavon Prodr. Fl. Per. et Chil. 20.

Low annuals with alternate pinnatifid leaves and small flowers in leafy-bracted capitate clusters. Tube of the calyx scarious between the 5 prominent green angles or costa, its lobes unequal, erect or spreading, pungent tipped, all entire, or the 2 larger ones spinulose-toothed or cleft. Corolla tubular-funnelform or almost salverform, with rather small oval or oblong lobes. Stamens inserted in or below the throat: anthers short. Capsule dehiscent from above or from below, or indehiscent. Seeds one to many in each cell, mostly mucilaginous and developing spiral threads when wetted.

* Some of the leaves and bracts more than once pinnately parted, that is their primary divisions incised or parted.

+ Herbage very glandular-viscid and unpleasantly aromatic-scented: stamens included in the throat of the corolla, commonly unequal in length and slightly so in insertion: ovules and seeds 8-12 in each cell:

N. squarrosa H. & A. Bot. Beech. 368. *Gilia squarrosa* Gray. Very glandular-viscid: stem rather stout and rigid, 3-12 inches high, simple or much branched: leaves twice pinnatifid, or pinnately parted and the divisions either parted or incised; upper ones and bracts spinescent: lobes of the calyx subulate and spinescent-tipped, mostly entire, longer than the tube: corolla blue to whitish, 4-6 lines long, with slender tube and funnel-form throat, but little surpassing the calyx: capsule ellipsoid, inclined to be stipitate. Common on plains and along roadsides, western California and Oregon to Brit. Columbia.

+ + Herbage neither viscid nor glandular: stamens exerted out of the throat of the corolla, at length mostly equalling the lobes: ovules 1-4 in each cell.

N. stricta. Stem strict, 4-6 inches high, divaricately branched above: leaves few, bipinnate, the divisions all spinose: bracts similar to the leaves,

white-pubescent: calyx pubescent, the teeth all spinose-tipped and toothed, very unequal: corolla pale blue, with filiform tube and funnelform throat; not exceeding the bracts: stamens about equalling the oblong corolla-lobes: capsule obovoid few-seeded: seeds winged. Southwest Oregon.

N. intertexta Hook. Fl. ii, 72. *Gilia intertexta* Steud. Neither viscid nor glandular: stem erect, simple or widely branched, 4-8 inches high, rather stout; leaves nearly glabrous with divaricate acerose spinescent divisions sparingly divided or simple: flowers densely glomerate: tube of the calyx and base of the bracts strongly villous with white spreading hairs; its unequal spinescent and entire lobes equalling the white corolla: ovules and seeds 3-4 in each cell. In damp places, Brit. Columbia to California and the Rocky Mountains.

Connell
June 10.

N. Suksdorfii. Low and depressed, or erect, 1-3 inches high, much branched; leaves linear, an inch or two long, entire or with a pair or two of linear lobes near the base, not spinose: flowers in dense globular heads, the subtending bracts bipinnate with spinose lobes: lobes of the calyx shorter than the cylindraceous tube, which is but slightly contracted at the sinuses; the smaller ones entire: corolla white, barely exceeding the calyx: stamens as long as the corolla: capsule very thin, 3-seeded: seeds oblong. Low grounds, Falcon Valley, Klickitat Co. Washington. Distributed by Mr. Suksdorf, as *Gilia minima*, from which it differs in its dense heads and 3-lobed calyx-teeth.

N. minima Nutt. Pl. Gamb. 160. Depressed, often forming broad tufts, $\frac{1}{2}$ -2 inches high glabrate: leaves acicular with simple and few divisions: flowers in small loose heads the subtending bracts spinosely pinnate: tube of the calyx white-hairy in the broad sinuses, as long as the spinose entire lobes which equal or exceed the white corolla: ovules 1-3 in each cell: capsule oblong-obovate, attenuate below. Interior of Oregon and Washington to Arizona and Nebraska.

N. Breweri Greene l. c. 137, *Gilia Breweri* Gray, Erect or at length much branched and diffusely spreading, 1-10 inches high, very minutely glandular-puberulent throughout: leaves with mostly simple acicular-subulate divisions: flowers in lax glomerules; the subtending bracts similar to the leaves: tube of the calyx a line long, 2 or 3 times shorter than the unequal entire lobes: corolla yellow, the slender tube equalling the calyx: stamens and style equalling the oblong corolla-lobes: ovules 1 or 2 in each cell. Southeastern Oregon to Wyoming, Nevada and California.

N. leucocephala Benth. Pl. Hartw. 160. Glabrous except some woolly pubescence at the summit of the stem and scarious calyx-tube: stem slender, 4-10 inches high, seldom rigid: leaves soft, their often simple divisions slender-spinulose: flowers in rather small heads, the subtending bracts with barely pungent divisions: calyx-tube contracted at the sinuses, about equalling the subulate entire lobes: corolla white, longer than the calyx: stamens exserted: ovules 2 in each cell. In wet places, southern Oregon to California

* * Leaves simply pinnatifid or incised or many of them entire.

N. divaricata Greene l. c. *Gilia divaricata* Torr. Stem slender, 1-6 inches high divaricately branched not glandular-viscid but glabrate: leaves slender and filiform, or the upper with acerose divisions and passing into the bracts of the small heads which are palmately 3-5-cleft: calyx woolly-pubescent; the scarious tube much shorter than the unequal entire lobes: corolla rather slender, 3-4 lines long; the slender tube about equalling the calyx-teeth: stamens included: ovules 5-7 in each cell. Washington to California, in the high mountains.

N. atractyloides H. & A. Bot. Beech. 368. Pubescent and very viscid:

rather stout 6-8 inches high, very rigid, especially the leaves and bracts; these lanceolate or the uppermost ones ovate, all pinnatifid and with divaricate subulate-spinose lobes: flowers glomerate: calyx cylindraceous with unequal, entire or 3-cleft, pungent teeth: corolla purple about twice the length of the calyx; ovules 6 or 7 in each cell. On dry ridges, southwest Oregon to California.

6 HUGELIA Benth. Bot. Reg. 1652.

Low floccose-lanate plants with narrow or narrowly lobed alternate leaves, and blue or white flowers in leafy-bracted terminal glomerules. Calyx densely woolly, 4-5-lobed, with acerose or subulate and cuspidate or pungent lobes. Corolla salverform; with ovate or oblong lobes. Filaments filiform, exserted: anthers deeply sagittate. Seeds few in each cell.

H. floccosa. *Gilia floccosa* Gray. Floccose-woolly, at least when young: stem 2-12 inches high, simple or branched, often diffuse or spreading: lobes of the calyx subulate, unequal, one large and three smaller ones, pungent: corolla yellow with blue or white lobes; its tube 3-4 lines long, surpassing the calyx-lobes: anthers narrowly oblong: seeds 1 or 2 in each cell. Dry plains, southeastern Oregon to California, Utah and Arizona.

7 GILIA Ruiz & Pav. Prodr. Fl. Per. & Chil. 25, t. 4.

Herbs with alternate or opposite simple or compound leaves and various inflorescence. Calyx campanulate or tubular, 5-toothed or 5-cleft, the sinuses usually scarious. Corolla funnelform or salverform, or sometimes campanulate or nearly rotate, regular. Stamens equally or unequally inserted in the tube or in the throat of the corolla: the mostly slender filaments sometimes unequal in length. Ovary oblong or ovoid, 3-celled with solitary or several ovules in each cell. Seeds 1-10 in each cell, usually developing mucilage, and often spiral threads, when wetted.

* Bracts and calyx-lobes commonly cuspidate or aristulate, and pubescent with long and many-jointed somewhat viscid hairs: flowers capitate-congested or sometimes more loosely cymose.

G. congesta Hook. Fl ii, 75. White-pubescent throughout: root perennial: stems erect or spreading, 3-12 inches long from a tufted base, bearing simple terminal, or few and corymbose capitate cymes: leaves mostly petioled, $\frac{1}{2}$ -2 inches long, pinnately divided into 3-9 narrowly linear mucronate divisions, or the uppermost entire: calyx campanulate; with very short tube and oblong cuspidate-pointed lobes: corolla white, with oval lobes nearly as long as the tube, which does not exceed the calyx-lobes: filaments short, at length as long as the anthers: ovules 1-4 in each cell. Dry plains, eastern Oregon to California and Nebraska.

** Rather tall biennials with thyrsoid-paniculate inflorescence.

G. aggregata Spreng. Syst. i, 626. Somewhat pubescent: stems erect, 1-4 feet high, leafy, simple, or sometimes loosely branched: leaves thickish, 1-3 inches long, mostly petioled, pinnately parted into narrowly linear mucronulate segments: flowers in a thyrsoid narrow loose or interrupted panicle, sessile, in small mostly short-peduncled clusters: calyx commonly glandular, 3-4 lines long; the campanulate tube about as long as the subulate teeth: corolla from scarlet to pink or white, 12-18 lines long, tubular-funnelform; its lobes ovate or lanceolate, acute or acuminate, 3-4 lines long, widely spreading, soon recurved: stamens inserted in the throat or

below the sinuses of the corolla, not longer than its lobes; filaments slender; anthers short, oblong or oval: ovules numerous in the cells: seeds developing mucilage and spiral threads when wetted. On dry ridges in mountainous districts, California to Brit. Columbia and Nebraska.

* * * Flowers scattered, crowded or rarely capitate-glomerate, inconspicuously bracted or ebractate.

+ Ovules and seeds few or numerous in the cells: stamens inserted in or just below the sinuses: annuals.

+ + Corolla more or less funnellform, having a distinct tube.

= Leaves once or twice pinnately parted or cleft: seeds developing mucilage and spiral threads when wetted.

G. capitata Dougl. Hook. Bot. Mag. t. 2698. Nearly glabrous: stem rather slender, usually 1-3 feet high, paniculately branched: leaves 2-3-pinnately divided into slender or even filiform lobes: flowers numerous, in dense capitate clusters terminating long naked peduncles: calyx glabrous or nearly so, the lanceolate acuminate lobes not longer than the campanulate tube: corolla blue to white, 4-5 lines long; its tube about as long as the narrowly oblong or lanceolate-linear lobes: stamens inserted in the very sinuses of the corolla and equalling its lobes: anthers elliptical. Common in open places and fields, California to Brit. Columbia.

Cornwall
June 10. 1911

G. achilleifolia Benth. Bot. Reg. 1622. Somewhat pubescent: stem rather stout, 1-2 feet high, loosely branched above: leaves once or twice pinnately parted into linear lobes: flowers numerous, in dense capitate clusters terminating long peduncles: calyx pubescent; its ovate almost spinose-tipped lobes longer than the tube: lobes of the blue corolla obovate or broadly oblong; its throat abruptly and amply dilated: stamens inserted in the sinuses of the corolla and about equalling its lobes. Western California and Oregon to Brit. Columbia.

Cornwall
June 16. 1911

G. inconspicua Dougl. Hook. Bot. Mag. t. 2883. Viscid, and usually with slight woolly pubescence when young: stem stoutish, 4-12 inches high, branching from the base: leaves mostly pinnatifid or pinnately parted, or the lowest bipinnatifid with short cuspidate lobes, the upper becoming small, subulate and entire: flowers somewhat crowded and sessile, or at length loosely paniced and some of them slender-pedicelcd: calyx 2 lines long, the short subulate teeth not half as long as the tube: corolla narrowly funnellform, with proper tube shorter or slightly longer than the calyx: seeds several in each cell. Dry hillsides and sandy plains, California and eastern Oregon to Brit. Columbia and the Rocky Mountains.

Var. sinuata Gray Proc. Am. Acad. viii, 278. Corolla becoming thrice the length of the calyx, with the tube more exerted, with the throat and lobes more ample. Dry plains, eastern Oregon to California and N. Mex.

= = Seeds destitute of mucilage and spiral threads when wetted.

G. gracilis Hook. Bot. Mag. t. 2924. Stem stout, simple, or at length corymbosely much branched and spreading. 2-10 inches high: leaves linear or the lower ones obovate to lanceolate, entire, sessile, the lower ones mostly opposite, 4-10 lines long: calyx rounded at base, deeply cleft, with strongly carinate subulate lobes: corolla about 5 lines long, purple or violet, the slender tube yellowish, and seldom longer than the calyx: seeds flat and somewhat winged. Common in open places, Brit. Columbia to California and Nebraska.

G. leptomeria Gray l. c. Somewhat glandular viscid: stem 6-12 inches high: leaves mainly radical, oblong or broadly lanceolate, incisely toothed or sinuate-pinnatifid the obtuse teeth or lobes minutely cuspidate; the cauline small and reduced upward to the subulate bracts of the open

effuse cymose panicle; flowers inconspicuous; corolla white, 2-3 lines long, fully twice the length of the calyx, slender-funnelform, with very small acute lobes: capsule ovoid, equalling or exceeding the triangular acute calyx-teeth. Eastern Washington and Oregon to Nevada and Utah.

G. hispida Piper *Erythraea* vi, 30. " Annual, prostrate, 3-5 inches in diameter, hispid throughout with white hairs; stems usually purplish, branched from the base in a falsely dichotomous manner, the branches curving inward in age; leaves all alternate, spatulate-lanceolate, acutish or the earliest truly spatulate and obtuse, 6-12 lines long, all tapering to a narrowed base; midrib prominent in age, the veins not visible: flowers solitary and sessile in the forks or terminal, the latest ones loosely crowded in very leafy capitate clusters: calyx green, very hispid the lobes nearly equalling the corolla, becoming scarious at base in age; corolla pinkish, tubular, 4 lines long, the lobes very short and obtuse, very slightly dilated in the throat, sparsely hispid above both within and without; stamens unequally inserted, entirely included in the lower half of the tube: ovary 2-celled; style short, one-half the length of the corolla: mature capsule oblong, 1-2 lines long with about eight ventricose swellings on each valve marking the position of the seeds; seeds 10-12, black, wrinkled, the coats not developing mucilage when wetted. In drifting sand at Pasco Washington.

++ ++ Pedicels slender or filiform, scattered, becoming horizontal or reflexed: corolla campanulate or rotate.

G. micromeria Gray l. c. Nearly glabrous, glandless, effusely much branched; branches filiform: radical and lower leaves pinnatifid, with obtuse lobes; the upper linear and entire: pedicels capillary, 6-7 lines long, axillary, or opposite leaves: flowers barely a line long: corolla campanulate, white, a little longer than the 5-cleft calyx: capsule globular, few-seeded. Northwest Nevada, to be looked for in adjacent Oregon.

G. filiformis Parry, Gray Proc. Am. Acad. x, 75. Completely glabrous and smooth: stem erect with filiform spreading branches: leaves all filiform or nearly so, entire: pedicels scattered, capillary, at length refracted: corolla cream-color, very open-campanulate, 2 lines long, deeply 5-cleft, exceeding the 5-parted calyx; its lobes truncate and obscurely erose-dentate: capsule globular: seeds few, developing mucilage but not spiral threads when wetted. Eastern Washington to Utah.

+ + Much branched annuals with filiform or slender-subulate and entire or sometimes 3-parted leaves and short-campanulate 5-toothed calyx: flowers scattered, small: stamens inserted on and included in the tube of the corolla: ovules solitary in the cells.

G. minutiflora Benth. DC. Prodr. ix, 315. Glabrous or minutely glandular-puberulent above: stem erect, 10-20 inches high, with many virgate and rigid, slender branches: upper leaves all reduced to minute subulate appressed bracts, the lower larger and some of them 3-parted: flowers 2 lines long, terminal and spicately disposed along the branchlets: tube of the corolla about twice the length of the calyx and of its own lobes: filaments slender: capsule ovoid: seeds oblong. Eastern Washington and Oregon to Idaho and Wyoming.

G. tenerrima Gray Proc. Am. Acad. viii, 277. Minutely and sparsely glandular: stem 4-10 inches high, effusely much branched with filiform branches: leaves entire, linear-lanceolate: flowers loosely paniced, on slender divergent pedicels, minute: calyx campanulate, the lanceolate lobes equalling the tube: lobes of the corolla oblong, as long as the calyx: capsule globular: seeds turgid-oval. Southeastern Oregon to Utah.

G. capillaris Kellogg Proc. Cal. Acad. v, 49. Slender annual 2-18 inches high, glandular, otherwise glabrous, branching into an effuse pan-

icle: leaves 6-20 lines long or the uppermost reduced to small subulate bracts, entire or the lower sometimes with 2 or 3 small lobes: peduncles filiform or capillary: calyx small; its lobes subulate: corolla pink-red, 5-10 lines long; its slender tube longer than the calyx, and rather abruptly expanded into a wide funnellform throat of about the length of the oval spreading lobes. On wet banks, California to Washington.

G. linearifolia. Minutely glandular: stem slender, 6-12 inches high, branching into an effuse panicle: leaves linear, 6-12 lines long, attenuate at both ends: peduncles filiform: calyx a line long, with short-oblong triangular-pointed lobes: corolla with a slender tube longer than the calyx, gradually expanded into a funnellform throat of about the length of the oblong lobes. In moist places, southern Oregon.

8 POLEMONIUM Tourn. Inst. 146, t. 61.

Herbs with alternate pinnate or pinnately parted leaves, and mostly showy flowers in cymose panicles, or racemes, or thyriform. Calyx herbaceous throughout, neither angled nor costate, slightly accrescent and loosely investing the capsule, campanulate or narrower, cleft to the middle, the lobes equal, erect or connivent over the capsule, or campanulate-spreading, entire. Corolla regular, from funnellform to nearly rotate. Filaments more or less declined, and usually pilose-appendaged at base, slender. Ovules few or several in each cell. Seeds angular or winged, developing mucilage when wetted.

§ 1 Root annual. Flowers solitary, opposite the leaves. Corolla almost rotate, shorter than the broad and open deeply 5-cleft calyx. Filaments almost naked at base.

P. micrantha Benth. DC. Prodr. ix, 318. More or less viscid-pubescent: stem 2-8 inches long, diffusely much branched from the base: leaflets 5-13, obovate to lanceolate, 2-4 lines long: calyx truncate at base, the broadly lanceolate lobes 2 lines long, twice as long as the broad tube: peduncles mostly solitary, opposite the leaves or terminal: corolla white, a line or two long: ovules 1-3 in each cell: capsule globose, shorter than the calyx. In moist places, California to Brit. Columbia, east of the Cascade Mts.

§ 2 Root perennial. Leaflets simple and entire, sometimes confluent. Inflorescence open and with very few bracts. Corolla campanulate-funnelform with tube not surpassing the open-campanulate calyx, and shorter than the ample spreading limb. Filaments usually dilated and pilose-appendaged at base.

* Stem 6-10 inches high, from cespitose-branching and mostly thickened rootstocks: leaflets seldom 6 lines long: flowering stems only 1-3-leaved: flowers cymulose.

P. elegans Greene Pitt. iii, 305. Very viscid-pubescent throughout except the corolla: stems slender, 2-6 inches high; simple or sparingly branched above: leaflets very numerous somewhat crowded, obovate to elliptical, a line or two long: flowers in a small cymulose cluster; calyx campanulate, cleft to the middle, with broadly lanceolate lobes: corolla blue with yellow throat, 6-7 lines long, the broadly obovate lobes equalling the tube: filaments pilose at base: style barely exerted: capsule ovoid, much shorter than the calyx, few-seeded. On Mount Adams Washington near perpetual snow.

P. humile Willd. in Roem. & Sch. Syst. iv, 792. Somewhat pilose

below, pubescent above: stems rather stout, 4-8 inches high, corymbosely branched: leaflets 15-21, oblong to broadly lanceolate, or some of the lower ones obovate, 4-8 lines long: flowers in cymulose clusters: calyx open-campanulate, 2-3 lines long, cleft to the middle, with short triangular lobes: corolla pale blue or purplish, 4-6 lines long; its ample rounded lobes much longer than the tube: filaments pilose and dilated at base: ovules 2-4, and seeds 1 or 2 in each cell. On the highest mountains, California to the Arctic coast and the Rocky Mountains.

P. pulchellum Bunge in Ledeb. Fl. Alt. i, 233. Minutely puberulent and viscid-glandular: stems rather slender, sparingly branched, 6-10 inches high: leaflets 9-21, oblong to lanceolate: flowers in cymulose clusters, mostly slender-pedicel: calyx narrowly campanulate, cleft to below the middle, 2-3 lines long: corolla blue with white tube, 6-8 lines long, the ample oblong lobes much longer than the short tube: filaments pilose but not dilated at base: capsule obovoid, much shorter than the calyx: ovules 2-4 and seeds usually 1 in each cell. On high mountains, Oregon to Alaska and the Rocky Mountains.

* * Tall, from slender rootstocks or roots: leaves and leaflets comparatively large.

+ Stems erect, 1-3 feet high: leaflets numerous and mostly approximate, not rarely confluent or the rachis winged: ovules 6-13 in each cell.

P. occidentale Greene Pitt. ii, 75. *P. caeruleum* of authors as to our plant. Either glabrous or viscid-pubescent: stem strict and virgate, 2-3 feet high, from running rootstocks, 5-10-leaved: leaflets 15-23, from linear-lanceolate to oblong-ovate, 5-20 lines long: flowers numerous, in a naked and narrow thyrsus or panicle: calyx cleft to or below the middle, with short lanceolate lobes: corolla blue, an inch or less in diameter, the obovate lobes much longer than the tube: filaments densely bearded at base, often equalling the corolla-lobes: style exerted. In springy places on high mountains, California to Alaska and the Rocky Mountains.

P. foliosissimum Gray Syn. Fl. ii, 151. Very viscid-pubescent throughout and strong-scented: stems a foot or more high, very leafy: leaflets from lanceolate to ovate-lanceolate: flowers corymbose-cymose, small: corolla commonly white or cream-color, sometimes violet, twice as long as the calyx which is 5-cleft to or beyond the middle: style and stamens not exerted. Idaho to the Rocky Mountains and New Mexico.

P. pectinatum Greene Bull. Cal. Acad. i, 10. Glabrous or the inflorescence viscid-pubescent: stems clustered, a foot or more high, slender, leafy to the summit: leaflets linear-filiform, an inch long, in about 5 pairs: flowers corymbose-cymose: calyx cleft to beyond the middle: corolla half-inch broad, white or cream-color: seeds wingless. Collected in eastern Washington by Prof. E. W. Hilgard in June 1882.

+ Herbage glabrous or slightly pubescent, neither viscid nor glandular: stems lax, with diffuse branches and open corymbiform or paniculate inflorescence: leaflets fewer and rather large, membranaceous, only the ultimate at all confluent: style and stamens rather shorter than the corolla: ovules only 3-4 in each cell.

P. carneum Gray l. c. Stems rather stout 1-2 feet high: leaflets 5-15, from ovate to oblong-lanceolate, 6-18 lines long: branches somewhat umbellately 3-5-flowered: pedicels slender, pubescent: calyx campanulate, 6-10 lines long, pubescent; the lanceolate acute lobes longer than the tube: corolla salmon-color or flesh-color, 12-18 lines broad, the ample rounded obovate lobes thrice longer than the tube: filaments slender, villous at the slightly dilated base: capsule oblong not longer than the tube of the calyx: seeds 2 or 3 in each cell. In damp places, southwestern Oregon to Calif.

P. amœnum Piper *Erythea* vii, 174. "Perennial, erect, or nearly so, 15-24 inches high, glabrous below, sparsely viscid-puberulent above; stems terete, slightly wing-margined; cauline 4 or 5, 18 inches long; leaflets 15-21, lanceolate, sessile, attenuately acute, 1-2 inches long: inflorescence leafy-bracteate, open, the flowers in clusters of 2-4 on slender peduncles; bracts 3 to 9-foliolate; calyx deeply 5-cleft, 5 lines long, viscid-pilose, the narrow acute lobes about twice as long as the tube; corolla pale blue, 6-10 lines long, the broad obtuse lobes exceeding the tube; filaments dilated at base, pilose-appendaged; style 3-cleft at the apex included; seeds 3-4 in each cell. Humtulips, Chehalis Co. Washington."

P. luteum. Slightly pubescent: stems slender, ascending, 6-18 inches long leafy, cymosely 3-9-flowered: leaflets 11-21, oblong to almost lanceolate, acute, or the terminal ones rounded at the apex, 2-8 lines long, the lower ones smallest: calyx open-campanulate, 4-6 lines long, cleft nearly to the base, the ample lobes lanceolate, often more or less acuminate: corolla yellow, 8-10 lines long, the ample obovate lobes 3 or 4 times as long as the tube: filaments slender, pubescent at base, about half as long as the corolla-lobes. In forests of the Cascade Mountains Oregon.

§ 3 Leaflets very small and crowded so as seemingly to be verticillate. Inflorescence capitate-congested or spiciform. Corolla strictly or even narrowly funnellform; its tube more or less exceeding the oblong or cylindraceous calyx, prominently longer than its lobes. Filaments naked or nearly so, not dilated at base, usually inserted on the middle of the tube, or occasionally adnate higher.

P. confertum Gray Proc. Acad. Philad. 1863. Stems 10-12 inches high from a tufted rootstock, glandular-pubescent and viscid, musky-fragrant: petioles of the radical leaves conspicuously scarious-dilated and sheathing at base: leaflets 1-3 lines long, mostly 2-3-divided and so appearing as if in fascicles or whorls; the divisions from round-oval to oblong-linear: flowers densely crowded, heavy-scented: corolla deep blue, 6-12 lines long, its rounded lobes 2-3 lines long: ovules about 3 in each cell. Bleak points on the highest mountains Idaho to the Rocky Mountains and California.

ORDER LXIV HYDROPHYLLACEÆ Lindl. Nat. Syst. 271.

Herbs, or rarely shrubs, with colorless insipid juice, alternate or sometimes opposite leaves without stipules, and mostly a scorpioid bractless inflorescence or the scorpioid cymes more commonly reduced to geminate or solitary false spikes or racemes which in descriptions may be termed spikes or racemes. Calyx 5-parted or nearly 5 sepalous inferior and free from the ovary. Hypogynous disk at the base of the ovary often conspicuous. Corolla regularly 5-lobed, with the 5 stamens borne on the base or lower part, and alternate with its lobes. Styles 2, distinct or partly united, or rarely completely united: stigma terminal. Ovules amphitropous or anatropous, from 4 to very many, pendulous or when numerous almost horizontal. Fruit a 2-valved capsule, 1-celled with 2 parietal placentæ, or incompletely 2-celled by the approximation or meeting of the placentæ, or even completely 2-celled by their union in the axis. Seeds with a close and usually reticulated or pitted coat, and a small

or slender embryo in cartilaginous or firm-fleshy albumen.

TRIBE I Ovary and capsule strictly 1-celled, lined with a pair of expanded placentæ. Capsule loculicidally dehiscent

- 1 **Hydrophyllum** Root perennial or biennial: leaves all alternate: calyx nearly unchanged in fruit: style and stamens exserted.
- 2 **Nemophila** Root annual: some or all of the leaves opposite: calyx enlarged in fruit: stamens and style shorter than the corolla.

TRIBE II Ovary either strictly 1-celled or 2-celled by the meeting of the narrow placentæ in the axis.

* Leaves all or all but the lowest alternate.

+ Style 2-cleft, at least at the apex.

- 3 **Phacelia** Corolla not yellow, deciduous: stamens equally inserted low down on the corolla.
- 4 **Emmenanthe** Corolla yellow or yellowish, persistent: stamens equally inserted low down on the corolla.
- 5 **Conanthus** Corolla purple, deciduous, funnelform; the slender filaments unequally inserted more or less high up on its tube.
+ + Style and even the stigma entire.
- 6 **Romanzoffia** Corolla white or pink, funnelform; the stamens inserted on the base of the tube.

** Leaves and 1-flowered peduncles all radical: style 2-cleft at the apex.

- 7 **Capnorea** Corolla campanulate or rotate, with the stamens inserted on its base.

TRIBE III Ovary completely or incompletely 2-celled. Capsule loculicidal bearing the half dissepiments on their middle.

- 8 **Nama** Mostly low herbs: capsule membranaceous, the valves and placentæ undivided.
- 9 **Eriodictyon** Shrubby plants: capsule crustaceous, loculicidal then septicidal, thus apparently 4-valved.

Tribe 1 Hydrophyllæ B. & H. Gen. ii, 825. Calyx sometimes appendaged at the sinuses. Corolla mostly convolute in the bud. Style more or less 2-cleft at the apex. Ovary hispid, at least at the apex, strictly 1-celled, lined with expanded, at first fleshy, at maturity thin and membranaceous placentæ, which form a lining to the pericarp, and enclose the 4 or more amphitropous ovules. Capsule globose, Seeds by abortion commonly fewer than ovules, globular or angled by mutual pressure: albumen cartilaginous.

1 HYDROPHYLLUM Tourn. L. Gen. n. 204.

Perennial herbs with alternate petioled and lobed or divided leaves and small flowers in terminal scorpioid racemes or heads on long naked peduncles. Calyx early open, without appendages at the sinuses, nearly unchanged in fruit. Corolla campanulate, the tube within bearing a linear longitudinal appendage opposite each lobe with infolded edges, forming a nectariferous groove.

Filaments slender, long-exserted, bearded at the middle; anthers linear or oblong, inflexed in the bud. Style slender, long-exserted. Seeds 1-4, ovules only four.

H. capitatum Dougl. Benth in Linn. Trans. xvii, 273. Retrorsely hispid with minute white hairs: stems often tufted. 4-12 inches high from a small fascicle of thickened perennial perpendicular roots: one-several-leaved, erect in flower, recurving and often prostrate in fruit: leaves long-petioled, exceeding the stems, pinnately 5-7-parted or at base divided; the lanceolate divisions entire or often 2-3-lobed or 2-3 cleft, all mucronate-tipped: flowers in a dense capitate cluster: calyx very hispid, parted nearly to the base, with linear-oblong, obtuse divisions: corolla blue, but little longer than the calyx: filaments twice as long as the corolla; anthers oblong, attached near the middle; style equalling the stamens, 2-lobed: seed a line in diameter. Under shrubs &c. Brit. Columbia to California east of the Cascade Mountains.

H. occidentale Gray Proc. Am. Acad. x, 314. Pubescent, hirsute, or sparingly hispid: stems erect, usually numerous from a fascicle of fleshy-fibrous roots, 12-18 inches high: leaves elongated-oblong in general outline, pinnately parted or divided into 7-15 oblong, mostly incised or cleft obtuse divisions 1-2 inches long: peduncles rather slender, elongated, often surpassing the subtending leaf: cymes mostly dense or capitate: calyx deeply parted, its divisions lanceolate and rather obtuse: corolla white to violet-purple, 4-5 lines long: anthers oblong-linear. In moist shady places, Washington to California.

Var. Fendleri Gray l. c. Pubescence mainly hirsute or hispid, not at all canescent or cinereous: divisions of the leaves broader, acute or acuminate, incisely serrate: peduncles shorter: cyme rather open: corolla white or nearly so. In shaded ravines, Mount Adams Washington to Colorado and New Mexico.

H. Virginicum L. Sp. 146. Pubescent with short scattered hairs: stems few or solitary from a short scaly rootstock, 1-2 feet high: leaves very long-petioled, ovate or cordate in outline, 3-5-parted or divided, the lobes or divisions 2-4 inches long, ovate-lanceolate to rhombic-ovate, acute or acuminate, coarsely incised-toothed, the lowest commonly 2-cleft, and the terminal one often 3-lobed: peduncle elongated, at length surpassing the leaves, usually once or twice forked; cymes at length open: calyx parted to the very base into linear and spreading hispid-ciliate acute divisions: corolla nearly white, or sometimes deep violet, 3-4 lines long: filaments more than twice as long as the corolla; anthers oblong, attached below the middle. In rich damp woods, Oregon to Alaska and across the Continent.

2 NEMOPHILA Nutt. Jour. Acad. Phila. ii, 179.

Annuals with mostly opposite and usually pinnatifid leaves, and usually large flowers on rather long axillary peduncles. Calyx deeply 5-cleft or 5-parted, with a reflexed or spreading appendage in each sinus, enlarged in fruit. Corolla rotate or nearly campanulate, usually longer than the calyx: the base within mostly with 10 appendages. Stamens shorter than the corolla: anthers usually sagittate-oblong. Ovules 4-20. Seeds commonly with a deciduous or more persistent caruncle.

N. Menziesii H. & A. Bot. Beech. 125. Sparingly strigose-pubescent: diffusely branched from the base, the branches mostly prostrate, 2-10 inches long: leaves oblong in outline on rather short winged petioles, 3-9 parted into rounded obovate lobes 1-2 lines long: peduncles 2-3 inches

long: calyx hirsute, deeply parted, with lanceolate lobes and linear appendages: corolla an inch or less in diameter, rotate, the ample obovate lobes white or light blue speckled with dark blue: scales at the base of the short tube narrow, wholly adherent their free edge densely hirsute-ciliate: ovules 8-24: seeds 5-15, globular, with a very prominent papillæform caruncle. Common in open places, Willamette Valley Oregon to California.

N. pedunculata Dougl. Hook. Fl. ii, 79. Minutely hispid: stems slender, 2-6 inches high, paniculately branched: leaves bipinnatifid or the upper ones pinnate only, with rounded lobes: calyx 5-parted, with oblong acute lobes, the appendages in the sinuses very small or obsolete: corolla white, 4-5 lines broad, the obovate emarginate lobes longer than the tube and surpassing the calyx; appendages in the throat broad and glabrous: stamens inserted on the base of the corolla and not longer than its tube: ovules: a pair to each placenta: seeds globose; the caruncle at length evanescent. In damp places, southern Oregon to California.

N. parviflora Dougl. Hook. Fl. ii, 79. Rough-pubescent with short retrorse hairs: stems slender, 4-16 inches long branching from the base, prostrate or ascending: leaves broadly ovate in outline 6-10 lines long by 4-8 lines broad, pinnately 5-lobed, with ovate acute and mucronate lobes, the lower sometimes coarsely 2-3-toothed; petiole shorter than the blade: peduncles slender, an inch or less long in fruit: calyx 2 lines long or less, deeply 5-lobed with lanceolate lobes inconspicuous linear appendages: corolla white, campanulate, but little longer than the calyx, the rounded obovate lobes longer than the tube, the appendages in the throat linear and glabrous, or almost obsolete: stamens inserted on the base and not exceeding the tube of the corolla: anthers short, cordate, very obtuse: ovary 4-ovuled, very hispid: capsule much longer than the calyx, 1-4-seeded. Common in forests, western Oregon and Washington.

N. densa. *N. parviflora* Gray in part. Sparingly pilose: stem somewhat succulent, decumbent and spreading from the base, forming dense round mats 2-3 inches in diameter: leaves oblong in outline, 6-7 lines long by 2-4 lines broad, pinnately 7-parted, with obovate, barely apiculate lobes: calyx $1\frac{1}{2}$ lines long, with subulate lobes and linear appendages: corolla blue, campanulate or more open, twice as long as the calyx; the broad lobes longer than the tube: the ovary 4-ovuled, pubescent: capsule longer than the calyx, 1-4-seeded. Under small trees in open places, Washington to California.

N. breviflora Gray Proc. Am. Acad. xi, 315. Stem erect, 4-10 inches high, weak, branching from the base: leaves sometimes all alternate, pinnately 5-parted, the divisions approximate, oblong-lanceolate, acute, entire, 3-9 lines long: peduncles seldom exceeding the petioles: appendages of the calyx nearly half the length of the proper lobes, both ciliate, with long hirsute bristles: corolla whitish or tinged with violet, broadly short-campanulate, decidedly shorter than the calyx; the lobes considerably shorter than the tube; appendages in the throat cuneate, the broad free summit fimbriate-incised: style minutely 2-cleft at the apex: seed usually solitary, almost filling the cell, globular, nearly smooth and even; the caruncle evanescent. In the Blue Mountains of Oregon.

Tribe 2 Phaceliæ B. & H. Gen. ii, 826. Calyx naked at the sinuses, deeply 5-parted. Corolla imbricated in the bud. Style, from 2-parted to entire: the branches at the apex or the stigmas obscurely if at all thickened. Ovary mostly hispid or pubescent, at least at the apex, either strictly 1-celled or 2-celled by the meeting of the linear or lanceolate placentæ in the axis: these separating in the loculicidal dehiscence and borne on the middle of the semiseptif-

erous valves, or sometimes falling away.

2 PHACELIA Juss. Gen. 127.

Annual or perennial herbs with alternate simple or compound leaves, and more or less scorpioid cymes, or so called spikes or racemes, of blue purple or white flowers. Calyx-lobes all similar or nearly so, more or less enlarging in fruit, deciduous, at least thrown off by the enlarging capsule, except in *P. sericea*; the tube with or sometimes without appendages within: these when present generally in the form of 10 vertical folds or lamellar projections in pairs either adnate to or free from and alternate with the base of the slender filaments. Stamens equally inserted low down on the corolla. Ovules and seeds when reduced to a pair collateral and nearly as long as the cell. Seed-coat reticulated or pitted.

§ EUPHACELIA B. & H. Gen. ii, 818. Lobes of the campanulate corolla entire; the tube with 10 laminate appendages in pairs at the base of the stamens. Ovules a pair to each placenta. Seeds as many as ovules, or by abortion fewer, areolate-reticulate or foveate.

* Lower leaves and all the branches opposite: spikes or branches of the cyme hardly at all scorpioid: pedicels shorter than the calyx.

P. Pringlei Gray Proc. Am. Acad. xvii, 223. Stem slender, 2-6 inches high from an annual root, glandular and pubescent: leaves linear-lanceolate, entire, tapering at base, obscurely petioled, only the uppermost alternate: calyx-lobes linear, 3 lines long, about half as long as the very open-campanulate blue corolla, longer than the globose capsule: seeds angled and not hollowed ventrally. On the mountains of southern Oregon and northern California.

* Pubescence or some of it hispid or hirsute: spikes or branches of the cyme scorpioid and dense: pedicels short or hardly any: appendages of the corolla broad and salient, usually more or less united at the base of the filaments.

+ Leaves all simple and entire, or some of the lower pinnately 3-5-parted or divided; the segments or leaflets entire: capsule ovate, acute: seeds densely alveolate-punctate, the upper end acutish.

P. nemoralis Greene Pitt. i, 141. Perennial, often flowering the first year from seed, 2-6 feet high stout, loosely branching; hispid throughout and destitute of canescent pubescence: leaves simple and entire or the lower ones more or less lobed or parted at the base, ovate-oblong, 2-6 inches long, petiolate, rugose and without conspicuous parallel veins; racemes geminate, short and spreading, slender but not loose: corolla small, greenish-yellow: stamens exerted: fruiting calyx round-ovate or nearly globose; the oblanceolate calyx-lobes spreading away from the capsule below, connivent over it above: seeds 2, (the other 2 ovules always abortive,) ovate, acutish, deeply pitted, dark brown. In rich alluvial soil, Washington to California.

P. mutabilis Greene Erythra iv, 55. "Biennial, erect, slender, 10 to 18 inches high, not much branched, sparingly leafy, the radical leaves few and ascending, not forming a depressed tuft, sparsely hirsute throughout, and with a short somewhat villous pubescence beneath the hirsute: leaves of thin texture, mostly entire and simple, elliptic, acute, some of the radical with a pair of pinnæ at the summit of the slender petiole: ra-

cemes several, terminal and subterminal: corolla nearly cylindrical, either deep purple or ochroleucous: mature calyx-segments narrowly oblanceolate, or some of them more dilated at summit, hispid with spreading hairs, without finer pubescence: capsule small, ovate, acuminate mostly 4-seeded. In rich moist soil, southeastern Oregon and adjacent California.

P. heterophylla Pursh Fl 140. *P. circinata*. Jacq. ? Hispid and the foliage canescent: stem stout, 6-24 inches high from a perennial root: leaves from lanceolate to ovate, acute, pinnately and obliquely striate-veined, the lower tapering into a petiole and commonly some of them with 1 or 2 pairs of small lateral leaflets: inflorescence hispid; the dense spikes thyrsoid congested: corolla bluish, longer than the oblong-lanceolate or linear calyx-lobes: filaments much exerted, sparingly bearded. Dry grounds and rocky ridges, Brit. Columbia to California.

P. virgata Greene Erythea iv, 54. Hispid and the foliage strigose: stem usually solitary, erect and strict, simple, 1-2 feet high from an annual or biennial root: leaves pinnate or the upper ones simple and entire, leaflets lanceolate, acute or acuminate, 6-12 lines long, strongly pinnae-veined: flowers in dense glomerules in a long virgate spike or thyrsus; inflorescence hispid; sepals oblong-lanceolate, corolla white or yellowish, little exceeding the calyx; filaments long exerted, often curved or twisted, pubescent. Dry ground, southwestern Oregon.

P. leucophylla Torr. Frem. Rep. 95. Perennial by a stout rootstock, pale, densely silky-pubescent, the hairs appressed or ascending: stems simple or branched, 12-18 inches high: leaves lanceolate to oblong, entire; pinnately veined, 2-4 inches long, 4-12 lines wide, the lower long-petioled, the upper sessile or nearly so; spike-like branches of the scorpioid cymes very dense, nearly straight and 1-3 inches long when expanded: flowers sessile, very numerous, about 4 lines high: calyx-lobes hispid, oblong-lanceolate or linear, somewhat shorter than the white or bluish, 5-lobed corolla; corolla-appendages conspicuous, in pairs between the filaments; stamens exerted glabrous; ovules 2 on each placenta; capsule ovoid: In dry soil, Idaho to Dakota and Nebraska.

P. humilis T. & G. Pac. R. Rep ii, 122. Pubescent or the inflorescence often hirsute: stem 8-10 inches high from an annual root, diffusely branched from the base: leaves spatulate-oblong or oblanceolate, rather obtuse; the lower rarely with 1 or 2 lateral ascending lobes, the veins branching: spikes loosely paniculate or solitary, in age rather slender: pedicels either all very short, or the lower sometimes almost as long as the calyx: corolla indigo-blue, rather deeply lobed, surpassing the linear calyx-lobes: filaments moderately exerted, glabrous or sparingly bearded above: capsule ovate, acute, $1\frac{1}{2}$ lines long, 4-seeded: seeds a line long, minutely pitted. Eastern Oregon to Nevada and California.

+ + Leaves simple, all petioled rounded-cordate, somewhat palmately lobed or incised, the lobes serrate.

P. malvæflora Cham. Linn. iv, 494. Rather tall and stout, hispid with spreading or reflexed bristles and the foliage more or less pubescent: leaves green and membranaceous, round-cordate, incisedly 5-9-lobed, acutely toothed, somewhat palmately ribbed at base: flowering spikes solitary or geminate, an inch long: corolla 3-4 lines long, white, longer than the unequal linear and spatulate calyx-lobes: stamens exerted: seeds alveolate-scabrous. Along the coast, southern Oregon and California.

P. Rattani Gray Syn, Fl. Supp. 413. Hispid with slender stinging bristles throughout: root annual: stem slender and weak, 6-18 inches high: leaves oval to oblong-ovate, with truncate or barely subcordate base, incisedly somewhat lobed and crenate, only the lower palmately veined at

base: spikes slender, often solitary, short and rather loosely flowered: calyx of 4 spatulate and 1 larger obovate sepals: corolla obovate 2 lines long, whitish: stamens and style included; seeds small, alveolate. In shady places along streams, southern Oregon to California.

+ + + Leaves from simple and pinnately dentate or lobed to pinnately compound: flowers crowded in the scorpioid spikes.

P. ramosissima Dougl. Hook. Fl. ii, 80. Stems rather stout and branching, 1-3 feet long, spreading or ascending from a perennial root, leaves pubescent, 5-9-lobed or divided into oblong or narrower pinnatifid or incised divisions: inflorescence hispid; spikes glomerate, short and dense, but little elongated in age: flowers subsessile and in fruit ascending on the rachis: calyx-lobes entire, linear-spatulate to obovate: corolla funnelform, but little exceeding the calyx; the appendages within with a truncate free apex: filaments exerted, glabrous: capsule ovate or short-ovoid, much shorter than the calyx; seeds oblong, rounded on the back. On rocky hills and banks, eastern Oregon and Washington to California.

P. ciliata Benth. Linn. Trans. xvii, 280. More or less pubescent: stem erect or ascending, scabrous, 3-12 inches high, from an annual root: leaves 1-3 inches long, pinnately parted or the lower divided and the upper merely cleft; the oblong divisions or lobes pinnatifid-incised: spikes rather short and in fruit rather loose: pedicels short or hardly any ascending: calyx-lobes from lanceolate to ovate, accrescent and becoming venose-reticulated in age, then sparingly ciliate with short rigid bristles, 4-5 lines long: corolla but little surpassing the calyx, its appendages short and broad, near the base of the tube: filaments not exceeding the corolla: capsule ovate, mucronate, half as long as the fruiting calyx: seeds oval smoothish. Eastern Oregon to California.

§ **EUTOCA** Gray Man. ed. 2, 329. Appendages of the mostly campanulate corolla in the form of 10 vertical salient lamellæ. Capsule ovate or oblong. Ovules and seeds 6-50 on each placenta; the testa areolate-reticulated or favose-pitted, but not transversely rugose.

P. Bolanderi Gray Proc. Am. Acad. x, 322. Hispid with slender bristles, also viscid-pubescent, especially above: stems several, from a perennial root, stout, erect or ascending, 1-2 feet high, freely branching: radical and lower cauline leaves lyrate, and oblong in outline, with 1 or 2 pairs of small and incised lateral divisions: the terminal division and upper leaves ovate or oval, coarsely incised or lobed, truncate or subcordate at base: calyx-lobes hispid, at length spatulate, 3 or in fruit 4 lines long: corolla nearly rotate when expanded, 8-12 lines in diameter, white or blue; its appendages semi-ovate, almost as broad as long, distinctly connected at base in front of the adnate and sparingly bearded filaments: stamens about equalling the corolla; anthers oblong: style cleft nearly to the middle: capsule broadly ovate, acute, shorter than the calyx: seeds about 50 on each dilated placenta. Southern Oregon to California, near the coast.

P. procera Gray Proc. Am. Acad. x, 323. Stems several from a perennial root, erect, 3-7 feet high, minutely soft-pubescent; the summit of the simple stems glandular but not hispid: leaves green and membranaceous, 2-5 inches long, ovate-lanceolate and ovate, acute, mostly lacinate-pinnatifid or cleft; the lobes 2 to 4 pairs and acute: spikes of the glomerate or bifid cyme somewhat lengthened in age: calyx-lobes oblong-lanceolate, minutely hispid: corolla ochroleucous, the semi-cordate oblique appendages united over the base of the sparsely bearded filament: stamens exerted: anthers oblong, style 2 cleft above the middle: capsule globular-

ovate, hardly mucronate : seeds 10-18, wing-angled. In the high mountains of Brit. Columbia to California.

P. sericea Gray Am. Jour. Sci. ser. 2, xxxiv, 254. Stems 8-12 inches high from a branching perennial caudex, silky-pubescent or canescent or the simple virgate stems and inflorescence villous-hirsute, leafy to the top: leaves pinnately parted into linear or narrow-oblong numerous and often again few-cleft or pinnatifid divisions, silky-canescens or sometime greenish: the lower petioled; the uppermost simpler and nearly sessile: short spikes crowded in a naked spike-like thyrus: calyx-lobes linear, minutely hispid: corolla blue or whitish, very open-campanulate, cleft to the middle, marcescent-persistent; its appendages oblong, vertical, wholly free from the filaments: stamens long-exserted; anthers short-oval: style 2-cleft at the apex: capsule ovate, short-acuminate, a little longer than the calyx and marcescent corolla, 12-18 seeded: seeds ovate-oblong, terete, acutish, longitudinally costate and transversely alveolate-reticulated. On high mountains, Oregon and Washington to the Arctic regions and the Rocky Mountains.

P. Franklinii Gray Man. ed. 2, 329. Villous-pubescent throughout: stem erect, 6-18 inches high, from an annual root, simple or corymbosely branched at the summit: leaves $1\frac{1}{2}$ -3 inches long, pinnately parted into 7-15 linear or linear-oblong acute entire dentate or incised segments: flowers blue to nearly white, short pediceled, in dense scorpioid racemes: calyx-lobes linear-lanceolate, acute, longer than the tube of the rotate-campanulate corolla: appendages of the corolla long and narrow, free at the apex, and at base free from the filaments: stamens about as long as the corolla; anthers short: style 2-cleft at the apex: capsule ovate, acute, about equalling the calyx, seeds numerous, oval, minutely alveolate in vertical lines. Along the Snake river southwestern Idaho to Lake Superior.

P. Menziesii Torr. Watson Bot. King 252. Hispid or roughish-hirsute, and usually cinereous-pubescent also: stem erect, 4-12 inches high from an annual root, at length paniculately branched: leaves mostly sessile, linear-lanceolate, entire or some of them deeply cleft; the lobes few or single, linear or lanceolate entire: spikes or spike like racemes thyrsoïd-paniculate, at length elongated and erect: calyx-lobes linear, hispid-ciliate, 4-5 lines long: corolla blue varying to white, rotate-campanulate, 6-10 lines in diameter; its appendages connivent in pairs opposite the lobes, forming 5 nectariferous grooves: alternate stamens shorter than the corolla: style 2-cleft at the apex: capsule ovate, acuminate, about half the length of the calyx: ovules 12-16: seeds oblong coarsely favose-reticulated. Common in dry grounds, Oregon and Washington to California, Brit. Columbia and Montana.

P. verna Howell Erythea iii, 35. Soft-pubescent and cinereous: stem 4-10 inches high from an annual root, paniculately branched: leaves obovate to spatulate, entire or rarely some of the lower ones incisely toothed, abruptly contracted below to a winged petiole, or the upper ones sessile: corolla pale blue, but little exceeding the calyx, open-campanulate, cleft to the middle, its appendages broad and free from the filaments; calyx-lobes linear-lanceolate, 2-3 lines long, hirsute: stamens exserted, anthers oval: style deeply 2-cleft, hispidulous: capsule ovoid, acuminate, more than half the length of the calyx; seeds 8-12, oblong to obovate, favose-pitted. On rocky ridges in the Umpqua Valley, Oregon.

§ 3 MICROGENETES B. & H. Gen. ii 828. Low annuals with mostly pinnatifid leaves. Appendages in the corolla present or rarely wanting. Style 2-cleft only at the apex. Stamens unequal, not exserted. Ovules several on each placenta. Seeds oblong, strongly corrugated transversely.

P. Ivesiana Torr. Bot. Ives 21. Hirsute-pubescent and glandular:

stem 6-10 inches high, diffusely branched from the base: leaves pinnately parted into 7-15 linear or oblong and entire or incisely few-toothed lobes rarely bipinnatifid: racemes loose, 6-20 flowered: sepals linear, minutely ciliate, 2 lines long: corolla white or pale purple, slightly longer than the calyx, its appendages adnate to the filaments only at base, vertical, long and narrow: style hairy below: capsule oblong, 16-24-seeded: seeds strongly corrugated. Dry plains eastern Oregon and Washington to California and Utah.

P. bicolor Torr. Watson Bot. King 255. Viscid-puberulent: stem 6-8 inches high, diffusely much branched: leaves pinnately parted and the divisions again irregularly pinnatifid into small nearly linear lobes: racemes spiciform, loosely 10-20-flowered: calyx divided to the base, the lobes linear-spatulate, 3-4 lines long, often unequal: corolla nearly funnelform, 6-8 lines long, with violet lobes yellow throat and white tube; its appendages long and narrow, united for more than half their length with the filament forming a long tubular cavity behind it: capsule ovate oblong: seeds about 16; minutely corrugated. Under Junipers, southeastern Oregon to Nevada and California

4 EMMENANTHE Benth. Trans. Linn. Soc. xvii, 281.

Low annual herbs with alternate, pinnatifid or entire leaves and yellow flowers in simple circinate racemes. Calyx 5-parted, the sinuses naked. Corolla yellow, campanulate, 5-cleft, without appendage persistent. Stamens included, inserted at the very base of the corolla, with slender filaments and elliptic anthers. Nectary or disk annular, surrounding the base of the ovary, rather thick, free or adnate to the base of the corolla. Ovary ovoid or oblong, compressed, 2-celled, by the union of the placentae in the axis, many-ovuled: style 2-lobed at the summit, subsistent: stigmas capitellate. Capsule ovoid or oblong, incompletely 2-celled. Seeds 2-20 reticulated, or pitted and transversely rugose, pendent.

E. parviflora Gray Pac. R. Rep. iv, 85, t. 15. Densely pubescent and viscid; depressed annual: leaves deeply pinnatifid: flowers crowded in short spikes or racemes, on very short pedicels: corolla bright yellow, 2-3 lines long, merely 5-lobed, not longer than the linear obscurely spatulate calyx-lobes, withering persistent and enclosing the capsule; the tube within furnished with 10 narrow appendages: style hardly longer than the ovary, persistent: ovules 20-40; seeds 15-20. Shores of Klamath Lake Oregon.

E. lutea Gray Proc. Am. Acad. x, 328. Somewhat canescent with a fine pubescence, and viscid above: stem ascending or depressed, much branched from the base: leaves oblong in outline, 1-2 inches long, petioled, subpinnately parted, the 5-9 lobes entire, oblong or obovate, 1-3 lines long: flowers crowded, on very short pedicels: sepals linear, obtuse, becoming 3 lines long: corolla bright yellow, narrowly campanulate, merely 5-lobed, equalling the calyx, persistent at the base of the capsule, the tube within furnished with 10 narrow appendages: style filiform, much longer than the ovary, persistent: ovary densely hairy, about 11-ovuled: capsule 3 lines long acutish, 8-10-seeded: seeds oblong, finely reticulated as well as rugose. Southeastern Oregon to Nevada and California.

E. pusilla Gray Proc. Am. Acad. xi, 87. Pubescent: stem 1-2 inches high, at length diffusely branched: leaves spatulate or oblong-lanceolate, entire or nearly so, 2-5 inches long, tapering into a petiole of equal length:

peduncles slender, loosely and racemosely 3-7-flowered, the earliest ones scapiform: pedicels spreading: corolla nearly white, 5-cleft, short-campanulate, about half as long as the linear obscurely spatulate calyx-lobes and of the ovoid very blunt capsule, persistent, its internal appendages not manifest: style very short, at length deciduous: capsule 8-10-seeded, Southeastern Oregon to Nevada.

5 *CONANTHUS* Torr. Watson Bot. King 256.

Low annuals with entire leaves and solitary flowers in the forks of leafy branches. Calyx 5-parted, the sinuses naked and the lobes not enlarged in fruit. Corolla tubular-funnelform, with a broad, 5-lobed limb, and no appendages within. Stamens included, unequal and unequally inserted on the middle of the corolla-tube. Nectary or disk none. Ovary 2-celled, rather many-ovuled. Style 2-lobed at the summit. Capsule rounded-ovate 10-20-seeded. Seeds ovate or oblong, smooth.

C. aretioides Watson Bot. King 256. Hispid-hirsute throughout: small and depressed winter annual 2-3 inches high, repeatedly forked from the very base, forming mats or tufts: leaves linear-spatulate, narrowed below to a petiole: flowers comparatively large and numerous, sessile in the forks, fully 6 lines long: calyx-filiform-linear, hispid with long spreading hairs: corolla purple, funnelform with rather long narrow tube and ample limb: style 2-lobed at the summit: ovules about 20: seeds usually fewer, the testa thin and translucent, smooth or in age sparsely and obscurely excavated. Southeastern Oregon to Nevada, Arizona and California.

6 *ROMANZOFFIA* Cham. in Hor. Phys. Berol. 71, t 14.

Perennial herbs with alternate or chiefly radical, round, reniform or cordate, crenately lobed, long-petioled leaves and showy flowers in loose racemes or somewhat paniculate. Sepals or calyx-lobes all alike. Corolla funnelform or almost campanulate: the stamens inserted on the base of its tube, unequal. Style and small stigma entire. Inflorescence scapiform, loosely racemose. Ovary 2-celled or nearly so, the placentae narrowly linear. Capsule oblong, retuse, many-seeded. Seeds oval, the testa alveolate-reticulated.

R. Sitchensis Bongard Veg. Sitk. 41 t. 4. Slightly and sparsely pubescent or glabrate: stems slender, scape-like, spreading or ascending, 4-10 inches long: leaves round-reniform, 3-7-lobed, an inch or less in diameter, on slender petioles 1-4 inches long, the bases of which often enlarge and become bulblets: flowers white, in a loose terminal raceme: pedicels filiform, becoming an inch or more long: calyx-lobes very glabrous, subulate, about 2 lines long: corolla funnelform, 6-8 lines long, 5-lobed, the broad lobes rounded at the summit: style long and slender: capsule longer than the calyx. On wet banks, California to Alaska west of the Cascade Mountains.

6 *CAPNOREA* Raf. Fl. Tellur. iii, 75.

HESPEROCHIRON Watson.

Low stemless perennials with entire spatulate or oblong leaves on mostly elongated margined petioles crowning the caudex or root-stock, and from their axils sending up naked 1-flowered peduncles

equalling or shorter than the leaves. Calyx 5-parted, rarely 6- or 7-parted; the lobes linear-lanceolate, occasionally unequal. Corolla campanulate or rotate deciduous the stamens inserted on the base of its tube. Style 2-cleft at the apex. Disk none. Ovary 1-celled: the narrow placentæ projecting more or less on incomplete half-dissepiments: ovules 20 or more on each placenta. Capsule loculicidal, 15-20-seeded. Seeds pretty large with a somewhat fleshy minutely reticulated testa.

C. nana Raf. l. c. *Hesperochiron Californicus* Watson. Leaves numerous in a rosulate radical tuft, broadly lanceolate, 1-3 inches long, densely tomentose both sides, contracted below to a broad petiole: peduncles slender, shorter than the leaves, pubescent, recurved in fruit: calyx-lobes linear, 3-4 lines long, densely pubescent; corolla campanulate, 6-8 lines long, hairy within; its lobes shorter than the tube. On wet banks and springy places, eastern Washington to California and Utah

C. pumila Greene *Erythea* ii, 193. *Hesperochiron pumilus* Porter. Leaves several from the crown of a short usually branching rootstock, lanceolate to spatulate, tapering below to a slender petiole, minutely ciliate, otherwise glabrous: peduncles slender, 1-3 inches long, about equalling the leaves, glabrous: sepals lanceolate, about 6 lines long, minutely ciliate: corolla white to purple, rotate, often an inch broad; its broad ovate lobes longer than the tube; the tube within and base of the filaments pubescent. In wet places, eastern Washington to California and Idaho.

Tribe 3 *Nomeæ* B. & H. *Gen. ii*, 826. Leaves simple, alternate or sometimes imperfectly opposite. Corolla imbricated in the bud, not appendaged within. Style 2-parted, the tips or stigmas commonly thickened or capitate. Ovary completely or incompletely 2-celled. Capsule loculicidal; the valves bearing the half dissepiments on their middle. Seeds with firm-fleshy albumen.

8 NAMA L. *Gen. n.* 317.

Low herbs or suffrutescent plants of various habits: ours low annuals with entire leaves and the flowers terminal or lateral or in the forks of the stem. Corolla funnelform or somewhat salverform. Filaments and style filiform, more or less included. Stamens commonly unequal and more or less unequally inserted. Ovules numerous on the transverse lameliform placenta which approximate or cohere in the axis of the ovary but separate in the loculicidal dehiscence and are borne on the half-dissepiments or half-valves of the capsule. Capsule membranaceous, the valves and placenta undivided. Seeds usually numerous.

N. demissum Gray *Proc. Am. Acad. viii*, 283. Hirsute-pubescent to hispid: stems diffuse or depressed, 2-4 inches long, dichotomously branched: leaves linear-spatulate, 6-15 lines long, all or most of them tapering into a petiole: flowers subsessile in the forks: sepals linear or setaceous, 4 lines long: corolla purple, narrow-funnelform, about 6 lines long: capsule short-oblong, 10-16-seeded: seeds oval or oblong. Dry interior regions, Washington to California, Utah and Arizona.

9 ERIODICTYON Benth. *Bot. Sulph.* 35

Shrubby plants with alternate pinnately veined and finely re-

ticulated leaves and violet purple or white flowers in scorpioid cymes. Sepals narrow, not enlarging upward. Corolla funnel-form or approaching campanulate. Filaments more or less included, inserted on the tube and more or less adnate to it, usually sparsely hirsute. Ovary nearly or completely 2-celled by the meeting of the dilated placentae in the axis. Capsule small, crustaceous, 4-valved, that is first loculicidal then septicial thus splitting into 4 half-carpels which are closed on one side owing to the widely dilated placentae, and partly open on the other. Seeds rather few, pendulous.

E. glutinosum Benth. l. c. Glabrous, and glutinous with a balsamic resin: stems erect, 3-5 feet high: leaves lanceolate, 3-6 inches long, irregularly more or less serrate, sometimes entire, whitened beneath between the reticulation by a minute and close tomentum, dark green and glabrous above, persistent for more than a year: flowers purple, numerous, in elongated naked thyrsoid cymes: sepals subulate, 2 lines long, sparsely hirsute: corolla 6 lines long, tubular-funnel-form, sparsely hairy: capsule globose-ovate, pointed; 2 lines long. On dry open hillsides, southern Oregon to California.

ORDER LXV. BORAGINACEÆ Lindl. Nat. Syst. ed. 2, 274.

Mostly scabrous or hispid-hairy plants with bland watery juice, mostly alternate entire leaves without stipules and rather small regular flowers in scorpioid racemes spikes or cymes. Flowers perfect, generally 5-merous. Calyx free from the ovary, usually persistent. Corolla gamopetalous, mostly regular and 5-lobed, sometimes crested or appendaged in the throat. Hypogynous disk usually present but inconspicuous. Stamens inserted on the throat or tube of the corolla, as many as and alternate with its lobes. Style simple, rising between the divisions of a deeply 4-parted ovary, or from the summit of an undivided one. Ovary of 2 biovuled entire or more commonly deeply 2-lobed carpels, making it appear like 4 1-ovuled carpels. Ovules anatropous or amphitropous. Fruit 4, or by abortion fewer, nutlets, or a drupe containing 2-4 nutlets or cells, rarely reduced to one. Seeds with little or no albumen, and straight or curved embryo with superior or centripetal radical.

I Ovary undivided and surmounted by the style.

TRIBE I Low herbs shrubs or trees. Style once forked: the branches tipped with a simple stigma.

Coldenia Corolla-lobes imbricated or partly convolute in the bud: style simple and deeply 2-cleft: fruit separating into 4 dry carpels.

TRIBE II Herbs or sometimes shrubby plants. Style terminal, sometimes very short or none, entire. Stigma a fleshy ring, or margin of a disk, often surmounted by a mostly conical appendage.

2 **Heliotropium** Corolla-lobes imbricated in the bud with the sinuses plaited: fruit splitting into 4 one-seeded or 2 two-celled and 2-seeded carpels.

II Ovary 4-parted (rarely 2-parted) from above into 1-celled 1-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 near 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 2-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.

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

4 **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.

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

b Nutlets very variable, from nearly smooth to glochidiate.

6 **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.

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

c Nutlets unarmed.

8 **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.

9 **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.

10 **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.

11 **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 small 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 their 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 in 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 surpassing the calyx, the lobes rounded, imbricated or sometimes partly convolute in the bud. Stamens included. Style 2-cleft 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 curving 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 of which bears 5 short obtuse scales near the base: fruit deeply 4-lobed; the thin-walled nutlets rounded and united only at the centre, smooth and shining, oblong-ovate, marked with a linear and raphe-like ventral scar: embryo straight: cotyledons very deeply horseshoe-form, their elongated bases almost enclosing the radical. Arid plains, eastern Washington to 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 to

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

2 HELIOTROPIUM 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 a 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 glaucous: stems diffusely spreading, 6-12 inches long from a perennial root: leaves succulent, obovate to oblanceolate or nearly linear, 1-2 inches long: spikes 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. In saline soil, interior of Oregon, and along the coast of most of the warmer parts of the World.

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

Tribe iii, Boragææ DC. Prodr. x, 1. Chiefly herbs with somewhat mucilaginous watery juice and entire leaves. Flowers mostly near but not in the axils of leaves or bracts, or bractless in so-called spikes or racemes. Style entire, with a depressed or elevated base to which the nutlets are attached (called the gynobase). Stigma truncate 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 at base 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 uncinately 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, laciniate-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 uncinat 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, 2-6 inches high, paniculately branched: leaves linear: calyx-lobes linear, armed with stout white straight and divergent bristles: nutlets obovate, equally divergent, bordered by a broad thin scarious wing, the faces and margins beset with slender uncinat-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 uncinat-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 uncinat-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 paniced mostly bractless racemes. Calyx 5-parted, persistent, open 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-muricate and covered with short glochidiate-tipped spines. In open woods, Brit. Columbia to California.

C. occidentale Gray Proc. Am. Acad. x, 58. Hirsute-pubescent or 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:

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

5 LAPPULA Mœnch Meth. 416

ECHINOSPERMUM Sw, Lehm.

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

L. floribunda Greene Pitt. ii, 182. *Echinospermum floribundum* Lehm. Herbage soft-pubescent or the stem soft-hirsute: stems rather strict, 2-5 feet high, from a biennial or perennial root: leaves from oblong to linear, 2-4 inches long, sessile or the lower tapering into margined petioles; racemes numerous, erect or nearly so, densely flowered: pedicels mostly shorter than the fruit, at length reflexed: corolla short-funnelform, blue or white, 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. Eastern Washington to Brit. Columbia Minnesota and Ontario.

L. diffusa Greene Pitt. ii, 182 *Echinospermum diffusum* Lehm. Soft-pubescent or at most soft-hirsute: stems erect, 1-3 feet high, from a perennial root: leaves usually lanceolate, the lower ones tapering below to a margined petiole, the upper sessile and passing into small bracts: racemes paniced, erect or merely spreading: pedicels longer than the fruit: corolla from 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 triangular-ovate, obscurely carinate, rough-tuberculate, and with a few short 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.

L. hispida Greene l. c. *Echinospermum hispidum* Gray: Hispid with spreading papillose-based hairs: stems usually erect, 1-3 feet high, from a perennial root: leaves lanceolate, 3-5 inches long, the lowest long-petioled, the upper sessile and gradually reduced upward to bracts; racemes lax, 10-15-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 is sometimes reflexed or cup-shaped; inner face smooth and lucid, with scar almost central. Rocky hillsides, eastern Oregon to Idaho.

L. ciliata Greene l. c. *Cynoglossum ciliatum* Dougl. Cinereous with a 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.

L. MYOSOTIS Mœnch Meth. 417. Hispid or appressed-pubescent: stem leafy, branching, 1-2 feet high, from an annual root: leaves linear to oblong or spatulate, sessile or the lower ones narrowed into petioles, erect or ascending, 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 a double row of slender and distinct prickles or these irregularly over most of the back. In waste places, Idaho and eastward. Naturalized from Eu.

L. Texana Britton Mem. Torr. Club v, 275. *Echinosperrum Redowskii* var. *cupulatum* Gray. Hispid-hirsute annual: stem 2 inches to 2 feet 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-funnelform 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 to Nevada, Texas, Nebraska and Brit. Columbia.

L. Fremontii. *Echinosperrum Fremontii* Torr. P. R. R. Rep. xii, 46, *E. Redowskii* var. *occidentale* Watson. Soft-pubescent with white hairs: stem erect, 6-18 inches high, from an annual root, at length diffusely much 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; scar long and narrow, occupying most of the ventral angle. Common throughout the dry interior from Brit. Columbia to California.

6 ERITRICHIUM 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 tube 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-camplanate 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 cespitose: lower leaves linear-spatulate, 6-10 lines long; those of the short flowering stems linear: flowers few in the sparsely bracted cymes: calyx-lobes linear-lanceolate: corolla bright blue, 4-5 lines in diameter: nutlets very smooth, obliquely truncate on the back, wingless but the margin of the ovate acutish and flat or slightly depressed dorsal 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 cespitose 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 calyx linear-lanceolate, about a line long, equalling the tube of the corolla: limb of the corolla bright blue, 2-3 lines in diameter; nutlets with a crest-like

or wing-like border that is usually cut into slender teeth or lobes. On the highest 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. echinoglochin Greene Pitt. i, 15. *Echinosperrnum Greenei* Gray: Strigose-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, open 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, scabrous throughout and with small terete barbed prickles interspersed. In wet places, southwestern Oregon and adjacent California.

A. plebia Greene l. c. 16. *Eritrichium Californicum* var. *plebium* Gray. Sparsely 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-reticulated, sharply carinate ventrally down to the large ovate scar and dorsally 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 ascending, 2-6 inches long: racemes single or geminate, naked, or leafy-bracted 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 lightly 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-bracted: nutlets vitreous-shining, ovate-oblong, carinate ventrally only, the back with crowded depressed rugæ 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 ovate 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. Chorisiana Greene Pitt. i. 13. Pubescence sparse and appressed except on the calyx: stem 1-2 feet high, freely branching, the branches at length recurving: larger leaves 2-4 inches long: racemes elongated, loose 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. Sparsely 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 indistinctly 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.

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

A. mollis Greene l. c. 20. *Krynitzkia mollis* Gray. Copiously soft-villous, 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, hardly 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 scar 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 of 4 rather distinctly margined nutlets.

P. circumscissus Torrey l. c. *Krynitzkia circumscissa* Gray Hispid-canescens throughout: stem 1-4 inches high, densely branched from the base: leaves linear or the lowest spatulate, 3-6 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 oblong-ovate, 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 on 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. Style 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 base, smooth or papillose-scabrous.

E. micrantha Greene l. c. *Krynitzkia micrantha* Gray. Hirsute-canescens: 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 flower in the fork, 4-6 lines long, densely flowered: corolla barely a line high, and its lobes $\frac{1}{3}$ - $\frac{2}{3}$ of a line long, obscurely appendaged in the throat: style becoming thicker than the gynobase, or even pyramidal; nutlets oblong-ovate, acute or acuminate, smooth and shining or dull and punctulate. Dry plains, southeastern Oregon to California, Utah and Arizona.

10 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 short-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. & M. 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 smaller, 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 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 soft hairs: stem slender erect or ascending, 6-10 inches high, usually branching from the base: radical leaves numerous, in a dense rosulate tuft, broadly linear to lanceolate, 6-12 lines long; cauline leaves few, lanceolate to nearly 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 rosulate tuft of basal leaves, the branches hispid, floriferous almost throughout, many of the calyces subtended by a leafy bract; leaves rather roughly hirsute or almost hispid: calyx large and nutlets $\frac{3}{4}$ line long, vitreous and shining, lineately rugose transversely and with or without murications."

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

** ** 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 up 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-lanate 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 Oregon, 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 rosulate 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-triangular lobes connivent over the fruit. sparingly hispid: nutlets broadly orbicular, abruptly stout-beaked, strongly carinate on the back, strongly transverse 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 circumscissily 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 erect 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 oblong or lanceolate to linear, 1-2 inches long, numerous in a dense rosulate 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-villous, 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 2-3 lines broad: nutlets abruptly stout-beaked, carinate on the back, transversely rugose and minutely granulate. Common on open hillsides, Brit. 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, 4-8 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 stout, 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 thyriform, and usually dense the short and often forked lateral spikes at length commonly exceeding the subtending leaves: sepals very setose-hispid, linear, 2-3 lines long: limb of the corolla 3-5 lines in diameter, the crests in the throat truncate: nutlets forming an ovoid fruit, each triangular-ovate, sparsely more or less tuberculate-rugose on the back, with sharp lateral edges, the sulcate ventral angle extending into a broad basal scar. On dry hillsides, eastern Washington to New Mexico, Nebraska and the Saskatchewan.

O. sericea Greene l. c. *Krynitzkia sericea* Gray. Canescent with a dense silky pubescence and bristly-hirsute: stems stout, simple, 4-8 inches high, from a somewhat woody perennial caudex, leafy: leaves spatulate or oblanceolate, obtuse at the apex, narrowed below to a broad petiole, including the petiole 1-2 inches long: flowers numerous, in a short thyrus: calyx cleft nearly to the base, the linear or lanceolate segments about equalling 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 and 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. leucophaea Greene l. c. *Myosotis leucophaea* Dougl. *Krynitzkia leucophaea* Gray. Silky-strigose and silvery-canescant: stems many or few from the ligniscent base or root, 6-12 inches high: leaves lanceolate to linear, acute, 2-4 inches long: inflorescence glomerate-paniculate 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-triangular, 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 CRYPTANTHE Lehm. Sem. Hort. Hamburg. 1832.

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

Low setose or hispid branching annuals with narrow alternate

leaves and small, mostly white, flowers on very short pedicels in scorpioid 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 carinate 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.

C. 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 if at 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.

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

C. multicaule. Densely hirsute with short erect but not appressed white hairs: stems several from the crown of a rather stout root, strictly erect, 4-10 inches high, simple up to the short somewhat paniculate inflorescence: lower leaves numerous, linear-spatulate, 1-2 inches long; upper leaves almost filiform, erect, 12-18 lines long: spikes short and rather stout, hispid-hirsute with spreading hairs, an inch or less long, densely-flowered: segments of the calyx acuminate-lanceolate, barely 2 lines long, their bases hispid 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.

C. 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-acum.

inate, a line long, the groove of the attachment divaricately forked and somewhat open at the base. On dry hillsides, southern Oregon and adjacent 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 or 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 to the slender pyramidal gynobase, the free apical portion a little diverging. 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, 1-4 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 or nearly to the apex: the ventral groove with or without an areola.

C. barbigera Greene l. c. 114. *Eritrichium barbigerum* Gray. Hispid and hirsute: stem 4-12 inches high, freely branching; leaves linear, 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 a little dilated at base. On dry plains, southeastern Oregon to California and Arizona.

C. ambigua Greene l. c. 113. *K. ambigua* Gray. Rough-hirsute and the stem strigose-pubescent also: stem stoutish, 1-2 feet high, paniculately branched; leaves oblong to linear or linear-lanceolate, 6-20 lines long; spikes usually in pairs with a flower in the fork, naked, slender, sparsely 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 bifurcation. 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, lanceo-

late, hispid, somewhat connivent over the fruit: nutlets deltoid-ovate in outline, half the length of the sepals, sharply muricate over the back, which is hardly convex except by a slight dorsal ridge, and with distinct and thickish but acutish lateral angles these muricate-papillose like the back, attached for $\frac{2}{3}$ of their length to the subulate gynobase, the ventral groove open and abruptly dilated at the bifurcate base. On dry hillsides, eastern Washington to California and Arizona.

♂ ♂ 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, bractless: sepals in fruit 2 lines long, ovate, rusty-hirsute and the midrib setose-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, one of them commonly wingless and rounded at the sides, the others with lateral angles extended into a broad radiately striate wing with crenulate 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 5-parted, persistent. Corolla salverform or at the throat somewhat funnelform, more or less plaited in bud at the sinuses, with tube 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 oblong. Cotyledons each 2-parted thus apparently four.

A. intermedia F. & M. Ind Sem. Petrop. 26. Rough-hispid throughout: stem erect, usually 1-2 feet high and sparingly branched above; the bristles 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, 3-5 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, Brit. Columbia to California. Cornell
June 10

A. lycopsoides Lehm. Del. Sem. Hamb. 1831, 7. Rather, sparingly setose-hispid with pungent bristles: stem rather weak, 1-4 feet high with numerous loose straggling branches: leaves lanceolate to ovate-lanceolate, 1-4 inches long, acute at the apex, hispid-ciliate: spikes usually in pairs, at length long and sparsely-flowered: sepals linear-lanceolate, at length spreading and 3 or 4 times longer than the nutlets, papillose-hispid: corolla almost 2 lines in diameter, somewhat funnelform, the tube but little longer than the calyx: nutlets oblong-ovate, about a line long, very rough muricate. In rich alluvial ground, western Oregon and Washington to California.

Var. bracteosa Gray Syn. Fl. ii, 198. Smaller-flowered and more decumbent, with most of the flowers subtended by a foliaceous bract. Near the Coast, Puget Sound to California.

14 MERTENSIA Roth Catal. Bot. i, 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 in the throat, its lobes imbricated in the bud. Stamens inserted on 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 their 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 to spatulate-lanceolate, obtuse, 6-20 lines long, the lowest ones small, the largest ones in the middle, smooth or the upper face scabrous with minute stiff 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 blue limb, the throat rather abruptly dilated and open with pubescent crests at its base on a line with the stamens: filaments as broad and not longer than the anthers: style long and capillary, not exerted: nutlets dull and with obtuse angles. In moist places, Blue Mountains of Oregon to Nevada, Utah and the 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 and 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 by an inch broad: floral bracts acutish: flowers in a rather dense strictly terminal and subcorymbose panicle: calyx rather large, cleft to near the base, the lobes lanceolate: corolla about an inch long, with long slender tube and short erect narrow-campanulate limb: the almost capillary style nearly equalling the corolla. Eastern Washington. Perhaps only a form of *M. oblongifolia*.

M. Sibirica Don Syst. iv, 320. Glabrous and smooth or nearly so; pale and glaucescent: 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 paniced; 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 ones ovate, rounded or cordate at base, 2-5 inches long, long-petioled, upper ones ovate or ovate-lanceolate, acuminate at the apex, narrowed at the base into 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 in

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 exerted: nutlets rounded. In damp woods, California to Alaska, and Hudson Bay to Michigan, Nebraska and the Rocky Mountains.

M. platyphylla Heller Bull. Torr. Bot. Club xxvi, 548. Stems weak, 16-30 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, on 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 rose-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 exerted. In rich moist ground, western Washington and Oregon.

M. nutans. Stems simple, 1-8 from the crown of a thick branching root, 3-10 inches high, very leafy to the top: leaves oblong to lanceolate or the 1 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 exerted. 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, slightly spreading. Filaments scarcely exerted. Ovary 4-divided; style slender. Nutlets erect, fleshy, attached just above their bases to the somewhat elevated gynobase, smooth and shining, acutish-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 whitish-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 narrower and much longer than the anthers: nutlets acute, fleshy-herbaceous, in age becoming utricular, the scar small. Along the Coast, Puget Sound 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:

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 thyrus: 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 CONVULVULACEÆ 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 CONVULVULUS 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 funnellform, 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 membranaceo-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, 1-2 inches long, short-funnelform: stigmas ovate. Sandy sea-shores, Puget Sound to California. Europe &c.

C. sepium L. Sp. 153. Glabrous or more or less pubescent, freely twining: leaves slender-petioled, deltoid-hastate and triangular-sagittate, 2-6 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 funnellform, 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-linea

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 4-6, 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 1½ 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

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 cylindric-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. i, 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.

- 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, unbellately 3-10-flowered, 6-18 lines long: flowers white, on pedicels 3-7 lines long: calyx-lobes oblong, obtuse, 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. Hofn. 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. pruinosis 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, nearly

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 Hyoscyameæ 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 exserted: 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 Cestrineæ 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, septicial 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. Stoutier 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-imbriate 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

one, entire or 2-lobed: ovary 2-celled or rarely 1-celled, with the few-many-ovuled placentæ 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 confluent 1 celled, (Introduced weeds).

1 **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.

2 **Linaria** Corolla with a spur at the base:

3 **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.

4 **Collinsia** Corolla declined, deeply bilabiate.

5 **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.

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

+ + Sterile filament conspicuous and elongated.

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

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

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

9 **Chlonophila** 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: no 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-funnelform, 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.

24 Melampyrum Annual branching herbs with opposite leaves.

SERIES I PSEUDOSOLANÆÆ 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. THAPSUS 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 wing 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 petiolated 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 Antirrhineæ Benth. Monog. Antirrh. 1833. Inflorescence simple and racemose, 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 or 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 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 waste 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; the sterile shoots spreading or procumbent, very leafy: leaves linear-oblong. 4-15 lines long, $\frac{1}{2}$ -1 line wide, entire, sessile; those of the sterile shoots often opposite: flowers blue, 3-4 lines long, in long slender racemes: pedicels 3-4 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 apical holes, each becoming 3-toothed: seeds angled, wingless. On rocky banks, 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 or 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: stem 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

in 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, indurated and persistent: capsule about equalling the calyx, somewhat oblique, the cells opening by 1 or 2 holes: seeds rugose-pitted. On bare hillsides, Cow Creek Mountains Oregon to the Sierra Nevadas in California.

A. Kingii Watson Bot. King 215 t. 21. Nearly glabrous throughout or puberulent or even woolly at base: stem slender, 6-18 inches high, from an 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 equalling 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 Cheloneæ 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 rudiment 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 2-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 filiform style. Filaments filiform, the lower pair inserted higher on the corolla than the others, the fifth represented by a gland at the base of the corolla on the upper side. Anthers round-reniform the 2 cells confluent into one at the apex. Ovules few in the cells. Capsule ovate or globose, at first septicial; the valves soon cleft in the middle. Seeds amphitropous and peltate, concave ventrally.

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

C. 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, the blade 4-6 lines long, often coarsely toothed; upper ones spatulate or oblong to lanceolate or linear, 10-18 lines long, sessile or short-petioled, sparingly 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 only 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, saccate, 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-marg ned. 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 axils, 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 axils 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 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 meniscoidal, 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

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 exotic 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 septicidally 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 laciniate-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.

vallis
1910
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.)

Perennial herbs with opposite leaves and large white red or

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 exerted, 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 in 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 oblong, 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: a 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, Brit. Columbia to California.

P. Davidsonii Greene Pitt. ii, 241 A low semiherbaceous under-shrub, 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, 3-6 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 tips 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, 3-5 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 xxvii, 397. A much branched densely cespitose 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 within on the lower side; upper lip of 2 rounded lobes, the lower of 3 oblong

ones, the middle one longest: sterile filament short and slender, sparingly bearded. On dry gravelly plains in the Cascade Mountains near the base of Mount Hood Oregon.

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. Barrettæ 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 peltately explanate after dehiscence, 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 orbicular-ovate and merely acute to ovate-lanceolate or strongly acuminate from a broad base, commonly with erose edges; corolla 1-1½ inches long, bright blue to violet-purple, rather abruptly expanded above the calyx: anthers 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 dehiscence commonly completely 1-celled.

P. Dayanus. Glabrous below, pubescent above: stems rather slender, 6-18 inches high: lower leaves obovate to lanceolate or linear, laciniately toothed or entire, narrowed below to slender petioles as long or longer than the blades, including the petioles 2-4 inches long; cauline linear-lanceolate to 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, and 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. Pruinose-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. pruinus Dougl. Lindl. Bot. Reg. t. 1280. Pruinose-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 lip 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. whitedii Piper Bot. Gaz. xxi 490. puberulent below and glandular pubescent above: stems several from a lignescent base 8-12 inches high: radical leaves glabrous or sparingly puberulent, narrowly spatulate-lanceolate, acute, saliently dentate with large obtuse teeth, or rarely entire or 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 outside, 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. Lindl. Bot. Reg. t. 1295. Stems strict, 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: thyrus spiciform, interrupted, the peduncles and pedicels short: sepals ovate or oblong-lanceolate, acute or acuminate, 2-3 lines long, narrowly scarious-margined: corolla narrowly funnellform, 8-11 lines long, blue, ochroleucous or yellow: sterile filament bearded at the apex. Interior of Oregon to Idaho.

P. confertus Dougl. Lindl. Bot. Reg. t. 1260. Glabrous throughout or the inflorescence sometimes pubescent or puberulent: stems slender, 6-20 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: thyrus spiciform, interrupted, of 2-5 verticilatriform 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: capsule 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. Wallowa Mountains, eastern Oregon.

P. procerus Dougl. ex Graham in Edinb. Phil. Jour. 1829. *P. confertus* var. *cæruleo-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 2 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 lowest from ovate to oblanceolate, 6-12 lines long including the slender petiole; those of the stem 2-3 pairs, oblong or lanceolate-oblong, sessile: thyrus 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, shrubby below, forming loose bushy clumps, 1-2 feet high: leaves linear-lanceolate, entire or sparsely dentate, all nearly alike, 1-2 inches long, 2-6 lines wide, only the uppermost ones sessile: flowers very numerous, in open thyrsoïd 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 the 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. Rattani 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 exerted, 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 exerted and sparsely bearded. On gravelly banks in the dry interior region, Brit. Columbia to California, Nevada and Montana.

P. Gairdneri 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. 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 or the lowest 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 funnelliform, 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. laricifolius H. & A. Bot. Beech. 376. Glabrous: stems tufted, 2-5 inches high: lignescent 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 thinish, 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 funnelliform 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 1-3-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, funnelliform, 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 lignescent 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. Rœzli 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 lignescent caudex, strict, equably 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. Pruinoso 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:

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

P. heterophyllus Lindl. Bot. Reg. t. 1899. 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 Gratioleæ 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 enclosed 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 cylindraceous 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. i, 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, $\frac{1}{2}$ -6 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 spreading limb, 4-5 lines long, little longer than the calyx: 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 placenta united below. In moist places, Brit. Columbia to California, east of the Cascade Mountains.

MIMULUS L. Sp. 634. 1753.

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 placenta.

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.

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.

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

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, funnelform; 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 funnelform; 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:

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 lyrate, 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-nerved from the base, 6-12 lines long, sessile by a broad base, or tapering to a short petiole: peduncles slender, about equalling 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. Pulsiferæ 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 equalling 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. peduncularis 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, ciliolate, 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, 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 $\frac{1}{3}$ 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, 2-4 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: stems 2-6 lines high: perennial by stolons: leaves obovate to oblong, 2-6 lines

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.

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.)

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 cylindrical tube and more or less bilabiate limb: upper lip entire, emarginate or 2-cleft; 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.

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, 2-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.

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.)

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. gratioides 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, $1\frac{1}{2}$ 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 *Digitales* 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, rare

ly wanting. Stamens 2, rarely 4, inserted on the corolla, or on the outside of the hypogynous disk, exerted: filaments slender: anther-cells parallel or somewhat divergent below, not confluent at the apex. Style filiform, with small capitate stigma. Capsule compressed, obtuse or emarginate. Placentæ short, chiefly at the centre of the valves. Seeds discoidal, orbicular or oval, with very close and strictly conformed smooth coat.

§ 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 crenately-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 unequally 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, $1\frac{1}{2}$ 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: 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. Wormskjoldii 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 short 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, septicidally 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, 6-10 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 Euphrasiæ 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 all linear-lanceolate and entire, sessile, acuminate, 2-3 inches long: bracts similar to the leaves but smaller, red or red-tipped, very narrow, equalling or longer than the short-pedicelled flowers: calyx green, cleft on both sides to about the middle, the lobes lanceolate, acute, entire or 2-toothed:

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 subtinted; 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. *Whitedii* 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 ¾ 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. *pinetorum* 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 14 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: calyx narrowly flask-shaped, 6-12 lines long, equally cleft before and behind, the lobes divided into broadly lanceolate acutish segments: corolla 12-14 lines long, the galea barely as long as the tube; lower lip very short, the 2 broadly deltoid lateral lobes longer than the middle one. On rocky ridges, Swan Lake Valley, Klamath Co. Oregon.

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 exserted, with 3 incurved lobes about $\frac{1}{4}$ 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 subconvolute 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 exserted, 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 exserted, longer than the tube, the very short lower lip exserted, 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 exserted, 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, 2-5-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 $\frac{1}{3}$ 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 6-15 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. leviseeta Greenman l. c. Stems many from a perennial base, 6-12 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,

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-complanate, 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, uncinuate 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 EUORTHOCARPUS Corolla with simply saccate lower lip inconspicuously or obsoletely 3-lobed, and moderately smaller ovate-triangular galea with small usually somewhat uncinuate or 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 cut 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 to simple: leaves linear-attenuate, 3- or 5-lobed, with filiform lobes, 6-15 lines long: bracts oblong, 6-8 lines long, rounded and minutely or not at

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 funnelliform, 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 or 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 oblong, 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 within 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 short and inconspicuous: capsule ovate. In open places, southern Oregon and California.

O. lacerus Benth. Pl. Hartw. 329. Rather soft hirsute and above viscid: 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 puberulent: 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 grey. 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 end 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,

the lower round and 3-crenulate or entire, the galea narrow. Stamens 4 and didynamous, or sometimes the shorter pair wanting. Anther-cells either pilose-ciliate or with the base and apex minutely bearded. Style usually with an uncinately inflexed apex, thickened under the entire stigma. Ovules several, ascending. Capsule compressed, loculicidal. Seeds few.

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.

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.

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.

22 PEDICULARIS L. Sp. 603.

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.

* Cauline leaves and flowers verticillate or nearly so.

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 cylindraceous 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,

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 pinnately 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 $\frac{1}{4}$ -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, puberulent, 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 fasciated 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 cylindric, 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 placentæ 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 mucicose at base.

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

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 funnellform, 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 subulatelinear 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 sessile 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. (1843.)

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-puberulent 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, puberulent 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 muticose 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 a 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

lip entire, a little longer than the 3-toothed lower one, all more or less ciliate: filaments woolly at base: anthers white, ciliate 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 rosulate 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 3-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 2-7 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. i, 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, 2-6 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 staminoidea; 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

without albumen. Embryo mostly straight: radicle short, inferior.

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 capitata-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 **NEPETA** Erect plants: flowers verticillastrate-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 verticillastrate-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 Ajugoideæ 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.

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 exalbumenous.

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.

In wet places, throughout most of North America.

L. rubellus Mœnch 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 exserted. 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: 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-funnelform, with slender tube about equalling the calyx, amplate throat and short rounded lobes. Common in wooded districts, Brit. Columbia to California.

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 Monardææ Benth. in DC. Prodr. xii, 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, exserted, 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 exserted, 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: corolla yellowish or pink, about 15 lines long, pubescent, sometimes glandular: stamens exserted. 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

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 or axillary and cymose. Calyx tubular, somewhat oblique at the mouth, 15-nerved, usually incurved, 5-toothed, scarcely bilabiate but the upper teeth usually longer than the lower. Corolla-tube enlarged above, the limb strongly bilabiate: upper lip erect, entire, emarginate 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 straight, ascending: leaves ovate to oblong, acute at the apex, coarsely crenate-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: stems 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 slender-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. Herbage 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 of a single lobe. Stamens 4, ascending and parallel: both pairs fertile; the lower or outer pair longer and with anthers mostly 1-celled by abortion: 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; the lips entire, the upper one with a crest or protuberance upon its back and often deciduous in fruit; the lower one persistent.

Corolla much exserted, 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.

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 racemes, 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,

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.

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 muricate. In loose soil on dry wooded hillsides, southern Oregon to California.

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 mountains, Brit. Columbia to California.

S. siphocampyloides 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

Covall
June 17.

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-

Waller
Smith, 1910

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-triangular, smooth.

■ *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: calyx 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. AMILEXICATIE 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 cylindraceous 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, southwern 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 lines long, the tube fully twice as long as the calyx, the upper lip hirsute. In swamps, western Oregon to California.

Corvallis
June 16

S. ciliata 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.

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 funnellform, 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 basally 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 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 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 5-7-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 a 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, exerted: 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 exerted: 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 anemophilous, 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 exerted 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 exerted 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

triangular, in villous forms top-shaped, cylindrical, 2-5 inches long: bracts aristate to foliaceous, often 10 times as long as the flowers, linear-subulate to linear, acute: flowers perfect: calyx-lobes villous to glabrate herbaceous, spatulate-oblong: corolla-lobes spreading, round-ovate: stamens 4, barely exerted from the tube: capsule oblong, obtuse, circumscissile at about the middle: seeds 2, brown, oblong, finely pitted. In fields and plains, Oregon to the Eastern and Southern States.

P. tetrantha E. L. Morris Bull. Torr. Bot. Club xxvii 119. A low green and purplish acaulescent glabrous to pubescent or villous annual: leaves linear, entire, 2-3 inches long, about a line wide, truncately callous-tipped, sessile and with a somewhat clasping base scapes 4-6 inches high: spikes oblong, 6-12 lines long, rather few-flowered: bracts scarious, with rigid callous-tipped apex, $\frac{1}{2}$ as long as the calyx: flowers perfect: calyx pubescent, the ovate or oblong obtuse lobes with or without scarious margins, 1-2 lines long: corolla-lobes rounded-ovate, obtuse, about 2 lines long, white with dark brown base, spreading or somewhat reflexed: stamens 4, long-exserted: capsule ovoid, 2 lines long, 2-seeded, circumscissile much below the middle: seeds dark brown, deeply channelled on the face. On dry hillsides near Grant's Pass, Oregon to California.

P. Bigelovii Gray Pacif. R. Rep. iv, 217. Mostly glabrous and green, annual: leaves linear, $1\frac{1}{2}$ -4 inches long, rather fleshy obtuse, entire: scapes 4-6 inches high: spikes oblong or linear, densely few to many-flowered, about an inch long: bracts carinate, about an inch long: flowers perfect, calyx-lobes ovate, obtuse, about equalling the bracts: corolla-lobes ovate, remaining open: stamens 2, slightly exerted: capsule ovoid-oblong, one half longer than the calyx, 4-seeded: seeds oblong, not hollowed on the face. In brackish marshes along the coast, San Francisco Bay California to Vancouver Island.

P. elongata Pursh Fl. 729. *P. pusilla* Nutt. Somewhat cinereous-puberulent annual: leaves linear-spatulate, 1-2 inches long, entire: scapes 1-6 inches high: spikes 3-18 lines long, loosely flowered: flowers imperfectly diœcious or polygamous: bracts ovate, keeled, about a line long: sepals oblong, obtuse, about equalling the bracts, with broad scarious margins: corolla-lobes triangular-ovate, acute, becoming erect and closed over the capsule: stamens 2: capsule short-ovoid, a little longer than the calyx, circumscissile below the middle, 4-seeded: seeds elongated-oblong, dark brown. In wet places, Oregon to the Eastern States.

DIVISION III. APETALÆ.

Floral envelopes consisting of a calyx only which is often petal-like or wholly wanting. Very rarely some petals present.

SYNOPTICAL KEY TO THE APETALOUS ORDERS

A. Flowers not in aments.

* Ovary superior, 1-celled and mostly 1-ovuled, or carpels distinct if more than one.

74 **Nyctaginaceæ** Herbs with simple opposite leaves without stipules:

flowers involucrate: calyx corolla-like: fruit an achene, enclosed in the tube of the calyx and thus apparently inferior.

- 75 **Polygonaceæ** Herbs or woody plants with alternate simple leaves with sheathing or on stipules: flowers perfect, on jointed pedicels, often involucrate: fruit a more or less triangular achene.
- 76 **Phytolaccææ** Herbs or shrubs with alternate leaves: flowers perfect, polygamous or monœcious: fruit a berry, or capsular or samaroid.
- 77 **Amaranthaceæ** Herbs or low shrubs with alternate leaves: flowers with petal-like scarious persistent sepals and bracts: fruit a utricle: seed lenticular.
- 78 **Chenopodiaceæ** Herbs or shrubs with opposite or alternate simple leaves without stipules sometimes leafless: bracts herbaceous: flowers usually with herbaceous persistent sepals: fruit a utricle or achene.
- 79 **Lauraceæ** Trees or shrubs with simple entire leaves without stipules: flowers perfect: fruit a drupe.
- 80 **Elæagnaceæ** Shrubs or small trees with simple opposite leaves: flowers diœcious: fruit drupe-like, enclosed in the calyx-tube and thus apparently inferior.
- 81 **Ulmaceæ** Trees or shrubs with alternate stipulate leaves and small mostly monœcious or polygamous flowers: fruit a drupe, samara or nut.
- 82 **Urticaceæ** Herbs, rarely shrubs or trees with alternate or opposite mostly stipulate simple leaves: often armed with stinging hairs: flowers monœcious or diœcious: fruit an achene.

* * -Ovary and fruit superior, of 2 or more carpels.

- 83 **Euphorbiaceæ** Herbs or shrubs or trees with milky juice, mostly alternate leaves with or without stipules: flowers monœcious or diœcious: fruit usually a 3-celled 3-seeded capsule.
- 84 **Empetraceæ** Low evergreen shrubs with simple leaves without stipules: flowers diœcious or polygamous: fruit berry-like containing 1-several 1-seeded nutlets.

* * * Ovary and fruit inferior.

- 85 **Aristolochiaceæ** Perennial herbs or shrubs with alternate entire petioled leaves: flowers perfect with 3 lobed valvate calyx; fruit a 6-celled many seeded capsule.
- 86 **Santalaceæ** Perennial herbs or shrubs with alternate entire simple sessile leaves: flowers perfect, with 3-5-cleft calyx: fruit a 1-seeded nutlet or drupe.
- 87 **Loranthaceæ** Parasitic perennial plants with jointed stems and opposite entire leaves: flowers diœcious: fruit a 1-seeded drupe with glutinous pulp.

B. Trees or shrubs with alternate leaves. Flowers monœcious, at least the staminate in aments.

* Flowers monœcious; staminate numerous, in aments; pistillate few, with naked ovary.

- 88 **Fagaceæ** Trees or shrubs with entire or lobed leaves with caducous stipules: flowers monœcious in aments, fruit a cup like or closed and spiny involucre enclosing-several nuts.
- 89 **Corylaceæ** Shrubs or small trees with simple leaves: flowers monœcious, staminate in aments, pistillate few in separate scaly buds fruit a

1-seeded nut contained in a foliaceous tubular involucre.

* * Flowers monœcious or diœcious, all in aments: ovary superior.

- 90 **Betulaceæ** Trees or shrubs with simple leaves with distinct deciduous stipules: staminate flowers in long aments; pistillate in shorter or head-like aments: fruit a many-seeded cone with thickened and rigid scales.
- 91 **Myricaceæ** Shrubs with simple leaves mostly without stipules: flowers monœcious or diœcious, without calyx: fruit small, often waxy-coated, drupelets.
- 92 **Salicaceæ** Trees or shrubs with simple leaves with scaly and deciduous or foliaceous and persistent stipules: fruit many-seeded capsules.

ORDER LXXIV NYCTAGINACEÆ Lindl. Nat. Syst. 231.

Herbs, some tropical genera trees or shrubs with fragile stems and tumid joints, watery juice, entire petiolate mostly opposite leaves without stipules and perfect flowers in terminal or axillary clusters often subtended by an involucre. Calyx corolla-like, tubular to campanulate, the persistent base indurated and constricted over the ovary. Stamens few, hypogynous, with slender filaments and rounded 2-celled anthers. Ovary 1-celled, with a solitary campylotropous ovule. Style short or elongated. Stigma capitate. Fruit consisting of the hardened base of the calyx, enclosing the free achene.

- 1 **Mirabilis** Involucre 5-lobed, not changed in fruit stamens usually 5: fruit not angled or winged.
- 2 **Allionia** Involucre calyx-like, deeply 5-lobed, 3-5 flowered: stamens 3-5: fruit with a double row of tubercles on the back surrounded by a winged margin.
- 3 **Abronia** Involucre of 5 or more distinct bracts surrounding a many-flowered head: calyx salverform, including the stamens and style: fruit wing-angled.

1 MIRABILIS L.

Perennial herbs with opposite leaves and showy flowers in involucrate terminal clusters. Involucre calyx-like, 5-cleft or 5-parted 1-12-flowered, not changed in fruit. Calyx corolla-like, tubular or more or less broadly funnelform with a spreading limb. Stamens usually 5, as long as the calyx: filaments united at base. Stigma capitate, granulate. Fruit globose to ovoid-oblong, smooth, obscurely or not at all ribbed or angled.

M. Greenei Watson Proc. Am. Acad. xii, 253. Somewhat glandular-puberulent: stems very stout and branching 2-3 feet high: leaves rather thick ovate, acute, 2-3 inches long, attenuate to a short stout petiole: involucre acutely lobed, 1-1½ inches long, 7-10-flowered: calyx dull red, or whitish nearly 2 inches long, funnelform: fruit ovate-oblong 3-4 lines long, usually abruptly contracted near the base, rather strongly 5-angled. On barren clayey hillsides near the Klamath river in California, perhaps in Oregon farther east.

2 ALLIONIA Lœfl. Inter. Hisp. 181 (1758.)

Annual or perennial herbs with opposite equal leaves and rather small flowers, involucre in loose terminal panicles. Involucre 5-lobed, 3-5-flowered, becoming enlarged and reticulate-veined after flowering. Calyx campanulate, its tube constricted above the ovary, stamens 3-5, usually 3, unequal, hypogynous. Fruit obovoid or clavate, strongly ribbed, pubescent in our species.

A. linearis Pursh Fl. 728. *Oxybaphus angustifolia* Sweet. Stems slender terete or somewhat 4-angled below glabrous and glaucous, 1-4 feet high, erect, the branches and peduncles sometimes puberulent: leaves thick, linear, 1-nerved, 1-3 inches long, 2-4 lines wide, obtuse or acute sessile, or the lower ones sometimes short-petioled: involucre about 3-flowered, green before flowering: calyx purple longer than the involucre: stamens and style exserted: fruit commonly roughened between the 5 prominent ribs. In dry soil Idaho to Nevada, Texas and Minnesota.

3 ABRONIA Juss. Gen. 448. (1774.)

Annual or perennial herbs with thick opposite unequal leaves and rather small usually fragrant flowers on axillary and terminal peduncles. Involucre of 5-15 distinct somewhat scarious bracts enclosing the numerous sessile flowers. Calyx salverform, the limb of 4 or 5 obcordate or emarginate lobes. Stamens usually 5, unequal, included in the tube and adnate to it. Style included: stigma linear-clavate. Fruit coriaceous or indurated, 3-5-winged, mostly reticulate-veined enclosing a smooth cylindrical achene: embryo with only 1 cotyledon, the other rudimentary or wanting.

* Wings of the fruit coriaceous, not completely encircling the body, consisting of a single lamina: the body more or less woody.

A. umbellata Lam. Ill. i, 469. A viscidly puberulent slender prostrate perennial, the stems often elongated, 1-3 feet long: leaves nearly glabrous, ovate to narrowly oblong, 1-1½ inches long obtuse, the margin often somewhat sinuate, attenuate into a slender petiole: peduncle 2-6 inches long: involucre bracts small narrowly lanceolate 2-3 lines long, 10-15-flowered: calyx rose-colored: 6-8-lines long with emarginate lobes: fruit 4-5 lines long, nearly glabrous, the body oblong attenuate at each end, the thin wings nearly as long, rounded, broadest above and often truncate, narrowing downward to the base of the fruit. On sands along the coast, Washington to California.

A. mellifera Dougl. Hook. Bot. Mag. t. 2879. Minutely viscid-glandular: stems stout, prostrate, 1-2 feet long from a stout perennial root: leaves mostly oblong, obtuse, the blade 1-2 inches long, abruptly and more or less obliquely contracted at base to a slender petiole often longer than the blade: peduncles stout, 4-8 inches long: involucre bracts usually 5, scarious, broadly lanceolate, acute or acuminate, 6 lines long or more, flowers pure white, about an inch long, the limb 4-5 lines in diameter; wings of the fruit narrow, often laterally elongated. On sandy banks along the Columbia river, eastern Oregon and Washington.

** Fruit wholly coriaceous and the central cavity extending through the wings.

A. latifolia Eschschaltz Mem. Acad. Petersb. x, 281. Stems stout

and fleshy, prostrate very viscid-pubescent 1-3 feet long, from a long fleshy perennial root: leaves thick, broadly ovate to reniform 6-18 lines long, obtuse, on short thick petioles: peduncles usually exceeding the leaves: bracts of the involucre 5, rounded to ovate or oblong 2-4 inches long: flowers numerous 5-6 lines long bright yellow, very fragrant, the lobes emarginate: fruit 4-6 lines long, coriaceous, acute at each end, the wings more or less unequally developed, usually narrow. On sand-banks along the coast, Vancouver Island to California,

A. fragrans Nutt. Hook. Kew Journ. Bot. v, 261. More or less viscid-puberulent: stems several, from a perennial root, herbaceous, 6-20 inches high, erect or ascending, usually much branched: leaves oblong or ovate, 1-3 inches long, truncate, more or less cuneate at base, obtuse to acute: peduncles mostly solitary: bracts of the involucre large, broadly ovate, white and scarious 4-9 lines long: flowers white, very numerous in the involucres, 5-10 lines long, opening at night: fruit 3-6 lines long, coriaceous, with narrow undulate wings which do not close over the ovary; In dry soil eastern Washington to Iowa.

ORDER LXXV POLYGONACEÆ Lindl, Nat. Syst. 211.

Herbs shrubs or trees with jointed stems, watery, often acid or acrid, juice, alternate, opposite or whorled simple mostly entire leaves with sheathing united stipules and regular perfect, dioecious, monoecious or polygamous flowers. Calyx free from the ovary, 2-6-cleft or 2-6-parted, the segments or sepals more or less imbricated, often petal-like stamens 2-9, inserted near the base of the calyx, or in staminate flowers crowded toward the center. Ovary superior, 1-celled, with a solitary erect or pendulous orthotropous ovule. Style 2-3-cleft or 2-4-parted, sometimes very short stigma, capitate or tufted, rarely 2-cleft. Fruit a lenticular 3-angled or rarely 4-angled achene, usually invested by the persistent calyx. Embryo straight or curved in mealy albumen.

TRIBE I Herbs or somewhat shrubby plants. Flowers involucrate.

- 1 **Eriogonum** Involucre several-flowered with 4-8, pointless teeth: flowers exserted: stamens 9: achenes mostly 3-angled.
- 2 **Oxytheca** Involucre few-flowered, herbaceous, with 3-5 straight acute or awned lobes: flowers on exserted pedicels, pubescent: stamens 9: achenes lenticular.
- 3 **Chorizanthe** Involucre 1-3-flowered, coriaceous or chartaceous, 3-6 angled, with 3-6 cuspidate often hooked teeth and sometimes as many cuspidate divaricate spurs at base: flowers usually included: stamens 3, 6 or 9: achenes 3-angled.
- 4 **Pterostegia** Slender annuals with opposite toothed or lobed leaves: involucre bract-like, with a solitary included flower.

TRIBE II Herbs with alternate leaves and scarious sheathing stipules. Flowers not involucrate.

- 5 **Polygonum** Sepals 4-6, equal, appressed to the triangular or lenticular achene: styles 2 or 3: stigmas capitate.

- 6 Rumex** Sepals 6, the outer spreading, the inner enlarged and appressed to the triangular achene: stigmas 3, tufted.
- 7 Oxymia** Sepals 4, the outer smaller and spreading: stigmas 2, tufted: achenes orbicular, winged.

Tribe 1 Eriogoneæ Meisner Pl. Vas. Gen. 229, as Order. Herbs or shrubby plants with alternate or verticillate leaves without stipules. Flowers involucrate, 3-6-parted or 3-6-lobed. Stamens 9. Styles 3, with capitate stigmas. Juice nearly tasteless.

1 ERIOGONUM Michx. Fl. 1246. (1803.)

Annual or perennial acaulescent or leafy-stemmed herbs or shrubs with entire alternate opposite or whorled leaves and small, perfect flowers on jointed pedicels subtended by an involucre in panicles racemes heads or umbels. Involucre campanulate top-shaped or almost cylindrical, 5-8-toothed or 5-8-cleft, the teeth pointless. Calyx 5-cleft or 5-parted, usually colored, the segments equal or the outer ones larger. Stamens 9, with filiform filaments and oblong anther. Style 3-parted, stigmas capitate. Fruit a 3-angled pyramidal achene invested by the calyx-segments, or winged.

§ 1 Involucre not nerved or angled, 4-8-toothed or lobed, more or less broadly turbinate: bracts foliaceous, indefinite in number.

* Perennials, more or less tomentose or rarely glabrous, with peduncles naked and scape-like, or verticillate-bracteate in the middle: bracts mostly conspicuous: involucre 5-8-toothed or 5-8-cleft, in a simple or compound umbel or solitary: flowers mostly attenuate to a stipe-like base: achenes glabrous or nearly so.

E. flavum Nutt. Fras. Cat. (1813.) White-tomentose throughout: stems very short and thick, simple and solitary to tufted and creeping, woody: scapes 2-12 inches high: leaves crowded on the short stems, linear-oblong to lanceolate, 1-3 inches long, narrowed into petioles with dilated and imbricated base inflorescence regularly umbellate: involucre top-shaped, 2-2½ lines long: bracts spatulate, foliaceous: calyx yellow 3 lines high, top-shaped, very villous, the segments obovate: stamens and style-branches exerted achenes constricted at the middle, 2 lines long, villous at the summit the angles undulate, the faces swollen, Dry plains eastern Washington to Arizona and Nebraska.

E. Piperi Greene. "Densely tufted on a stout woody caudex: stems erect, leafless tomentose, 5-10 inches tall: leaves all basal, lanceolate or oblanceolate, acute or obtuse, densely hairy beneath, green and less hairy above, 1-2 inches long, attenuate into a usually shorter petiole: umbels several-rayed, simple, or contracted into a dense cluster: bracts 3-8, oblanceolate, 1-1½ inches long: involucre short-toothed, villous: flowers yellow, 2-3 lines long. Summit of Cedar Mountain, Washington. Hardly distinct from *E. flavum* Nutt." Piper & Kent in Palouse Flora, 50.

E. androsaceum Benth. Dwarf perennial: tomentose throughout or smoother above: caudex branching: leaves oblanceolate or spatulate, white-woolly beneath, glabrate above: scapes 2-3 inches high, simple: umbel simple or subcapitate, 4-7-rayed: rays short and slender: teeth of the involucre short, erect or nearly so: flowers sparingly villous, yellow, 2-3 lines long, short attenuate. On the high mountains of eastern Washington to Brit. Columbia.

E. pyrolæfolium Hook. Kew Journ. Bot. v, 395, t. 10. Caudex short and thick, sparingly branched: leaves thick, glabrous, round-obovate to oblong, 3-9 lines broad, mostly abruptly attenuate into a short petiole, broad and villous at base: scapes smooth, 2-3 inches high, bearing a 2-bracteate umbel of 1-4 very shortly pedicellate sinuately-toothed and villous involucre; flowers yellow, slightly villous at base, short-attenuate. On the high mountains Washington to California.

Var. coryphæum T. & G. More tomentose, with narrower leaves and smaller flowers. On the high peaks of the Cascade Mountains.

E. thymoides Benth. A much branched undershrub 3-10 inches high: leaves linear to spatulate with revolute margins, 2-5 lines long, white-woolly; peduncles slender, 1-2 inches high, bearing a whorl of linear bracts below the middle and a solitary, several-flowered involucre at the summit: involucre 3-4 lines high deeply cleft, the lobes spreading or recurved at the tip: calyx attenuate and densely retrorse villous at base, 2-3 lines long, the segments glabrous above, pink to purplish, broad and rounded at the apex. In sterile rocky places on top of high hills, eastern Oregon and Washington.

E. cæspitosum Nutt. Journ. Acad. Philad. vii, 50, t. 8. A densely branched undershrub: stems 2-4 inches long depressed or ascending, the branches usually crowded with leaves: leaves ovate-spatulate to oblong, 2-6 lines long, densely white-woolly, crowded on the short branchlets: peduncles scape-like 1-3 inches long, slender naked: bearing a single several-flowered involucre: lobes of the involucre linear-oblong, as long as the turbinate tube, becoming reflexed: flowers yellow, often tinged with purple, pubescent, $1\frac{1}{2}$ -2 lines long, the base stipe-like, the lobes oblong-oval. On dry ridges, southeastern Oregon to Nevada.

E. Douglasii Benth. in DC. Prodr. xiv, 9. Shrubby and rather loosely branched at base; 4-10 inches high: leaves spatulate to linear-lanceolate alternate below to a petiole white-tomentose below, pubescent above, 6-14 lines long; peduncles rather stout, 2-6 inches long, with a whorl of oblanceolate leaves in the middle and a single many-flowered involucre: flowers yellow pubescent outside, about 3 lines long. In the Blue Mountains of Oregon to California.

E. sphærocephalum Dougl. Benth. l. c. Shrubby and loosely branched below, 6-10 inches high; leaves lanceolate to spatulate 6-14 lines long tapering below to a distinct petiole, often with revolute margins, densely white-woolly below, pubescent but green above; peduncles 2-6 inches long with a whorl of lanceolate leaves usually above the middle and a single many-flowered involucre; outer flowers reflexed, thus forming a dense round head, yellow or tinged with red or purple, pubescent outside, about 3 lines long the oblong lobes longer than the stipe-like base. On barren ridges, eastern Washington to California.

E. tenue Small Bull. Torr. Bot. Club xxv, 41. Stems loosely branching, 3-5 inches long, slender, shrubby at base: leaves crowded at the ends of the branches, linear or nearly so, 6-12 lines long, the margins revolute, thinly tomentose: peduncles erect, 3-5 inches high, bearing a whorl of leaves in the middle and a single terminal involucre: lobes of the involucre linear oblanceolate, obtuse, shorter than the turbinate tube, spreading or reflexed: flowers pale yellow, glabrous, about 5 lines long narrowed below to a stipe-like base, its segments unequal, the outer ones oblong-obovate, notched at the apex, the inner ones spatulate, erose at the apex. In dry sterile, rocky places along the Columbia river, eastern Oregon and Washington.

E. umbellatum Torr. Ann Lyc. N. Y. 241 Stems depressed and

shrubby below, much branched: leaves oblong- to obovate-spatulate, 1-2 inches long, on slender petioles, white-tomentose below, green and glabrate above: peduncles 6-15 inches high, naked, bearing a simple umbel of 3-10 naked rays subtended by a whorl of leaves: involucre deeply lobed, the lobes shorter than the turbinate tube: flowers yellow or yellowish, 2-3 lines long, glabrous. Dry ridges, Oregon to California and the Rocky Mountains.

E. Tolmieanum Hook. Fl. 134. *E. umbellatum* var. *monocephalum* T. & G. Branches short and depressed, shrubby below, densely cespitose: leaves ovate, 3 lines long, narrowed to short petioles, glabrate above: peduncles 2-4 inches high, bearing a whorl of leaves above the middle and a single large globose head of one or more small involucre: flowers yellow, the base abruptly narrowed and stipiform. High mountains, Washington to California.

E. montanum. Stems depressed and diffusely much branching, 6-10 inches long shrubby and rooting at the nodes: leaves obovate to oblong, often acute, short-petioled, 3-6 lines long, whiter tomentose beneath, green and glabrate above: peduncles 1-3 inches long, naked bearing a simple umbel of 3-10 short naked rays subtended by a whorl of leaves: involucre loosely woolly the linear lobes longer than the turbinate tube: flowers yellow, about 2 lines long, gradually attenuate to a stipe-like base, glabrous. On the highest peaks of the Cascade Mountains.

E. croceum Small Bull. Torr. Bot. Club xxv, 43. Shrubby and spreading below 4-12 inches long, the branches often tufted leaves clustered at the ends of the shoots, oval or orbicular-oval, 6-9 lines long obtuse tomentose or glabrate above, abruptly narrowed to a stout petiole shorter or longer than the blade: peduncles erect, 4-8 inches high, usually naked except a bract near the middle, bearing a compound umbel subtended by a whorl of leaves: involucre thinly tomentose, the somewhat lanceolate acute lobes longer than the broadly turbinate tube: flowers golden yellow, about 3 lines long, narrowed into a long stipe-like base. In the mountains of eastern Oregon and Idaho.

E. ternatum. Stems short and densely cespitose, woody, 1-2 inches long, densely leafy: leaves obovate to spatulate or oblong, obtuse, narrowed below to a short winged petiole, densely white-tomentose both sides when young, becoming green and glabrous above, 6-10 lines long: scapes 4-12 inches high, densely floccose with white wool when young, becoming glabrate in age, bearing a 4-rayed umbel subtended by a whorl of linear bracts otherwise naked: central ray short, with a single naked involucre, the other 3 longer, with 1-3 involucre subtended by linear bracts: involucre somewhat funnelliform, about 6 lines high, tomentose, few-flowered, the short erect teeth less than a line long: sepals yellow, a line long, oval to obovate. On gravelly bars along streams near Waldo, southern Oregon.

E. stellatum Benth. Tans, Linn. Soc. xvii, 469. More or less tomentose: stems diffuse and leafy: leaves ovate-spatulate to oblanceolate: peduncle naked, 6-12 inches high, bearing an umbel of 2-4 mostly elongated rays which are usually and often repeatedly divided in a cymose manner, the nodes and lateral rays all leafy-bracted: flowers yellow, about 3 lines long, the base attenuate and stipe-like. In the mountains, Oregon to California.

Var. bahiiforme Watson Proc. Am. Acad. xii, 257. Leaves mostly small, often densely tomentose both sides: umbel very compound. With the type.

E. heracleoides Nutt. Stems short and woody at base: leaves narrowly oblanceolate with revolute margins densely tomentose beneath somewhat

glabrate above: peduncles stout 6-12 inches high with a whorl of leaves near the middle umbel 1-11-rayed, sometimes simple, usually with some or all of the rays once or rarely twice divided: flowers yellow or whitish, glabrous, about 3 lines long. On dry plains, eastern Washington to Nevada and Utah.

E. compositum Benth. Trans. Linn. Soc. xvii. 409. Stems decumbent or ascending, 4-10 inches long, somewhat woody: leaves oblong-ovate, acute or acutish, 1-3 inches long, cordate at base on petioles 2-8 inches long, densely white-tomentose beneath, green and flocculent above: peduncles stout, naked, 6-18 inches high, nearly glabrous: umbel of 6-10 more or less elongated rays, each bearing a short several-rayed umbellet, subtended by whorls of linear-oblong leaflets: flowers yellow to whitish or rose-color, 2-4 lines long, the stipe-like base short. On rocky banks, Brit. Columbia to California and Idaho.

* * Densely tomentose perennials with naked peduncles: involucre with 5 short erect teeth: flowers small abruptly narrowed at base, pubescent: achenes densely villous.

E. acule Nutt. T & G. Proc. Am. Acad. viii, 163. White-tomentose and matted caespitose: leaves densely crowded upon the closely branched caudex, oblong to linear with revolute margins, sessile, 2-3 lines long, spreading from the imbricated base: involucre in heads of 1-5, among the uppermost leaves, nearly sessile short, 3-5-toothed: flowers with broad sessile base, hardly 2 lines long, the oblong segments equal: filaments pilose at base: ovary very tomentose with long wool. Sandy hills, Idaho to the Rocky Mountains.

E. minimum Small Bull. Torr. Bot. Club xxv, 47. Gray-canescens: branches densely tufted, about 6 lines long: leaves densely imbricated and crowded, the persistent ones of previous years black, the fresh ones gray, spatulate, or almost terete by the strongly revolute margins, obtuse, dilated at base: peduncles erect, 1-3 lines high, simple: involucre solitary, turbinate-campanulate a little more than a line high: flowers 1-2 lines long, the segments unequal, the 3 outer oval, the 3 inner obovate, all obtuse: filaments villous at base. At high elevations in the Cascade Mountains of Washington.

E. pendulum Watson Proc. Am. Acad. xxiii, 265. White-tomentose throughout: stems woody at base 1-2 feet high profusely branched: leaves scattered, oblong-oblong-ovate, 1-3 inches long, obtuse, subglabrate above: inflorescence several times di- or trichotomous upon naked peduncles: pedicels mostly elongated and naked: involucre at first nodding, campanulate, about 2 lines long, its deltoid teeth erect: flowers very small, densely tomentose, slightly exserted. On dry rocky plains, eastern base of the Coast Mountains near Waldo, Oregon.

§ 2 Involucre campanulate or short turbinate, not angled or nerved, with 5 rounded erect teeth, pedunculate in diffuse repeatedly di- or trichotomous panicles: bracts not foliaceous, all ternate, small, mostly triangular and rigid: flowers not alternate at base: ovary glabrous.

* Annuals: leaves all radical or nearly so: involucre flowers and achenes small.

E. cernuum Nutt. Journ. Acad. Phila. Ser. 2, 1 162. Stem very short: scape erect, usually much branched. 6-12 inches high: leaves orbicular or oblong-orbicular, less than an inch long obtuse or slightly apiculate, flat, floccose-tomentose, especially beneath, petioled: inflorescence paniculate: involucre campanulate, slightly more than half a line high solitary on

slender deflexed pedicels an inch long or less, 5-cleft to near the middle: flowers whitish, campanulate, half a line long, fiddle-shape. On dry plains, eastern Oregon to Nebraska and New Mexico.

* * Annuals, branching from the base, with leaves developed at the nodes in the axils of ordinary triangular bracts: flowers minutely glandular.

E. angulosum Benth. Trans. Linn. Soc. xvii, 406, t. 18. Floccose-woolly, or at length glabrate: stem erect, 4-12 inches high, leafy, branching into a repeatedly di- or trichotomous panicle; the branches acutely 4-6 angled: radical leaves spatulate or rounded, the cauline oblong-linear to lanceolate: pedicels 6-12 lines long, widely spreading: involucre short-campanulate or hemispherical, minutely glandular or almost smooth, solitary, many-flowered, 5-toothed becoming dilated in fruit: flowers very obtuse at base, a line long, on short pedicels, rose-color or white, deeply 5-parted, the outer segments ovate, the inner at length longer, lanceolate-oblong. Eastern Oregon to California and Utah.

* * * Tall stout white-tomentose annuals, with leafy simple stems, naked above: inflorescence cymose: involucre turbinate-campanulate, shortly pedicelled: flowers white, nearly glabrous: sepals very unequal.

E. annum Nutt. Trans. Am. Phil. Soc. Ser. 2. v, 164. Flowers tomentose throughout: stem 1-3 feet high, leafy below: leaves oblong-lanceolate or oblanceolate, narrowed at base to a petiole, the margins somewhat revolute or crisped: involucre turbinate 1-1½ lines long secund, erect, 5 toothed: calyx ½-1 line long, the segments obovate. On dry plains Idaho to Nebraska and Texas.

§ 3 Involucre cylindrical-turbinate, more or less strongly 5-6 nerved, often becoming costate or angled, with as many short erect teeth, mostly sessile in heads or clusters, scattered in cymes or along virgate panicked branches, always erect, 1-3 lines long: bracts ternate, connate at base, usually short, acute and more or less rigid: flowers not attenuate at base: achenes usually glabrous.

* Cespitose densely tomentose perennials with short closely branched caudex: involucre a single head or short cymose umbel on the naked peduncle: outer sepals broad and somewhat cordate, the inner much narrower: ovary scabrous above.

E. ovalifolium Nutt. Journ. Philad. Acad. vii, 50, t. 8. Densely white-tomentose and silvery: stems very short and depressed-cespitose, perennial; leaves broadly oval or oblong, the blade 3-10 lines long, acutish, abruptly narrowed to a long slender petiole, crowded upon the numerous short branches: scapes 3-9 inches high simple, naked, bearing a single head of 3-8 closely sessile 5-8 toothed involucre: calyx very glabrous, yellow or rose-color, becoming thin and scarious, after flowering, the segments very unequal, the outer very broadly oval, cordate at base: the inner spatulate, emarginate. On dry hillsides, eastern Brit. Columbia to California and the Rocky Mountains.

Var. proliferum Watson Proc. Am. Acad. xii, 63. Larger than the type, the involucre loosely cymose-umbellate. With the type.

E. vineum. Small Bull. Torr. Bot. Club xxv, 45. Closely white-tomentose up to the inflorescence: perennial from a stout tap-root: stems branching, the branches tufted, clothed with the persistent leaf bases: leaves crowded, the blades suborbicular or broadly oval, 3-5 lines long obtuse or rounded at the apex, abruptly narrowed or truncate at base: on petioles often as long as the blade: scapes erect, 1-4 inches long, simple: involucre s

4-6, in terminal heads, 3-4 lines high, angled, contracted, near the top: flowers wine-red, at length 3-lines long: its segments very unequal, the 3 outer ovate with cordate base; the inner spatulate. Eastern Oregon to California.

E. dichotomum Dougl. Benth. in DC. Prodr. xiv, 14. Densely white-tomentose below: stems short but somewhat diffuse and depressed, leafy: leaves oblong or oblanceolate, acute at each end, an inch or two long, on slender petioles: peduncles rather short 6-18 inches high, bearing a 3-rayed umbel the somewhat erect rays sparingly di- or trichotomous: involucre usually solitary tomentose, about 3 lines long, strongly toothed: flowers white to rose-red $1\frac{1}{2}$ -2 lines long, the outer segments broadly elliptical, the inner linear-spatulate. On dry rocky hills eastern Washington to California.

E. niveum Dougl. Densely white-tomentose below: stems rather few, short and depressed: leaves oblong 6-12 lines long, petioled: scapes 4-10 inches high, bearing a 3-rayed umbel: involucre usually solitary, tomentose, about 2 lines high, with some or all of the teeth produced and often recurved: flowers white or rose color, its outer segments round-oval, the inner obovate-spatulate. On dry rocky hillsides, eastern Oregon and Washington to Idaho.

* * Flowers narrower at base, the sepals similar and nearly equal: achenes smooth or nearly so.

+ Perennials with short branched caudex, naked peduncles and capitate involucre.

+ Densely white-tomentose, dwarf and caespitose, alpine or subalpine: heads solitary.

E. pauciflorum Pursh Fl. 735. Stems very short, loosely tufted, covered with the dilated bases of the petioles: leaves linear or linear-spatulate, 1-3 inches long, with revolute margins, glabrous, or sparingly pubescent above, white-tomentose or cottony beneath, narrowed into slender petioles: peduncles 2-6 inches high: involucre 4-10, in a capitate cluster, 5-toothed, the teeth obtuse, more or less reflexed: flower white, campanulate, $1\frac{1}{2}$ lines long, its segments ovate. On dry plains, eastern Oregon to Neb

E. multiceps Nees Max. Reis. N. A. ii, 446. Stems short, tufted, much branched, sometimes several inches long: leaves spatulate 6-20 lines long, numerous, obtuse at the apex, narrowed below into petioles: peduncles 1-5 inches high: involucre 3-12, in a capitate cluster, sessile, $1\frac{1}{2}$ lines long, 5-6 toothed, the teeth acute: flowers white or rose-color, $1\frac{1}{2}$ -2 lines long, campanulate, somewhat villous, the segments cuneate, obtuse or emarginate. On dry plains, Idaho to Nebraska.

+ + Peduncles mostly tall and stout, from a sparingly branched caudex: heads solitary or few, in a long-jointed subumbellate cyme.

E. nudum Dougl. Benth. Trans. Linn. Soc. xvii, 413. ? Stems short and loosely branched 1-2 inches long: leaves ovate or oblong-ovate, the blade 1-3 inches long, obtuse or acutish at the apex, rounded, truncate or cordate at base, green and glabrate above, densely white-tomentose beneath, on petioles 2-6 inches long: peduncles rather slender 1-2 feet high, somewhat tomentose: inflorescence a compound umbel: involucre tomentose, campanulate about 2 lines long its triangular teeth erect: flowers yellow to reddish, glabrous about $1\frac{1}{2}$ lines long, its segments elliptical, rounded at the apex. On dry hillsides, southwestern Oregon to California.

E. elatum. Dougl. Acaulescent: leaves all in a rosulate tuft, ovate-oblong or sublanceolate, narrowed into petioles, rarely subhastate or subcordate at base, the margins usually undulate, green and glabrate above very softly villous-pubescent, or almost velvety beneath, on long slender pet

oles: peduncles 1-4 feet high, rigid and rush-like: inflorescence a very diffuse panicle: involucre glabrate, or glabrous, few, cylindrical or turbinate-campanulate, repandly 5-toothed many-flowered, gathered in heads or clusters, sometimes only in pairs, or solitary in the forks: flowers white or rose-color a little hairy at base the segments ovate-oblong, nearly equal. On barren rocky places, eastern Washington to California.

+ + Leaves not fascicled: bracts small very rarely foliaceous below: involucre mostly solitary in a repeatedly di- or trichotomous corymb-like cyme.

+ + Perennials, woody and diffusely much branched, leafy below.

E. microthecum Nutt. Jour. Acad. Phila. ser. 2, i, 172. More or less floccose-tomentose throughout: stems erect or ascending, branching, especially from the base, 6-12 inches high: leaves oblong or oblanceolate, obtuse at the apex, narrowed into short petioles, 6-12 lines long, the upper bract-like: inflorescence compoundly cymose: involucre turbinate $1\frac{1}{2}$ lines long: flowers yellow, pink or white, campanulate, at length constricted near the middle. Eastern Washington to California and Nebraska.

E. corymbosum Benth. in DC. Prodr. xiv, 17. Densely floccose-tomentose throughout: stems erect, branched 6-12 inches high: leaves oblong, obtuse at the apex, narrowed at base, petioled, 6-18 lines long, their margins more or less crisp: inflorescence compoundly cymose: involucre short-campanulate, 5-toothed, about $1\frac{1}{2}$ lines long, the teeth subacute flowers broadly campanulate, 1- $1\frac{1}{2}$ lines long, constricted near the middle, the segments fiddle-shaped, emarginate, the 3 inner ones shorter than the outer ones. Eastern Washington to Nevada and Kansas.

+ + Perennial: less woody and more shortly branched at base: leaves mostly narrow: sepals nearly equal.

E. campanulatum Nutt. l. c. 163. Stems short, thick and woody more or less tomentose: leaves crowded, narrowly oblanceolate, spatulate or nearly linear, 1-3 inches long, obtuse at the apex, narrowed into long petioles, white-tomentose on both sides, the margins sometimes revolute: peduncles erect or nearly so, glabrous, 4-12 inches high: inflorescences compoundly cymose: involucre oblong-turbinate, about a line long, with 5 obtuse teeth: flowers yellow, ovoid-campanulate, about a line long, the segments oblong or fiddle-shaped, emarginate. Eastern Oregon to Nebraska

+ + + Involucre sessile and solitary along the ascending and usually long-irrigate branches of the open naked panicle: flowers glabrous.

+ + White-tomentose perennials, leafy below: panicles sparingly branched, usually virgate: involucre tomentose, the teeth not margined.

E. strictum Benth. Branches very short: leaves small, ovate to oblanceolate, on long slender petioles: peduncles very slender, glabrate above: panicle twice or thrice divided, with 1-3 involucre on the short branches: involucre glabrate, $1\frac{1}{2}$ lines long: flowers white to rose-color, $1\frac{1}{2}$ lines long. In the Blue Mountains of Oregon.

+ + Annuals: leaves usually rosulate at the base, sometimes occurring at the nodes.

E. virgatum Benth. in DC. Prodr. xiv, 16. Usually white-tomentose throughout: leaves oblong, an inch long, on slender petioles: peduncles simple, or with a few erect virgate branches, 1-2 feet high: involucre remote, 2 lines long, tomentose, the 5 teeth very short: flowers a line long rose-color to white or yellow, glabrous, outer segments broadly ovate, cuneately narrowed at base, the inner about as long, spatulate-oblong. In

gravelly bars along rivers Southern Oregon to California.

E. vimineum Dougl. Benth. Trans. Linn. Soc. xvii, 416. Leaves orbicular to broadly ovate, 3-10 lines broad, the margins often undulate, loosely floccose-woolly above, densely white-tomentose beneath, on slender petioles about as long as the blade: peduncles usually diffusely and repeatedly branching from near the base, 6-20 inches high: involucre narrow and rather prismatic, $1\frac{1}{2}$ lines long, the teeth very short: flowers rose-color or yellowish, about a line long, outer segments obovate, the inner only half as broad. On dry plains, Brit. Columbia to California east of the Cascade Mountains.

E. Baileyi Watson Proc. Am. Acad. x, 348. Leaves orbicular to broadly ovate, 3-6 lines broad, white-tomentose both sides, petioled: peduncles diffusely branched 6-12 inches high, wholly glabrous: involucre narrow, a line or less long, open at the throat, the teeth obtuse: flowers pinkish-white, less than a line long. Dry plains eastern Washington to Nevada and California.

2 OXYTHECA Nutt. Pl. Gamb. 169.

Slender repeatedly dichotomously branched annuals with the leaves all in a rosulate tuft and small involucre flowers. Involucres few-flowered, more or less pedicellate, campanulate or turbinate, herbaceous and not reticulated, 3-5-cleft, the erect or spreading lobes mostly terminated by straight slender awns. Flowers perfect; calyx 6-parted, colored, enclosing the achene: the more or less exserted pedicels intermixed with bracts or bractlets. Achene, so far as known, ovate-lenticular, the elongated radical accumbent upon the rounded cotyledons.

O. dendroidea Nutt. l. c. Leaves linear-oblancoelate, hirsute, 6-18 lines long acute: scape-like stem usually 6-12 inches high very slender diffuse and much branched from near the base, or stouter and less branched: bracts unequal, without awns, linear-oblong to linear, or oblong-ovate in the stouter forms, the lower half-inch long or less, the upper much smaller, all more or less united at base: involucre turbinate, 1-3 lines long, unequally 3-4-lobed, rather fleshy, acutely awned, those in the forks on slender pedicels 1-4 lines long, the others more nearly sessile flowers light rose-color, half a line long, outer segments obovate, the inner narrower and shorter. On dry hillsides, southeastern Oregon to Wyoming and Nevada.

3 CHORIZANTHE R. Br.

Low dichotomously branched plants with the leaves mostly in a rosulate radical tuft, and small flowers in small involucre heads. Involucres tubular or funnellform, sessile, 2-6-angled or costate, and 2-6-toothed or cleft, the divisions more or less divaricate and terminating in cusps or rigid, often unciniate, awns. Flowers 1-3 in the involucre more or less exserted. Calyx 6-parted or 6-cleft. Stamens 3, or 2, inserted on the base or more or less adnate to the tube of the calyx, rarely on its throat. Styles linear, with capitate stigmas. Achenes triangular beaked. Embryo with inflexed or straight radicle. Ours all annuals.

C. membranacea Benth. Trans. Linn. Soc. xvii, 416, t. 17. Lanosely pubescent when young, glabrate in age: stems erect, 6-18 inches high, sparingly branched above: radical and lower cauline leaves linear, obtuse,

forming irregular whorls at the lower joints: involucre in the lower axils few, without scarious margins, the upper in condensed capitate heads, with equal broadly expanded scarious winged divisions, reflexed, rotate and tipped with a slender uncinata awn, the tube ribbed and protuberant below flowers 2-3, one with long pedicel partly exerted, the others undeveloped: flowers short tubular, hairy outside, the segments oblong, equal: stamens at the base. On rocky foothills southern Oregon to California.

C. Watsoni T. & G. Proc. Am. Acad. viii, 199. Canescently pubescent throughout: stem erect or ascending, 1-4 inches long, branching from the base: radical leaves narrowly oblanceolate to spatulate, 6-10 lines long, narrowed to a petiole with dilated base, the margins revolute, densely tomentose beneath; lower cauline similar, but smaller and uncinately awned, passing above into opposite uncinata-tipped bracts: involucre clustered on the upper branches, narrow, inconspicuously costate, unequally 5-lobed, one 3-4 times as long as the others, all uncinata tipped: flowers solitary, slender-pedicelled, included or partly exerted, the segments oblong, acute, pubescent outside: stamens inserted on the throat of the calyx: achenes oblong-triangular. On desert districts, southeastern Oregon to Nevada and California.

4. PTEROSTEGIA F. & M. Ind. Sem. Petr. ii, 48.

Very slender and weak diffusely and dichotomously branched annuals with opposite entire or 2-lobed leaves and small flowers solitary in foliaceous sessile involucre in the forks of the branches. Involucre of a single bract, subtending and shorter than the sessile flower, rounded and more or less 2-lobed, at length becoming enlarged, scarious and reticulated, loosely enveloping the achene, and gibbously 2-saccate on the back. Calyx 5-6-parted, the segments equal. Stamens inserted at the base of the segments, as many or fewer. Achene triangular, glabrous. Cotyledons rounded, accumbent upon the radicle.

P. drymarioides F. & M. l. c. Sparingly hirsute: stems decumbent, often 1-2 feet long: lower leaves petioled, 2-6 lines broad, fan-shaped, 2-lobed, the lobes crenately toothed or again lobed; upper leaves obovate to spatulate, entire or toothed: bracts similar, a line long: involucre very small, becoming 1-1½ lines long in fruit, somewhat 2-lobed, the margins toothed or laciniate: flowers yellowish the segments oblong-lanceolate. Hillsides and dry places, from the Columbia river to Lower California.

Tribe 2 Polygonaceæ Endl. Gen. 301. Herbs with alternate leaves and scarious sheathing stipules. Flowers without involucre. 3-6-parted. Stamens mostly 4-8. Styles 2 or 3. Juice usually pungent, acrid or acid.

5 POLYGONUM L. Sp. 359.

Annual or perennial plants with jointed stems, alternate leaves scarious sheathing stipules, called ocreæ, and small normally perfect flowers in spikes, racemes or panicles. Calyx 4-6-parted, or 4-6-cleft, the outer sepals or segments somewhat longer than the inner. Stamens 3-9, included or exerted; filaments filiform, or dilated at base, glabrous. Style 2-3-cleft or 2-3-parted, with capitate stigmas. Achenes lenticular or 3-angled, rarely 4-angled, invested by or exceeding the persistent calyx. Embryo near the

end of the seed in one of its angles, Cotyledons foliaceous, slender, accumbent or incumbent.

SUBGENUS I BISTORTA Meisn. Polygon. 50. Perennial by a bulb-like creeping or horizontal rootstock. Leaves radical and cauline: ocreae membranaceous, cylindrical, naked, open, oblique at the summit. Inflorescence a single terminal spicate raceme. Flowers subtended by usually toothed bract-like ocreolae. Calyx 5-parted. Stamens 8. Style 3-cleft. Achenes 3-angled. Cotyledons accumbent.

P. bistortoides Pursh Fl. 271. Glabrous or sometimes with a fine hispidulous pubescence on the under surface of the leaves, more or less glaucous throughout: stems erect or assurgent, 10-25 inches long, slender, simple: radical leaves oblong to oblong-lanceolate, 5-10 inches long, 3-18 lines broad, attenuate at base to a petiole 1-10 inches long, the midrib rather broad and conspicuous on both sides; cauline leaves mostly lanceolate, sessile or nearly so, subcordate, arising from near the summit of the ocreae, all often with revolute margins and conspicuously nerved: ocreae entire or somewhat broken about the oblique open summit, closely clasping the stem: raceme oblong, 6-30 lines long, densely flowered, not bulblet-bearing below: calyx about 2 lines long, light rose to white, 5-parted, the segments oblong, faintly nerved. Subalpine and alpine parts of the Cascade and Rocky Mountains, California to the Arctic regions.

P. viviparum L. Sp. 360. Glabrous and more or less glaucous except the under surface of the leaves: stems rather slender, erect, 6-18 inches high, simple: radical leaves ovate or oblong and subcordate to linear-lanceolate and attenuate at base, the blade 1-3 inches long, on petioles as long or longer; cauline leaves lanceolate to linear: ocreae $\frac{1}{2}$ -3 inches long, slightly enlarged at the obliquely opened summit: raceme narrowly cylindrical, 1-3 inches long, rather densely flowered above, bearing a number of ovoid-conic bulblets at base: calyx about a line long, rose-color to white, 3-parted to near the base, the ovate or obovate segments 3-nerved. Southern Oregon to Alaska and the Atlantic States.

SUBGENUS II ACONOGONON Meisn. Monogr. 53. Perennial by a more or less elongated creeping or horizontal rootstock. Leaves somewhat fleshy or coriaceous. Ocreae funnellform, membranaceous, oblique, naked. Inflorescence consisting of terminal clusters, racemes or paniculate racemes: flowers subtended by ocreolae. Calyx 5-parted. Stamens 8. Style 3-cleft. Achenes triangular. Cotyledons accumbent.

P. alpinum Allioni Fl. Pedim. ii, 206, t. 68. Bright green and glabrous or slightly pubescent throughout: stems stout, erect, 3-6 feet high, channeled, more or less branched: leaves lanceolate, 1-9 inches long, acute or acuminate, mostly tapering at base into short petioles, coriaceous: ocreae funnellform, 6-18 lines long, oblique and 2-cleft, the segments acute mostly glabrous, large and loose, brittle and early falling away: inflorescence consisting of compound or paniculate loosely-flowered racemes 1-2 inches long: ocreolae funnellform, oblique and shallow: calyx greenish or whitish, 1-1 $\frac{1}{2}$ lines long, 5-parted to near the base the segments obovate or oblong, rounded. In wet places, alpine and subalpine, Washington to California and Idaho.

Var. foliosum Small Bull. Torr Bot. Club xix, 360. Pubescent throughout: stems stout, sparingly branched, hispid, : leaves ovate-lanceo-

late, acute, petioled, more or less tomentose beneath, ciliate, numerous near the ends of the branches: ocreae funnellform, loose, hispid: flowers fewer: achenes broadly oblong. On the high mountains of Washington.

Var. Alaskanum Small Monogr. Polyg. 33. Stem stout, arising from a large rootstock, erect, 20-36 inches high, fleshy above: leaves ovate-lanceolate, 4-10 inches long, acuminate, obtuse or cordate at base, thin, pubescent both sides, or sometimes glabrous, ciliate, undulate, much crisped, on petioles 6-30 lines long: ocreae funnellform, 1-2 inches long, thin, striate, more or less hispid. On the high mountains of Washington to Alaska.

P. phytolacæfolium Meisn. Small Bull. Torr. Bot. Club xix, 360. Herbage glabrous or very sparingly pubescent with slender hairs, light green, turning dark in drying: stems erect, 16-30 inches high, somewhat branched, channeled: leaves ovate or ovate-lanceolate, 1-7 inches long, acute or acuminate, thin, undulate and somewhat crisped, sometimes coriaceous: ocreae 6-12 lines long, more or less pubescent, brittle, early falling away: inflorescence consisting of axillary and terminal or paniced few loosely-flowered racemes: calyx white or pinkish, about a line long, not much enlarged in fruit, 5-parted to below the middle, the segments obovate, 2 of them often much smaller than the others. In the mountains of Washington, Oregon and California.

P. Newberryi Small Bull. Torr. Bot. Club xxi, 170. Herbage dull green, more or less pubescent and scurfy throughout, or somewhat glabrous: stems ascending or erect, 4-17 inches high, stout and more or less fleshy, simple or branched: leaves ovate to broadly oblong-ovate, one-half to 2 inches long, rather fleshy, truncate, obtuse or acute at base, short-petioled or the upper ones sessile: ocreae funnellform, about a line long: flowers in few-flowered axillary racemes: calyx greenish, 1-2 lines long, 5-parted to near the base, its segments oblong or oblong-elliptic, the outer ones longer than the inner ones. Alpine and subalpine regions of Oregon and Washington.

P. Davisæ Brewer Gray Proc. Am. Acad. viii, 399. Glabrous and glaucous or inconspicuously pubescent: stems usually slender, from an enlarged and woody rootstock, erect or ascending, 2-17 inches long, flexuous striate, simple or sparingly branched above, leafy throughout: leaves from ovate to oblong or almost lanceolate, 1-4 inches long, obtuse or acutish, subcordate to acuminate at base, undulate and ciliate: ocreae funnellform, 3-6 lines long, more or less oblique: flowers in axillary and terminal 2-4-flowered loose clusters: calyx purplish-green or yellowish, about a line long, 5-cleft to the middle, much narrowed toward the base. On the highest slopes of the Cascade and Sierra Nevada Mountains.

SUBGENUS III PERSICARIA Meisn. Monogr. 66. Herbaceous or more or less woody perennial or annual plants with the leaves all cauline. Ocreae mostly membranaceous, cylindrical, truncate, naked or variously fringed. Flowers in terminal spicate racemes, usually geminate or paniculate, subtended by ocreolae. Calyx 3-5-parted. Stamens 4-8. Style 2-3-parted or 2-3-cleft. Achenes lenticular or triquetrous: Cotyledons accumbent.

P. amphibium L. Sp. 361. Perennial: glabrous when mature: stems emersed or floating on the surface of the water and rooting at the nodes, 1-10 feet long, simple or branched: leaves oblong, elliptic or elliptic-lanceolate, 1-6 inches long, thickish and somewhat coriaceous, glossy above, rounded or narrowed at base, long-petioled to sessile: ocreae cylindrical, those of the stem 8-15 lines long, those of the branches surpassing the internodes, with or without a few bristles: flowers in a dense oblong or

ovate spicate raceme: calyx rose-color, about 2 lines long, 5-parted to below the middle: stamens 5, exserted: style about 2 lines long 2-cleft: achenes lenticular, orbicular-oblong or obovoid. In ponds and wet places, Alaska to California and the Atlantic States: also Europe and Asia.

P. Hartwrightii Gray Proc. Am. Acad. viii, 294 Perennial: more or less hispid throughout, except when growing in water: stems creeping and ascending, or suberect, 1-3 feet long, leafy: leaves oblong to narrowly lanceolate, 3-9 inches long, obtuse or acutish at both ends, short-petioled or sessile: ocreae cylindric, 6-9 lines long, with a more or less spreading rim, fringed at the summit with short bristles: flowers numerous, in a dense oblong to conic spicate raceme: calyx rose-color, about 2 lines long, 5-parted to below the middle: stamens 5, exserted: achenes lenticular, oblong. In moist places, Alaska to California and the Atlantic States.

P. Muhlenbergii Watson Proc. Am. Acad. xiv, 245. Perennial: glabrous or strigose throughout: stems more or less creeping in wet places, the distal end erect, 12-30 inches long, mostly simple, leafy, enlarged at the joints: leaves narrowly to broadly lanceolate, 2-10 inches long, acute or acuminate, rounded or narrowed to cordate at base, all petioled: ocreae cylindric, 12-18 lines long. when young clasping the stem, becoming loose and inflated near the base in age: flowers in 1-3 terminal linear densely-flowered racemes 2-5 inches long: calyx dark rose-color to pink, 2 lines long, 5-parted to the middle: stamens 5, exserted: style 2-cleft, exserted: achenes lenticular, broadly obovoid. In water or wet places, throughout North America.

P. LAPATHIFOLIUM L. Sp. 360. Annual: glabrous or more or less pubescent throughout: stem stout, mostly erect, 1-2 feet high, branched above or throughout, sometimes nearly simple, thickened at the joints: leaves broadly to narrowly lanceolate, 2-10 inches long, attenuate toward the apex from the broadest part, acuminate at base, ciliate, inconspicuously punctate, short-petioled: ocreae cylindric, 6-12 lines long, loose, striate or ribbed, slightly ciliate when young: peduncles and pedicels more or less glandular: racemes 1-5, in a terminal panicle, densely flowered, 1-4 inches long, mostly drooping: calyx flesh-color to white, 5-parted to below the middle: stamens 6, included: achenes lenticular or trigonous, oblong or ovoid. In moist places, throughout temperate North America: introduced from Europe.

Var. incanum Koch Syn. Fl. Germ. 711. Small and slender: stem erect, 2-12 inches high, simple or branched: leaves lanceolate to ovate or oblong, glabrous above, white tomentose beneath, short-petioled or subsessile: racemes oblong, 6-12 lines long, erect: achenes lenticular, ovoid. In damp places, Oregon and Washington to the Atlantic States.

P. nodosum Persoon Syn. i, 440. Annual: stem stout, erect, 1-4 feet high, red or reddish with purple spots and dark rings, naked, branched: leaves rather narrowly lanceolate, attenuate upward from near the base and acuminate, cuneate at base and shortly petioled, somewhat scabrous with short prickly hairs on the midribs and margins: ocreae cylindric, 8-12 lines long, strongly ribbed: racemes axillary and terminal, oblong and erect or often linear and nodding, an inch long or more: flowers white to light rose-color, about a line long: stamens 6, included: style 2-parted, included: achenes lenticular, broadly oblong or ovoid. Throughout North America.

P. Pennsylvanicum L. Sp. 362. Annual: glabrous below, pubescent and glandular above: stem erect, 1-3 feet high, simple to much branched: leaves from narrowly to broadly lanceolate, 2-10 inches long, ciliate, the midrib prominent on the lower side, acuminate at base, short-petioled: ocreae cylindric or funnelform, 6-9 lines long: racemes panicled, oblong-cylindric, 1-3 inches long, erect, dense: calyx pink or light purple, 1-2

lines long, 5-parted to the middle: stamens 8 or fewer, included: style 2-parted to about the middle: achenes lenticular, flat, broader than high. Idaho to the Eastern States.

P. PERSICARIA L. Sp. 361. Annual: stem erect or sometimes spreading, 8-20 inches high, simple or branched: leaves lanceolate to linear-lanceolate, 1-8 inches long, acuminate at both ends, entire or sometimes erose, conspicuously punctate, nearly smooth except the more or less hispid midrib and nerves, short-petioled or nearly sessile, generally with a dark triangular or lunate spot in the middle: ocreae cylindrical or funnelform, 6-9 lines long, conspicuously fringed with short bristles: racemes 1-5, in terminal panicles, oblong or ovoid, 6-18 lines long, mostly erect, densely-flowered: calyx pink to purple or greenish, 5-cleft to the middle, the segments obtuse: stamens generally included: style 2- or 3-parted, included: achenes broadly ovoid, pointed. In waste places throughout North and South America: naturalized from Europe.

P. hydropiperoides Michx. Fl. i, 236. Perennial, often tinged with red throughout: stems erect, or the base decumbent and creeping, 1-3 feet high, simple or branched above, enlarged at the joints: leaves lanceolate to linear-lanceolate, 2-6 inches long, glabrous or strigillose, acute at both ends, ciliate, short-petioled: ocreae cylindrical or funnelform, 6-12 lines long, loose, fringed with long bristles: racemes almost linear, 1-3 inches long, erect, more or less interrupted: calyx about a line long, flesh-color, or greenish, 5-parted to below the middle, the segments oblong or obovate: stamens 8, included style short, 3-parted, at length exerted: achenes triquetrous, ovoid or broadly oblong. In ponds and wet places, Washington to California and the Atlantic States.

P. Hydropiper L. Sp. 361. Annual: glabrous: stems erect or assurgent, 8-24 inches high, simple, or branched throughout: leaves ovate to lanceolate, 1-5 inches long, acute or acuminate at both ends, ciliate, undulate or slightly crisped, short-petioled: ocreae cylindrical, 3-6 lines long, becoming somewhat funnelform and oblique fringed with long bristles, often bearing 1 or 2 flowers within, racemes numerous, axillary and terminal, 1-3 inches long rather loosely flowered and much interrupted, usually drooping: calyx greenish to red or white, 3-5 parted, the segments rather narrowly oblong: stamens 4, sometimes 6, included: style 2-3-cleft to near the base: achene lenticular or triquetrous, broadly oblong to orbicular. In damp places, throughout temperate North America and Europe.

SUBGENUS IV, AVICULARIA Meisn. Monog. Polyg. 85. Annual or perennial plants with the leaves all cauline, the petioles articulated at the junction of the ocreae; the upper ones reduced to foliaceous bracts. Ocreae membranaceous and usually hyaline, funnelform, oblique, 2-parted, at length lacerate. Inflorescence consisting of axillary clusters either widely separated or crowded into a terminal raceme. Calyx 5-parted. Stamens mostly 8. Style 3-parted or wanting. Achenes triquetrous. Cotyledons incumbent.

* Suffruticose smooth perennials with brown stems and loose scaly bark.

P. paronychia Cham. & Schlecht. Linn. iii, 51. Bright green and glabrous throughout: stems prostrate or ascending, 6-18 inches long, diffusely branched: leaves oblong to oblong-lanceolate, apparently linear or linear-lanceolate on account of the strongly revolute margins, 3-5 lines long, scattered along the branches and crowded in subspicate clusters at

the branches, sessile, pitted on the upper surface, acute or acuminate at base, with a broad 2-winged midrib ocreae 6-10 lines long, silvery, early lacerate into hair-like segments: flowers crowded into subspicate clusters near the ends of the branches: calyx white to pink, about 3 lines long, 5-parted to below the middle, the segments obovate or oblong: stamens 8, included: style a line or more long, 3 cleft at the apex. On sandy banks along the coast, Vancouver Island to California.

P. Shastensis Brewer Gray Proc. Am. Acad. viii., 400. Glabrous throughout: stems prostrate or ascending, 4-12 inches long, much branched: oblong to oblanceolate, 3-6 lines long, longer than the internodes, sessile, acute at base: ocreae 2-3 lines long, 2-parted, the segments very thin and silvery: flowers 2 or 3 together in the axils of the leaves: calx 2 lines long, rose-color or red, 5-parted to near the base, the segments obovate, each with a dark rib: stamens 8, included; filaments strongly dilated at base: style 3-parted, apparently formed by the splitting of the apex of the narrowly oblong achene. Mount Mazama Oregon to the high peaks of the Sierra Nevada Mountains.

* * * Annuals, rarely perennials, with striate stems, leafy throughout: calyx colored upon the margins, becoming closely appressed to the achene: style short.

P. littorale Link in Shrad. Journ. i, 54. Annual or perennial, glabrous, bright green and glaucous: stems prostrate, 1-4 feet long, diffusely branched: leaves oblong to oblanceolate, 3-12 lines long, generally acuminate at base, conspicuously nerved, often crisped, short-petioled: ocreae oblique, 2-3 lines long, 2 parted and silvery when young, at length lacerate and brownish: flowers in clusters of 1-6 in the axils of the upper leaves: calyx mostly green, 5-parted to below the middle, the segments oblong: stamens 8, included: style a line long, 3-parted to the base, included. Brit. Columbia to California and across the continent.

P. AVICULARE L. Sp. 362. Glabrous throughout and dull or bluish-green: stems prostrate or ascending, 4-24 inches long, simple or branched: leaves oblong to oblanceolate, 5-12 lines long, acuminate at base, not conspicuously nerved, subsessile or short-petioled: ocreae oblique, 2 lines long, silvery, becoming lacerate in age: flowers in clusters of 2-5 in the axils of the leaves: calyx mostly green, 5-parted to below the middle, the segments oblong: stamens 5-8, included: style very short, 3-parted. Common in yards and roadsides.

P. erectum L. Sp. 363. Glabrous throughout: stem stout, erect or ascending and somewhat spreading, 8-24 inches high, nearly simple to much branched: leaves oval, oblong or obovate, 6-30 lines long, mostly acuminate at base, sessile to short-petioled: ocreae 3-12 lines long: flowers in clusters of several in the axils of the middle leaves: calyx greenish, over a line long, 5-parted to below the middle, the segments oblong: stamens 6 or 7, included: style less than a line long, 3-parted. In sandy fields, eastern Oregon to Texas and Georgia.

P. minimum Watson Bot. King 315. Somewhat scurfy but glabrous: stem erect or spreading, 1-3 inches long, slender, simple or branching from the base: leaves obovate to ovate or oblong, 3-8 lines long, acute or apiculate at the apex, acuminate at base, subsessile, not much reduced above: ocreae about a line long, dentate-lacerate: flowers in clusters of several in axils of all the leaves: calyx greenish, about a line long, 5-parted to near the base, the segments oblong, the margins pale rose-color: stamens 5-8, included. On the high mountain tops, Washington and Oregon to California and Utah.

* * * Annuals with striate stems, the branches slender and virgate, angular: leaves diminishing upward and becoming bract-like; the

spike-like inflorescence more or less interrupted.

P. Douglasii Greene Bull. Cal. Acad. i, 125. Glabrous and more or less glaucescent except the more or less scabrous nodes: stem slender, 8-16 inches high erect usually somewhat strictly branched: leaves oblong to lanceolate, 6-30 lines long, mostly acute, often cuspidate, acuminate at base, sessile or nearly so, the margins often revolute: ocreae 5-6 lines long: flowers one to several in the axils of the upper leaves, on reflexed pedicels: calyx greenish, 1-2 lines long, 5-parted to near the base, the segments oblong with whitish or rose-colored margins: stamens 8, included: style very short, 3-parted. In dry places in the mountains of Brit. Columbia to California and Nebraska.

P. montanum Greene Pl. Baker. 13. *P. Douglasii* var. *latifolium* Greene Bull. Cal. Acad. 125. "Low, fastigiately branched from the base, 3 to 6 inches high, the branches floriferous from the base, but the flowers few among the proper leaves, most of them forming a mere bracted spike beyond the foliage, all the angles of stem and branches denticulate-scaberrulous, and other parts also more or less scabro-puberulent: leaves oblong-lanceolate, very acute, often an inch long, 1-nerved, the nerve sharply carinate beneath the leaf: perianth sessile but nodding, its segments dark green or purplish except marginally and completely enclosing the achene, this black, smooth and shining, the faces obtusely rhomboidal, the cross-section 3-lobed rather than triangular." On high mountains, Brit. Columbia to California and the Rocky Mountains.

P. Howellii Greene Pl. Baker. 14. Stem erect, 4-12 inches high, sparingly branched from the base, the branches erect: leaves elliptic-oblong to lanceolate, very acute and apiculate, attenuate at base, 6-12 lines long, the thin margins serrulate-scabrous: ocreae scarious, 2-4 lines long, 2-parted: flowers 1-3 in the axils of all the leaves, erect on erect pedicels: calyx whitish, about a line long, 5-parted to near the base, the segments oblong: achenes wholly invested by the calyx, very black and highly polished, the faces rhombic-ovate. On top of the Siskiyou Mountains along the Happy Camp trail in California, perhaps in Oregon farther east.

P. Sawatchense Small Bull. Torr. Bot. Club xx, 213. Glabrous and more or less scurfy or papillose throughout: stem erect, 2-8 inches high: leaves oblanceolate or obovate to almost linear, 3-12 lines long, acute at the apex, acuminate below, sessile, flat or revolute: ocreae at length lacerate to the middle: flowers in clusters of 2-4 in the axils of all the leaves: calyx green, on erect pedicels, a line or less long, 5-parted to near the base, the segments oblong, obtuse: stamens 6-8: style almost none. In the mountains, Washington to Colorado and Dakota.

P. ramosissimum Michx. Fl. i, 237. Glabrous throughout: stem erect or ascending, 4-12 inches high, nearly simple or diffusely branched: leaves lanceolate to oblong, 4-20 lines long, acuminate at both ends, short-petioled, persistent: ocreae 3-9 lines long, early becoming lacerate: flowers in small clusters in the axils of the upper leaves: calyx greenish or yellow, about a line long, erect, on erect pedicels, 5-parted or 6-parted to near the base, the segments narrowly oblong: stamens 6 or fewer, included: style very short, 3 parted to the base. In the mountains, eastern Washington to California and the Atlantic States.

P. Engelmanni Greene Bull. Cal. Acad. i, 126. Glabrous: stem very slender and wiry, 2-8 inches long, nearly simple or diffusely branched from the base: leaves linear-lanceolate, 1-6 lines long, light green or glaucous, beneath, acute, sessile: ocreae funnelform, about 2 lines long, at length slightly lanceolate: flowers in small fascicles in the axils of all the leaves, nodding on reflexed pedicels: calyx dark green, a line long, 5-parted to near the base, the segments oblong, obtuse, with whitish border: sta-

mens 5-8 included: style very short, 3-parted. High mountains, Washington to Colorado.

P. Austinæ Greene l. c. Glabrous and scurfy throughout: stems mostly erect, 2-6 inches high, branched from the base: leaves ovate-lanceolate to oblanceolate. 3-6 lines long, acute, sessile, revolute or flat, bright green beneath: ocreae about 2 lines long, at length slightly lacerate: flowers in clusters of 2-3 in the axils of the leaves, drooping, on reflexed pedicels: calyx green, a line long, 5-parted to near the base, the segments narrowly oblong obtuse, with whitish borders: stamens 5-8, included: style very short, 3-parted to the base. In the high mountains, eastern Washington to California.

P. majus Piper Fl. Palouse Reg. 63. Stem wiry, terete, erect or nearly so, much branched from the base, 6-18 inches high; leaves linear-lanceolate, 1-3 inches long, sessile: ocreae scarious, 6-12 lines long, at length lacerate: flowers few, in the axils of the upper leaves, spreading or ascending on short pedicels: calyx broadly campanulate, 1-2 lines long, 5-cleft to below the middle, the segments oblong, rounded at the apex, white with green midveins: stamens 5, included: style 3-parted to the middle: fruit reflexed. Common in stony soil, eastern Washington.

P. spergulariæforme Meisn. Small Bull. Torr. Bot. Club xix, 366. *P. coarctatum* Dougl. not Willd. Glabrous throughout: stem slender and wiry, erect, 4-20 inches high, branched, the branches usually erect: leaves linear-oblong to linear lanceolate, $\frac{1}{2}$ -1 $\frac{1}{2}$ inches long, acute, sessile, the margins usually revolute: ocreae 4-6 lines long, soon finely lacerate: flowers numerous, in small clusters in the axils of the upper leaves, erect or spreading: calyx 2 lines long 5-parted to near the base, the segments obovate, obtuse, pink with green midveins: stamens 5, included: style about a line long, 3-parted. On dry stony or sandy places, Brit. Columbia to California and Colorado. Flowering from Spring until Autumn.

P. lineare Hook. Fl. ii, 137. ? Minutely puberulent throughout: stem slender, prostrate or ascending, diffusely branched, 4-10 inches long, leaves linear to linear-lanceolate, $\frac{1}{2}$ -1 inch long acute, sessile, the margins strongly revolute, dark green above, white beneath: ocreae about 4 lines long, soon lacerate: flowers in small clusters in the axils of subulate bracts at the ends of the branches: crowded and apparently spicate, erect or spreading, on short pedicels: calyx about 2 lines long, broadly campanulate, 5-cleft to near the base, the 3 outer segments obovate, rounded at the apex, the 2 inner ones narrower and barely obtuse, all pink or rose-color with green midveins: stamens 8, included. On mossy banks along the lower Columbia and Willamette rivers. Not flowering until Autumn.

P. Nuttallii Small Monog. Polyg. 132. *P. intermedium* Nutt. not Ehrh. Glabrous throughout: stem slender and wiry, erect 3-9 inches high simple irregularly and divergently branched, dark red: leaves linear-lanceolate, 4-18 lines long, acute, sessile, glaucescent beneath more or less revolute: ocreae 1-2 lines long, at length lacerate: flowers in the axils of the upper leaves, crowded and racemose, erect: calyx greenish, about a line long, 5-parted to near the base, the segments oblong, with pinkish margins: stamens 8 or fewer, the filaments dilated at base. On grassy banks, Brit. Columbia to Oregon.

P. Kelloggii Greene Fl. Fr. 134. Glabrous throughout: stem slender, mostly erect, 1-3 inches high, divergently branched from near the base: leaves linear or linear-lanceolate 2-6 lines long, acute, sessile, crowded on the branches but spreading and not imbricated, much the same size throughout: ocreae funnelform a line or less long, thin and early lacerate: flowers in small clusters in the axils of the upper leaves, contiguous on account of the very short internodes making the branches appear like leafy

racemes: calyx green, a line long 5-parted to near the base, the segments oblong, obtuse, with whitish or cream-colored margins: stamens about 5, included. Washington to California and Colorado.

P. Watsoni Small Monog. Polyg. 138. *P. imbricatum* Nutt. not Raf. Glabrous throughout, stem slender and wiry, usually simple, 1-6 inches high: 2-4 of the lower leaves filiform, 6-12 lines long, the upper or floral bracts lanceolate to oblong 2-4 lines long, acute or shortly acuminate, sessile, green with very narrow scarious margins: ocreae silvery, 2-parted but early lacerate, 1-2 lines long: flowers white or pinkish, mostly solitary, in the axils of the upper leaves, the lower one remote, the others crowded and racemose: calyx about a line long, 5-parted to below the middle, the outer segments longest, ovate, obtusish: stamens 5 or fewer. In wet places, Washington to California and the Rocky Mountains.

P. polygaloides Meisn. in DC. Prodr. xiv, 101. Glabrous and light green, 4-8 inches high mostly somewhat corymbosely branched, slightly flexuous: leaves linear. 3-18 lines long, acute, sessile: ocreae funnelliform, 2 lines long or more, 2-parted, soon lacerate: flowers in small clusters in the axils of oblong scarious-margined more or less imbricated bracts at the ends of the branchlets: calyx a line long, 5-parted to near the base, white or pinkish, the segments with a dark midrib, the outer ones longer than the inner: stamens 8, included: style evident, 3-parted to the middle. In moist places on open plains, Brit. Columbia to California and the Rocky Mountains.

SUBGENUS V DURAVIA Watson Am. Nat. vii, 665. Slender wiry little annuals. Leaves linear, not jointed upon the scarious lacerate ocreae. Flowers in slender many jointed interrupted spikes, mostly solitary and nearly sessile in the sheaths. Sepals 5, colored, becoming somewhat appressed to the achene. Stamens 8, the 3 inner filaments but slightly dilated at base. Achenes membranaceous, linear, nearly terete, obscurely 3-angled. Cotyledons accumbent.

P. Californicum Meisn. in DC. Prodr. xiv, 100. Glabrous: stem very slender and wiry, erect, diffusely and loosely branched to nearly simple: leaves narrowly linear, to filiform 6-18 lines long, subulate-tipped, 3 ribbed, the upper reduced to subulate bracts: flowers solitary in the axils of the bracts forming slender terminal spikes: calyx a line or less long, 5-cleft to the middle at length exceeding the ocreae. On dry plains Southern Oregon to California.

P. Greenei Watson Proc Am. Acad. xix, 294. Glabrous: stem slender, erect, 4-7 inches high, generally branched throughout, compact: leaves linear to linear-lanceolate, 2-6 lines long, almost bract-like, reduced bracts above more or less imbricated and often of much the same size throughout, 3-ribbed, the margins revolute: ocreae 3-4 lines long conspicuously lacerate, the segments subulate, numerous, rigid: flowers solitary in the axils of bracts and thus apparently in terminal leafy-bracted racemes: calyx sessile, a line long, rose-color, 5-cleft, not exceeding the ocreae: stamens 8, included: style a line long 3-parted. Eastern Washington to California.

P. Parryi Greene Bull. Torr. Bot. Club viii. 99. Glabrous: stem erect, 1-4 inches high, simple to densely much branched, very leafy and bearing flowers to the base: leaves linear, 3-12 lines long, of much the same size throughout, subulate-tipped, 3-nerved: ocreae a little more than a line long, extremely lacerate, usually hiding the calyx and giving the whole plant a woolly appearance: flowers solitary in the axils of all the

leaves: calyx nearly a line long, sessile, 5-cleft. In moist places, eastern Washington to southern Oregon and California.

SUBGENUS VI TINIARIA Meisn. Monog. 62. Annual or perennial more or less twining plants with usually cordate or truncate leaves. Ocreae membranaceous, funnellform, oblique, naked at the summit. Flowers in axillary or terminal clusters or racemes. Calyx 5-parted, the outer segments keeled or winged. Stamens 8. Style 3-parted or wanting. Achenes triquetrous. Cotyledons accumbent.

P. CONVULVULUS L. Sp. 364. Annual: Glabrous: stem slender prostrate or twining, 1-4 feet long, branched: leaves broadly to narrowly ovate or ovate-sagittate, 1-3 inches long, acuminate, somewhat undulate and crisped, on slender petioles: flowers in small axillary clusters and terminal racemes on slender reflexed pedicels: calyx green or whitish, about 2 lines long, the segments oblong, obtuse, closely investing the triquetrous achene. Common in cultivated fields and gardens. Naturalized from Europe.

P. DUMETORUM L. Sp. ed. 2, 522. Perennial: bright green and glabrous throughout: stems weak and slender, extensively twining 2-20 feet long: leaves ovate-cordate, 1-4 inches long, acuminate, petioled or nearly sessile: flowers in axillary racemes 2 inches long: calyx yellowish-green, drooping, nearly 3 lines long. Said to grow in our region but I have not seen it. Missouri to Tennessee and Europe.

6 RUMEX L. Sp. 333.

Coarse perennial, biennial or annual herbs, some tropical species shrubs or trees, with more or less acid juice, alternate leaves with sheathing stipules and small flowers fascicled or verticillate in paniculate racemes. Flowers perfect, polygamons or dioecious, on jointed pedicels. Calyx 5-parted or of 6 distinct sepals the outer 3 herbaceous, spreading or reflexed, the inner larger and more or less colored, usually becoming enlarged and reticulated in fruit, appressed to the 3-angled achene. Stamens 6: filaments very short. Style 3-parted, with peltate tufted stigma. Embryo curved or nearly straight, borne in one of the faces of the achene.

§ 1 **ACETOSELLA** Trelease Rev. Rum. 76. Dioecious perennials with acid juice. Outer segments of the calyx without dorsal callosities, not reticulated nor larger than the achene.

R. ACETOSELLA L. Sp. 338. (SORREL.) Glabrous throughout stems slender, 6-12 inches high, tufted, propagating by creeping rootstocks: leaves oblanceolate, acute, the lower mostly hastate with a large decurrent, rarely toothed auricle on each side, petioled, 2-5 inches long, the upper gradually reduced and entire: panicle more or less compound, usually reddish, the filiform ascending branches, leafless: pedicels capillary, articulated at the summit: flowers about a line long. Common in fields and waste places throughout most of North America and Europe.

§ 2 **ACETOSA** Campd. Monog. Rumex, Dioecious perennials, the leaves with acid juice. Inflorescence with slender leafless branches. Inner segments of the calyx rather finely reticulated becoming round-cordate and much larger than the achene.

R. paucifolius Nutt. Mss. Watson Bot. King, 314. Stems somewha

tufted, about a foot high: leaves spatulate to lanceolate, or the shortest somewhat elliptical-ovate, very gradually narrowed at base, neither auricled nor hastate, 2-6 inches long: inflorescence rather simple. with suberect branches: pedicels about as long as the fruit, jointed toward the base, inner segment of the calyx about 2 lines in diameter, achenes about a line long. In mountain parks, Brit. Columbia to California and the Rocky Mountains.

R. acetosa L. Sp. 337. Stems simple, mostly solitary, 1-4 feet high, rather slender: leaves ovate or oblong-ovate 2-6 inches long, mostly obtuse, deeply cordate with commonly acute auricles or subsagittate, a small tooth sometimes present on each auricle: inflorescence a rather simple strict panicle: pedicels about as long as the fruit conspicuously jointed in the middle: outer sepals of pistillate relatively large, reflexed in flower orbicular, 2-3 lines in diameter clawless usually with a delicate callosity at base: achene about 3 lines long. In open places in woods, Alaska to Oregon and across the continent.

§ 2 **LAPATHA** Campd. l. c. Leaves never hastate, with or without acid juice. Inflorescence with stouter, sometimes leafy branches: hermaphrodite or andro-monoecious. Inner sepals commonly reticulated, becoming round or elongated and much larger than the achene.

* Sepals at most very minutely erose or low denticulate.

+ Inner sepals very large, mostly red, round or broadly ovate deeply cordate, without callosities, outer sepals at length reflexed.

R. venosus Pursh Fl. 733. Glabrous throughout: stems stout, 8-18 inches high from long running perennial roots, branching from most of the axils: leaves thick and somewhat coriaceous, elliptical to nearly ovate, abruptly acute at both ends, 2-6 inches long: inflorescence nearly simple, leafless, the short zigzag branches divergent: pedicels rather stout about as long as the fruit tumidly jointed below the middle: inner sepals firm, bright rosy-red, orbicular or broader than long, 8-12 lines in diameter, the sinuses often closed, emarginate to shortly blunt acuminate: achenes about 4 lines long. On sandy plains east of the Cascade Mountains, Brit. Columbia to Nevada and Kansas.

+ + Inner sepals not over 6 lines long, only moderately if at all cordate.

+ + Inner sepals round or very broadly ovate, low reticulate pedicels slender or capillary.

R. occidentalis Watson Proc. Am. Acad. xii, 253. Glabrous: stems stout, 1-3 feet high, from thick perennial roots: leaves ovate to lanceolate, 6-12 inches long wavy-margined, truncately cordate, the apex rounded to acute, with acid juice: inflorescence strict and dense, rosy-red in fruit, naked or with a few small leaves below pedicels 2-3 times as long as the fruit, very obscurely jointed below the middle: inner sepals at length rosy-red, 3-5 lines long, deltoid-ovate, often only slightly cordate, remotely erose or denticulate, rounded or obtuse at the apex, without callosities: achenes 2 lines long. In wet or moist alluvial soil, California to Alaska and Colorado.

R. confluis Greene Pitt. iv, 306. Stems stout, often 6-8 feet high: blade of the lowest leaves often $1\frac{1}{2}$ feet long, commonly 6 inches wide toward the deeply subhastate-cordate base, lanceolate, on petioles nearly as long as the blade: panicle ample, 1-2 feet long: pedicels slender, 3-6 lines long, jointed well above the base: valves suborbicular, with subtruncate base, green and of thin texture, the margins more or less crenate or dentate toward the base. In wet meadows, in the lake region of northern Idaho.

R. CRISPUS L. Sp. 335. Glabrous to slightly papillate: stems stout, 2-3 feet high, simple: leaves bluish-green, the lowest ample, elliptical to mostly oblong-lanceolate, rounded or decurrently acutish at base, often a foot long: branches of the panicle rather strict, somewhat leafy: pedicels about one-half longer than the fruit, tumidly jointed near the base: inner sepals 2-3 lines long, rounded ovate, barely cordate, rounded at the apex or with a broad blunt acumination, minutely erose to broadly dentate below, each with a smooth ovoid often rosy callosity reaching to the middle of the valve: achene 1-2 lines long. Common throughout temperate North America and Europe.

++ ++ Inner sepals triangular-ovate to oblong, sometimes with a contracted apex.

R. hesperius Greene Pitt. iv, 234. "Allied to *R. altissimus* but low and slender, very leafy, the panicle small, small-fruited: leaves elliptic-lanceolate, very acute or acuminate, wavy-margined or even almost crisped: pedicels jointed at the very base: valves of the fruiting calyx from quite exactly and sharply deltoid to subreniform-deltoid, as broad at base as long, none grain-bearing, all distinctly though not strongly venulose, seldom obviously reticulate.

Bottom lands near Bingen Washington, 31 Oct. 1893, W. N. Suksdorf; the specimens distributed for *R. altissimus*, but the species very distinct."

R. salicifolius Wein. Fl. iv, 28. Glabrous, pale green: stems spreading to erect, 1-3 feet high simple or branched, flexuous: from thick perennial roots, leaves lanceolate to linear, or the lower oblong, acute or acuminate at both ends, or rarely obtuse at the apex, often falcate, 2-7 inches long: panicles simple: pedicels arcuately curved, scarcely as long as the fruit, or a few in each cluster longer, jointed near the base: inner sepals triangular-ovate, acute, 2-3 lines long, delicately veined: callosities variable in number smooth or pitted, often nearly as long as the valve: achenes 1-2 lines long. In rich moist soil, Alaska to California and the Atlantic States and Canada: also Europe.

R. CONGLOMERATUS Murray Prodr. Fl. Goett. 52. Glabrous perennial: stems slender, mostly clustered, 1-3 feet high: leaves ovate to oblong or lanceolate, 1-5 inches long, some of them somewhat fiddle-shaped, crenulate and slightly crisped: flowering branches slender, at length elongated, not zigzag, bearing a broadly lanceolate leaf at nearly every node: pedicels slender, about as long as the fruit, tumidly jointed near the base: inner sepals about 3 lines long, nearly oblong, obtuse: callosities mostly 3, round to ovoid, very prominent, smooth, half as broad and nearly as long as the valves: achenes about a line long. In waste places, western Washington to California: also in the Atlantic States: adventive from Europe.

* * Valves very prominently toothed.

R. PULCHER L. Sp. 336. Stems slender, zigzag above, branching at nearly every node, at length dichotomous above, mostly glabrous: leaves oblong or some of the lower ones fiddle-shaped, 1-6 inches long, obtuse, cordate at base, upper ones oblong or oblong-lanceolate, usually narrowed at both ends: panicle loose: racemes long, divergent, rather leafy: pedicels very short, scarcely longer than the fruit, tumidly jointed near the middle: inner sepals rigid, one commonly longer than the others, prominently veined, nearly 3 lines long, ovate, obtuse, with 5-10 short teeth on each side, one or all of them with a wrinkled callosity half as long as the valve: achenes about a line long. In waste places: naturalized from Europe.

R. OBTUSIFOLIUS L. l. c. Glabrous perennial: stems stout, erect, simple or sparingly branched, 2-4 feet high: leaves ample, broadly ovate, 4-14 inches long cordate, the veins often red or purplish, the upper ones lanceolate or oblong-lanceolate, the margins somewhat undulate or crisped:

flowering branches suberect, sparingly leafy below: pedicels slender, about twice as long as the fruit, tumidly jointed toward the base: inner sepals not very conspicuously veined, about 3 lines long, ovate-oblong, with 3-5 thin triangular teeth on each side, mostly confined to the lower half, the triangular entire apex mostly acute: callosities smooth, one usually larger than the others. Common along roadsides and in pastures: naturalized from Europe.

* **R. persicarioides** L. l. c. Pubescent and pale green annual: stems rather stout, erect and simple or diffusely branched, 1-3 feet high, sometimes spreading or creeping, very leafy: leaves lanceolate or oblong, narrowed or sometimes cordate or sagittate at base, acute, the margins more or less undulate or crisped, 1-12 inches long: panicle simple or compound: racemes erect, leafy-bracted, usually interrupted: pedicels capillary, twice as long as the fruit, tumidly jointed at the base: inner sepals oblong, a line long with 1-3 bristles on each margin, each bearing an oblong callosity. Brit. Columbia to California, and the Eastern States and Canada

7 OXYRIA Hill Veg. Syst. x, 24. (1765)

Low perennial herbs with acid juice, mostly radical leaves and small perfect flowers in naked paniced racemes. Calyx unequally 4-parted, the outer segments smaller than the inner. Stamens 6, included: filaments short, subulate, glabrous: anthers oblong. Ovary 1-celled: ovule solitary. Style short, 2-parted, its branches divergent: stigmas fimbriate, persistent. Achenes compressed and thin, broadly winged.

O. digyna Campd. Monog. Rum. 155 t, 5. fig. 3. Rootstock large, chaffy: stem slender, scape-like, simple or sparingly branched, leafless or nearly so, 2-12 inches high: leaves reniform or orbicular-reniform, 6-18 lines broad, undulate, sometimes emarginate, long-petioled: ocreae oblique, loose, those of the stems bearing flowers: racemes many-flowered: flowers slender-pedicelled: calyx segments oblong, the inner erect, the outer reflexed in fruit: achenes pointed, smooth, surrounded by a broad membranous wing. On high mountains, California to the Arctic Circle and across the continent: also northern Europe and Asia.

ORDER LXXVI PHYTOLACCACEÆ Lindl. Nat. Syst. 231.

Herbs shrubs or trees with alternate leaves and perfect regular polygamous or monœcious, usually racemose flowers. Calyx 4-5-parted or of 4 or 5 distinct sepals, imbricated in the bud. Stamens as many as divisions of the calyx and alternate with them, or more numerous, hypogynous: filaments subulate or filiform: anthers 2-celled, the cells longitudinally dehiscent, often nearly separated. Ovary superior, several-celled, with a solitary amphitropous ovule in each cell. Styles as many as carpels, short or none: stigmas linear or filiform. Fruit a berry, capsule or samara.

1 PHYTOLACCA L. Sp. 41.

Tall perennial herbs with simple entire leaves without stipules and small flowers in terminal racemes which by the farther growth of the stem become opposite the leaves. Pedicels bracted at the base. Calyx of 4 or 5 persistent rounded sepals. Stamens 4-15,

inserted at the base of the calyx. Ovary globose, of 5-15 distinct or somewhat united carpels. Fruit a depressed-globose berry. Seeds erect, compressed. Embryo annular, in mealy albumen.

P. decandra L. Sp. ed. 2, 631. (POKE-BERRY) Glabrous and succulent: stems 4-12 feet high, stout, erect, branched: leaves oblong-lanceolate or ovate-lanceolate, pinnately veined, acute or acuminate at both ends, 8-12 inches long, petioled: racemes peduncled, 2-8 inches long: pedicels divergent, 2-6 lines long, each with a subulate-lanceolate branchlet at its base, and usually 2 linear ones above: flowers perfect: calyx white, 2-3 lines broad, its sepals suborbicular or oval: stamens 10, slightly shorter than the sepals: berry dark purple, 5-6 lines in diameter, 10-celled. In waste places in southern Oregon: introduced from the Eastern States.

ORDER LXXVII AMARANTHACEÆ J. St. Hil. Expos.
Fam. 204. (1805.)

Herbs or low shrubs with simple leaves without stipules and small monœcious, polygamous or diœcious flowers usually in terminal spikes or axillary heads. calyx herbaceous or membranaceous, 2-5-parted, the segments distinct or united at base. Stamens 1-5, mostly opposite the segments of the calyx, hypogynous. Ovary 1-celled, usually with a solitary amphitropous ovule. Style short, elongated or none: stigmas 1-3. Fruit an utricle, circumscissile, bursting irregularly or indehiscent.

1 AMARANTHUS L. Sp, 989. (PIG WEED.)

Annual herbs with alternate petioled entire leaves and small green or purplish mostly 3-bracteolate flowers in dense terminal spikes or axillary clusters. Calyx of 2-5 distinct sepals. Stamens 2-5: anthers 2-celled, longitudinally dehiscent. Styles or stigmas 2 or 3. Fruit a utricle beaked by the persistent style.

* Sepals 5, bracts 3.

A. HYBRIDUS L. Sp. 990. Pubescent to nearly glabrous, green to purple: stem rather slender, 2 inches to 8 feet high, usually branched: leaves bright green on both sides or paler beneath, ovate or rhombic-ovate, 1-6 inches long, on slender petioles: flowers very numerous, in dense linear-cylindric ascending or spreading spikes, forming dense terminal panicles: bracts subulate, 2-3 lines long: sepals 5, oblong, acute or cuspidate, about half as long as the bracts: stamens 5: utricle smooth, circumscissile. Common in fields and waste places: naturalized from Tropical America.

* * Sepals 3: bracts 3.

A. blitoides Watson Proc. Am. Acad. xii, 273. Nearly or quite glabrous, pale green: stem much branched from the base, the branches prostrate and spreading, rigid, 6-20 inches long: leaves obovate to spatulate 3-12 lines long, obtuse to acute at the apex, narrowed into slender petioles: flowers in small axillary clusters mostly shorter than the petioles: bracts subulate-lanceolate, little longer than the 4 or 5 oblong-lanceolate acute or cuspidate sepals: stamens 3: utricle nearly smooth. In waste places and roadsides Idaho to the Atlantic States.

A. GRÆCIZANS L. Sp. 990. *A. albus* L. Glabrous: stem erect, 6-24 inches high whitish diffusely and widely branched: leaves oblong, spatulate or obovate, 6-18, lines long, pale green, long-petioled: flowers polygamous, in small axillary clusters shorter than the leaves: bracts subu-

late, pungent-pointed, spreading, much longer than the 3 membranaceous sepals: stamens 3: utricle wrinkled, longer than the sepals, circumscissile common in fields and waste places: naturalized from tropical America.

A. carneus Greene Pitt. ii, 105. "Monœcious: glabrous, prostrate, forming a mat 6-10 inches broad, the branches pinkish, the glomerules of flowers and lower face of leaves deep flesh-purple: plant leafy and floriferous throughout: leaves obovate-lanceolate, entire, setose-tipped, $\frac{1}{2}$ - $\frac{3}{4}$ inch long, tapering to a short petiole: bracts ovate-acuminate and setose-tipped: utricle smooth: seed black and shining, $\frac{1}{8}$ line wide. Beaver Canyon, Idaho."

* * * Sepal 1, Bract 1.

A. Californicus Watson Bot. Cal, ii, 42. Prostrate or ascending, glabrous, branching at the base, the stems often a foot long or more, with numerous short branchlets: leaves obovate to oblong, an inch long or less including the petiole, often small, obtuse or acutish, with white veins and margin: flowers green or reddish, in numerous small dense axillary clusters: bracts often membranaceous and inconspicuous, lanceolate, acuminate slightly or not at all exceeding the utricle: sepal of the staminate flowers $\frac{3}{4}$ line long, that of the fertile flower shorter and narrower, lateral: utricle slightly rugose, tardily circumscissile: seed half a line broad. Idaho to California and Southern Oregon.

ORDER LXXVIII CHENOPODIACEÆ Dumort.

Anal. Fam 15. (1829.)

Herbs or shrubs with alternate or rarely opposite leaves without stipules and small greenish flowers mostly in axillary and terminal panicles or racemes. Flowers perfect, monœcious or dioecious. Calyx persistent, 2-5-lobed or 2-5-parted, rarely reduced to a single sepal, or wanting in pistillate flowers. Stamens as many as lobes or divisions of the calyx, or fewer, opposite them: filaments slender: anthers 2 celled, longitudinally dehiscent. Ovary mostly superior and free from the calyx, 1-celled, with a solitary amphitropous or campylotropous ovule on a stipe rising from its base: styles 1-3, with capitate stigmas. Fruit an achene or utricle. Embryo slender, either annular and surrounding the mealy albumen, or spiral with the albumen lateral or wanting.

TRIBE I Flowers perfect, without bracts. Seeds free.

- 1 **Nitrophila** Perennial herbs with opposite leaves and axillary flowers.
- 2 **Kochia** Perennial herbs with scattered terete or linear leaves and axillary flowers.
- 3 **Chenopodium** Annual or perennial herbs with mostly thin leaves: flowers somewhat paniced.
- 4 **Blitum** Annual herbs with broad thin leaves: flowers in dense spicate clusters.
- 5 **Monolepis** Low annuals with the flowers densely clustered in the axils: sepal 1, bract like: stamen 1: fruit naked: seeds vertical.

TRIBE II Flowers monœcious or dioecious, bracted. Seeds free.

* Bracts compressed: testa of the seeds mostly coriaceous.

- 6 **Atriplex** Fruiting bracts with margins often dilated and the sides often muricate.

* * Bracts obcompressed, completely united, not muricate: testa membranaceous.

- 7 **Eurota** Low and shrubby white-tomentose perennials: pericarp conical, densely hairy, not winged.
- 8 **Eremosemium** Somewhat spinescent nearly glabrous shrubs: pericarp flattened, orbicular, wing-margined, glabrous.

TRIBE III Flowers perfect, without bracts. Seed invested by the pericarp.

Corispermum Low annuals: flowers solitary in the axils; fruit compressed-elliptical, acutely margined.

TRIBE IV Fleishy saline plants with jointed stems and scale-like leaves.

- 9 **Salicornia** Branches opposite: flower clusters decussitately opposite: calyx saccate, becoming spongy.

TRIBE V Herbs or shrubs with fleshy leaves. Stems not jointed.

- 10 **Sarcobatus** Somewhat spinescent shrubs: flowers unisexual: the staminate in aments, without calyx; the pistillate axillary, solitary, with saccate calyx: fruit transversely winged.
- 11 **Dondia** Saline herbs or shrubs with perfect axillary flowers: the calyx 5-cleft or 5-parted.

Tribe 1 Chenopodiæ Moq. in DC. Prodr. xiii, 48. Stems not jointed. Leaves flat, except in Kochia. Flowers perfect, without bracts. Sepals persistent. Seeds free, mostly with crustaceous testa and copious albumen. Embryo annular.

1 NITROPHILA Watson Bot. King 257.

Low branching perennials with fleshy opposite leaves and small perfect axillary flowers. Calyx of 5-7 equal erect concave and carinate sepals, mostly 2-bracted at base. Stamens as many as sepals, united into a very narrow perigynous disk. Style short. Stigmas 2. Utricle subglobose, indehiscent beaked by the persistent style included within the connivent sepals.

N. occidentalis Watson l. c. Glabrous throughout: stems ascending or decumbent, 3-8 inches long, from a perennial running rootstock, branching from the base: lower leaves broadly ovate or oblong, 2-3 lines long, the rest linear, 12 lines long, semiterete, acuminate and cuspidate: bracts similar but shorter, mostly twice longer than the flowers: flowers 1-3 in each axil, the lateral ones often short-pedicelled, 2-3-bracted, the central one often bractless: sepals a line long, rather rigid, ovate acutish exceeding the stamens and style: utricule brownish: seeds half a line broad, black and shining. In moist alkaline soil, southeastern Oregon to California.

2 KOCHIA Roth. Schrad. Journ. Bot. i, 307. (1799.)

Perennial or annual herbs or low shrubs with alternate leaves and small flowers solitary or few in the axils of the upper leaves. Flowers perfect or pistillate sometimes bracteolate. Calyx herbaceous, 5-cleft, persistent over the fruit, and at length developing a horizontal wing. Stamens 3-5, usually exerted: filaments linear.

Ovary ovoid, narrowed upward into the style: stigmas 2. Utricle pear-shaped or oblong the pericarp membranaceous, not adherent to the inverted seed. Embryo annular, green, enclosing the scanty albumen.

K. Americana Watson Proc. Am. Acad. ix, 93. Woody and branching at base: stems erect, mostly simple and virgate, 6-18 inches high, leafy, villous-tomentose to nearly glabrous: leaves terete, linear 3-12 lines long, acutish, ascending: flowers 1-3 in the axils, mostly with abortive stamens: calyx densely white-tomentose, nearly a line broad in fruit, the membranous wing as wide or wider, its lobes cuneate, rounded, nerved and somewhat crenulate: ovary ovate tomentose above: style elongated: pericarp nearly smooth: seed $\frac{2}{3}$ of a line broad, Valleys and foothills, eastern Oregon to Nevada and Arizona.

3 CHENOPODIUM L. Sp 218.

Annual or perennial herbs with alternate flat leaves and very small perfect sessile, bractless flowers clustered in axillary and terminal often paniced or compound spikes. Calyx 2-5-parted or 2-5-lobed, more or less closely covering the fruit, its segments or lobes herbaceous or somewhat fleshy, often keeled or rigid. Stamens 1-5. Styles 2-4, slender. Pericarp membranaceous, closely investing the lenticular or globose seed. Testa crustaceous. Embryo annular or curved around copious albumen.

§ 1 CHENOPODIASTRUM Moq. in DC. Prodr. xiii, 61. Annuals, usually somewhat mealy but not pubescent, or glandular nor aromatic. Fruit dry. Seeds lenticular, horizontal. Embryo completely annular.

C. ALBUM L. Sp. 219. (LAMB'S QUARTERS.) More or less mealy throughout: stem usually slender erect, commonly much branched usually 1-4 feet high: leaves rhombic-ovate or the upper ones lanceolate to linear-lanceolate, 1-4 inches long, obtuse or acute, at least the lower ones sinuate-dentate, the upper usually entire: flowers densely clustered in simple or compound often paniced spikes: calyx about half a line broad in fruit, its segments strongly keeled, usually completely enclosing the utricle: seed firmly attached to the pericarp. Common in cultivated fields and waste places everywhere.

C. hybridum L. Sp. 519. Glabrous throughout, or the inflorescence more or less mealy: stem rather stout erect, 2-4 feet high, simple or sparingly branched above: leaves ovate or rhombic-ovate, long-acuminate at the apex, truncate, rounded or subcordate at base, sharply dentate with 1-4 large acute teeth on each side, or the upper lanceolate and entire, the lower ones 4-7 inches long: flowers in large axillary and terminal panicles: calyx about a line broad its segments oblong, slightly keeled incompletely covering the fruit; stamens 5: seed sharp-edged, firmly attached to the pericarp. In woods and thickets, Brit. Columbia to Oregon and the Atlantic States, also Europe.

C. MURALE L. Sp. 219. Scarcely or not at all mealy, somewhat scurfy above: stems erect or decumbent, usually branched 1-3 feet high: leaves rhombic-ovate bright green on both sides, acute or acuminate at the apex, sharply and coarsely sinuate dentate, broadly cuneate or subtruncate at base, 2-4 inches long: flowers in loose axillary panicles shorter than the leaves: segments of the calyx not entirely enclosing the utricle: seeds sharp-edged, firmly attached to the pericarp. Along the coast. Brit. Columbia to California

also in the Eastern States and Europe.

C. leptophyllum Nutt. Moq. in DC. Prodr. xiii, 71. Stem slender usually erect 6-30 inches high branched, mealy above: leaves linear to oblong, white-mealy beneath, green above, acute or acuminate, or the lower obtuse, entire or the lower sometimes toothed, short-petioled, 6-18 lines long, 1-3-nerved: flowers in small dense clusters in dense or interrupted axillary and terminal simple or branched spikes: calyx about half a line broad, its segments strongly keeled and nearly covering the fruit: seed not firmly attached to the pericarp. On dry hillsides. Brit. Columbia to California and the Great Lakes.

§ 2 **BOTRYOIS** Moq. in DC. Prodr. xiii, 272. Annuals, not mealy, more or less glandular-pubescent, aromatic. Seeds very small, not exceeding the dry calyx, often vertical: embryo curved.

C. Botrys L. Sp. 219. Glandular-pubescent and viscid throughout, strongly-scented, often red or purplish: stem slender, erect, simple to much branched. 6-20 inches high: leaves ovate or oblong, deeply and usually irregularly lobed, acute or obtuse at the apex, petioled 6-20 lines long, or the upper ones much smaller, the lobes mostly obtuse and dentate: flowers very small, in numerous loose axillary cymose panicles mostly longer than the leaves: calyx 3-5-parted, the segments lanceolate, acute, thin, very pubescent, rather longer than the utricle: seed firmly attached to the pericarp. On sandy bars and banks along streams, Oregon to California and across the Continent: also in Europe.

C. ANTHELMINTICUM L. Sp. 220. Glabrous or slightly glandular, rather dark green, strong-scented: stem much branched, ascending or erect, leafy, 2-3 feet high: leaves lanceolate or ovate-lanceolate, usually acuminate at the apex, narrowed at base, slender-petioled, coarsely dentate or incised, 2-5 inches long, the uppermost commonly linear lanceolate and entire: flowers in linear, usually bractless paniced spikes, or the lower spikes leafy-bracted. In waste places, not common: naturalized from Europe.

§ 3 **BLUTEÆ** Moq. l. c. Glabrous annuals. Flowers in crowded clusters, axillary or in spikes. Calyx becoming somewhat fleshy in fruit and often colored. Seeds subglobose.

C. rubrum L. Sp. 218. Glabrous and somewhat fleshy, not mealy: stem erect, leafy, 1-3 feet high, often much branched: leaves thick 1-4 inches long, rhombic ovate or rhombic-lanceolate, narrowed at base, coarsely sinuate dentate or the upper entire, petioled: flowers in erect compound leafy-bracted axillary and terminal spikes: calyx 3-5-parted its segments slightly fleshy, red, not keeled obtuse about as long as the utricle: stamens 1 or 2: seed separating from the pericarp. In saline or alkaline soil, Brit. Columbia to California and the Atlantic States also in Europe and Asia.

C. humilis Hook. Fl. ii, 127. Glabrous annual: stem prostrate or ascending, 1-6 inches long: leaves ovate to lanceolate, 6-12 lines long, obtuse to acute, often hastate, rarely toothed, attenuate below to a petiole: flowers in short axillary and terminal spikes or clusters: calyx 3-5-parted, its segments slightly fleshy, usually green, not keeled: obtuse; about as long as the utricle: stamens one or two: stigmas short: seed horizontal, shining, rather sharp-edged. On muddy banks and flats. Washington and Oregon to Nevada and Colorado.

4 BLITUM L. Sp. 2.

Annual herbs with alternate petioled rather light green leaves

and small green or reddish flowers in aggregated globose axillary sessile heads, or the upper heads forming an interrupted spike. Calyx 2-5-lobed, becoming pulpy and bright red in fruit. Stamens 1-5. Pericarp separating from the vertical shining seed. Embryo a complete ring around mealy albumen.

B. capitatum L. Sp. 2. Glabrous or sparingly pubescent, succulent: stem erect, ascending or prostrate, 6-24 inches high, commonly much branched: leaves usually longer than wide, broadly triangular or hastate, 1-4 inches long, sinuate, or the upper ones and sometimes all of them entire, rounded to cordate at base: flowers in globose sessile heads in the axils of the upper leaves and on the sides of the upper part of the stem and branches, 2-3 lines in diameter in flower, becoming bright red and 5-8 lines in diameter in fruit: seeds compressed, ovate, enclosed by the calyx or when mature slightly exserted. Brit. Columbia to California and the Eastern States.

5 MONOLEPIS Schrad. Ind. Sem. Gœtt. iv. (1830.)

Low annual branching herbs with alternate leaves and small perfect or polygamous flowers in small axillary clusters without bracts, calyx of a single persistent herbaceous sepal. Stamens 1. Styles 2, filiform. Pericarp membranaceous, persistent upon the vertical flattened seeds. Embryo annular around copious albumen, its radicle turned downward.

M. chenopodioides Moq. in DC. Prodr. xiii, 85. Glabrous or somewhat mealy: stem erect, much branched from the base, 3-12 inches high: leaves lanceolate, with 1 or 2 coarse teeth on each side, attenuate at base to a petiole, the upper ones much smaller, and usually entire: flower-clusters dense, often reddish: sepal fleshy-foliaceous, oblanceolate or spatulate, acute: pericarp adherent to the seed, minutely pitted: seed half a line broad, the margin acute. In moist places, Washington to California and the Saskatchewan.

M. spatulata Gray Proc. Am. Acad. viii, 386. Subpubescent or glabrous: stem decumbent or ascending, 5-6 inches high with elongated leafy branches leaves narrowly spatulate, 6 lines long or less, acute entire: flowers 10-20 in dense clusters: sepal spatulate obtuse: pericarp separating from the seed, minutely papillose: seed less than $\frac{1}{4}$ line broad. Eastern Oregon to Mono Pass, California.

M. pusilla Torr. Watson Bot. King 284. Stem erect, dichotomously much branched from the base 2-6 inches high, slender somewhat mealy, becoming glabrous often reddish: leaves oblong 3-6 lines long, obtuse, entire, shortly petioled: clusters 1-2-flowered; sepal obtuse: pericarp adherent, minutely tuberculate: seeds less than $\frac{1}{4}$ line broad, acute-margined. Alkaline valleys, eastern Washington to Nevada.

Tribe 2 Atriplicex Moq. in DC. Prodr. xiii, part 2, 89. Stems not articulated nor leaves fleshy. Flowers monœcious or diœcious; the staminate with 3-5-cleft calyx; the pistillate without calyx, enclosed in a pair of more or less united bracts. Seed free, vertical, with annular embryo and copious albumen.

6 ATRIPLEX L. Sp. 1052.

Herbs or shrubs with alternate or rarely opposite leaves and small greenish flowers in panicles or spikes or capitate-clustered

in the axils. Staminate flowers bractless, consisting of a 3-5-parted calyx and an equal number of stamens and with or without a rudimentary ovary. Pistillate flowers subtended by 2 bractlets which enlarge in fruit and are more or less united: calyx none. Ovary globose or ovoid. Stigmas 2. Utricle completely or partially enclosed by the enlarged bractlets. Seeds vertical or rarely horizontal. Embryo annular.

§ 1 Annuals: somewhat succulent. Fruiting bracts herbaceous or coriaceous, free or nearly so. Flowers androgynous or subdioecious in leafy or naked spikes. Radicle inferior or somewhat ascending.

* Leaves usually more or less hastate, the lowest opposite: bracts ovate-rhombic to triangular or hastate, often crested, the margins foliaceous, entire or toothed.

A. patula L. Sp. 1053. Glabrous and dark green or somewhat scurfy above: stem much branched, diffuse, ascending or erect, 1-3 feet long: leaves lanceolate or linear-lanceolate, slender-petioled or the uppermost nearly sessile, entire, sparingly toothed or 3-lobed below the middle, acuminate at the apex, narrowed or cuneate at base, 1-5 inches long: flowers in panicked interrupted mostly leafless spikes and usually also capitate in the upper axils: fruiting bractlets united only at the base, fleshy, triangular or rhombic, 3-4 lines wide their sides often tubercled. In saline places mostly along the coast, Alaska to California: also on the Atlantic coast and Europe.

** Leaves petioled: bracts ovate to linear, mostly 4-6 lines long, entire and not margined nor appendaged, only the apex foliaceous.

A. zosteræfolia Watson Proc. Am. Acad. ix, 109. Weak and slender, ascending, a foot high or less, diffusely branched, glabrous or slightly scurfy: leaves fleshy, mostly opposite, linear, 1-4 inches long, $1\frac{1}{2}$ line broad: flowers in axillary clusters and in short axillary androgynous spikes: calyx deeply 5-cleft: bracts linear, somewhat unequal, 1-2 lines becoming 4-6 lines long, free, fleshy: immature seed less than half a line broad: radicle, slightly ascending: mature fruit unknown. Collected only by Scouler at the Straits of De Fuca.

§ 2 Annuals with alternate or sometimes opposite leaves. Radicle superior.

A. pusilla Watson l. c. 110. Hoary-scurfy throughout: stem slender, 2-6 inches high, diffusely much-branched, leafy: leaves broadly ovate to oblong-lanceolate, 2-4 lines long, acute, sessile, entire, mostly crowded on the branches: flowers minute, subsolitary or one of each sex in the axils: calyx deeply 5-cleft: bracts ovate, half a line long in fruit, acutish, not foliaceously margined nor appendaged: style exerted: seeds with thin transparent testa. On alkaline plains, southeastern Oregon to Nevada.

A. truncata Gray Proc. Am. Acad. viii, 398. Rather stout, erect and mostly strate, 1-3 feet high, sparingly branched: leaves broadly ovate, 18 lines long, truncate or cordate at base, acute, sessile or the lower shortly petioled, spikes more or less leafy: fruiting bracts coriaceous, $1\frac{1}{2}$ lines long, ovate-oblong sessile or shortly pedicelled, united up to the truncate herbaceous summit, which is obtusely 3-toothed the sides rarely subtuberculate: calyx mostly 3-4-parted. Oregon to Nevada.

A. argentea Nutt. Gen. i, 198. Grayish-scurfy or nearly glabrous: stem erect, ascending or decumbent, 6-8 inches high, diffusely branched

and leafy: leaves rather thick, deltoid or triangular-ovate or subrhombic, often subhastate $\frac{1}{2}$ -2 inches long, acute or obtuse, opposite and petioled or the upper sessile and alternate: flowers in capitate axillary clusters or the staminate in short dense spikes: fruiting bracts shortly pedicelled, united nearly or quite to the top, more or less acutely and deeply toothed, the sides usually tubercled or crested. Dry or saline soil, eastern Oregon to California and Nebraska.

§ 3 More or less shrubby perennials, closely appressed-scurfy, mostly dioecious. Leaves mostly alternate. Radicle usually superior.

A. Nuttallii Watson Proc. Am. Acad. ix, 116. Stems erect, shrubby 1-3 feet high branching mostly from the base, bark nearly white: leaves narrowly oblong or oblanceolate 6-24 lines long, narrowed at base, sessile, entire: flowers in terminal spikes and capitate clustered in the axils, often strictly diœcious: calyx 5-cleft: bracts ovate, united to above the middle, mostly sessile, becoming suborbicular, 1-2 lines long, not compressed, the margins and summit irregularly gash-toothed and the sides usually mucronate or toothed. In dry saline soil, eastern Oregon to Brit. Columbia and Nebraska.

A. confertifolia Watson l. c. 119. A much branched spinescent shrub 1-6 feet high, hoary-scurfy: leaves alternate, ovate or obovate to lanceolate, 2-8 lines long, obtuse or acutish, cuneate at base, sessile or short-petioled, entire: flowers in small axillary clusters: calyx 5-parted: bracts thick and scurfy, about 6 lines broad, suborbicular, with free entire margins, not veined nor appendaged, sessile, united at the cuneate base around the seed and broadly margined above: seed a line broad, filling the cavity. On alkaline plains, eastern Oregon and Idaho to New Mexico.

7 **EUROTIA** Adans. Fam. Pl. ii. 260. (1763.)

Low pubescent undershrubs, with alternate entire leaves and small clusters of axillary and subspicate flowers. Flowers diœcious or monœcious. Staminate flowers bractless, the calyx 4-parted with unappendaged lobes and as many stamens: filaments slender, exserted. Pistillate flowers without calyx, bibracteate. Bracts sessile, somewhat obcompressed, united to the apex, becoming enlarged and rather rigidly membranaceous, not winged, 2-horned at the apex, the sides densely covered with long spreading tufted hairs. Ovary oblong-ovate sessile, hairy, firmly membranaceous. Styles 2, exserted. Seed vertical, obovate, the testa simple. Cotyledons broad and green: radicle inferior.

E. lanata Moq. Enum. Chenop. 81. White-tomentose throughout with stellate hairs: stems erect, with strict ascending leafy branches, 6-30 inches high: leaves linear to narrowly lanceolate, with revolute margins, 6-18 lines long, obtuse: calyx-lobes ovate, acute, hairy: bracts lanceolate, 2-3 lines long in fruit, with 2 short horns at the apex, penicillate with 4 dense spreading tufts of silvery white hairs: utricle loose, the pericarp readily separating from the large seed. On dry ridges, eastern Brit. Columbia to California and Nebraska.

8 **EREMOSEMIUM** Greene Pitt. iv, 225.

GRAYIA H. & A.

Subspinescent undershrubs with alternate entire leaves: and small flowers in axillary clusters or terminal spikes. Flowers

dioecious or sometimes monoecious. Calyx of the bractless staminate flowers mostly 4-parted, the 4-5 stamens central, with short subulate filaments. Pistillate flowers without calyx, enveloped in the obcompressed membranaceous bracts which are united into an orbicular flattened sac with a small naked orifice at the apex, adherent below to each other and to the pedicel of the ovary, becoming enlarged and reticulately veined and somewhat wavy-margined vertically. Styles 2, slender, at first exserted. Seeds vertical, with a membranaceous testa. Embryo annular: radicle inferior.

E. spinosa Greene Pitt. iv. 225 *Grayia polygaloides* H. & A. Stems erect, diffusely branched, 1-4 feet high, the branchlets often spinescent: leaves rather fleshy, glabrous or at first with the young branches somewhat mealy, oblanceolate or spatulate to obovate, 6-15 lines long, obtuse or acute, narrowed at base and sometimes petioled: staminate flowers in axillary clusters, the pistillate mostly spicate: fruiting bracts 3-6 lines in diameter, sessile, smooth, emarginate, thin, white or pinkish: the seed usually central, about $\frac{2}{3}$ of a line broad. On rocky ridges, eastern Oregon to California and Utah.

Tribe 3 Corispermæ Moq. Chenop. 101. Stems not articulated. Leaves not fleshy. Flowers perfect, bractless. Pericarp adherent to the vertical seed. Embryo annular around copious albumen.

9 CORISPERMUM L. Sp. 4.

Annual herbs with alternate leaves and small perfect bractless green flowers solitary in the axils, forming narrow leafy terminal spikes, the upper leaves shorter and broader than the lower. Calyx 1 or 2 thin broad sepals. Stamens 1-3, rarely more and one of them longer. Ovary ovoid: styles 2. Utricle ellipsoidal, mostly plano-convex, the pericarp firmly adherent to the vertical seed, its margins acute or winged. Embryo annular, surrounding somewhat fleshy albumen: radicle inferior.

C. hyssopifolium L. Sp. 4. More or less floccose or villous-pubescent: stem erect, 6-18 inches high, diffusely much branched: leaves linear, 9-18 lines long, cuspidate: floral bracts reduced more or less abruptly, from linear-lanceolate to ovate, acute to acuminate, membranously margined: sepals rarely wanting, shorter than the bracts: stamens more or less perfectly developed: fruit $1\frac{1}{2}$ -2 lines long narrowly winged, obtuse, often mucronate with the projecting style. On sandy alkaline plains, Alaska to California and the Atlantic States and Europe.

Tribe 4 Salicorniæ Dumort. Moq. in DC. Prodr. xiii pt. 2, 144. Fleshy saline plants with jointed stems and scale-like leaves. Flowers mostly perfect, immersed by threes in depressions in the rachis of a close cylindrical spike. Seed vertical. Embryo annular, with little albumen.

9 SALICORNIA L. Sp. 3.

Fleshy annual or perennial plants with opposite terete branches scale-like leaves and small perfect, or the lateral staminate, flowers in heads of 3-7 sunken in the axils of the upper scales, form-

ing terminal narrow spikes. Calyx obpyramidal or rhomboid, fleshy, 3-4-toothed or truncate, becoming spongy in fruit, deciduous. Stamens 1 or 2, exserted: filaments cylindrical, short: anthers oblong. Ovary ovoid: styles or stigmas 2. Utricle enclosed in the spongy fruiting calyx, the pericarp membranaceous. Seed erect, compressed. Embryo conduplicate.

S. herbacea L. Sp. ed. 2, 5. Annual: stem erect, rather slender, 6-18 inches high, usually diffusely branched: spikes 1-3 inches long, becoming a line or more thick: scales narrow, truncate or shortly acute: flowers in threes, the middle one twice higher than the lateral ones, slightly shorter than the joint: fruit pubescent: seeds $\frac{3}{8}$ to nearly a line long. In saltmarshes and wet saline places, Oregon to the Atlantic coast: Europe and Asia.

S. ambigua Michx. Fl. i, 2. Perennial by a woody base: stems decumbent and rooting at the nodes, or ascending, 6-18 inches long, the branches nearly simple: spikes 6-18 lines long, slender, short jointed: scales short, acutish or acute: flowers nearly equal in height and equalling the joint: seeds pubescent, $\frac{1}{2}$ of a line long. Along the coast, Alaska to California and the Atlantic coast.

Tribe 5 Suedææ Moq. l. c. 152. Stems not articulated. Leaves fleshy, terete. Embryo spiral, with little or no albumen.

10 SARCOBATUS Nees in Max. Reise. N. A. i, 510.

Subspinescent rigidly branched shrubs with alternate fleshy leaves and small green flowers in terminal aments and solitary in the axils. Flowers monoecious or dioecious without bracts, dimorphous: the staminate in terminal aments, without calyx, the stamens irregularly arranged around the base of stipitate peltate scales: the pistillate axillary and solitary with a closed compressed-ovate calyx adherent at the base of the stigma, and margined laterally by a narrow erect border which develops into a broad membranaceous horizontal wing. Ovary thin and hyaline, nearly filled by the ovule. Embryo spiral with little or no albumen.

S. vermiculatus Torr. Emory's Rep. 150. Glabrous or the young twigs and leaves grayish pubescent: stems erect, 2-3 feet high, much branched, the branches with a smooth white bark, leafy and spiny or spinescent: leaves linear, entire, 6-18 lines long, narrowed at both ends: staminate spikes cylindrical, 3-12 lines long, narrow, the persistent scales spirally arranged, rhombic-ovate, acute: stamens about 3, soon falling: fruiting calyx coriaceous, 2-3 lines long, the wing 2-3 lines broad: seeds half a line in diameter. In alkaline soil, eastern Washington to California and Nebraska.

11 DONDIA Adans. Fam. Pl. ii, 216. (1775.)

SUËDA Forsk. (1775.)

Herbs or low shrubs with alternate fleshy subterete leaves and small axillary clustered or solitary perfect, or rarely polygamous minutely bracteolate flowers. Calyx 5-parted or 5-cleft, the lobes fleshy, unappendaged or more or less strongly carinate or crested or becoming somewhat winged, enclosing the fruit. Stamens 5. Styles 2, rarely 3 or 4, short and rather stout. Pericarp mem-

branaceous, free. Seeds compressed, vertical and with the radicle inferior or horizontal: the testa smooth, black and crustaceous.

D. diffusa Watson Proc Am Acad. ix, 88, under *Suæda*. Glabrous or more or less pubescent, green or often purple. Stem erect, 12-18 inches high, diffusely branched with usually slender flexuous elongated branches: leaves subterete, 6-12 lines long, acute or acuminate, the floral ones similar but shorter, usually rather distant on the branchlets; clusters 2-4-flowered: calyx cleft to below the middle fleshy, but carinate: seeds mostly vertical half a line broad, perfectly smooth. Common on alkaline plains, southeastern Oregon to Nevada and New Mexico.

D. depressa Britton B. & B. III. Fl. i. 585 *Suæda depressa* Watson. Low and mostly decumbent, branching from the base, smooth, the lowest branches sometimes opposite: leaves linear, 3-12 lines long, broadest at base, the floral ones oblong to ovate-lanceolate or ovate, acute, rather crowded upon the branchlets: calyx cleft to the middle, one or more of the acute lobes very strongly carinate or crested: seed vertical or horizontal, $\frac{1}{2}$ line broad, very lightly reticulate. Idaho to Nevada, Colorado and the Saskatchewan,

D. occidentalis Watson Proc. Am. Acad. ix, 90 under *Suæda*. "Erect slender, 8-10 inches high, smooth, with elongated flexuous spreading branches: leaves linear, $\frac{1}{2}$ -1 inches long, acute, narrow at base, the floral leaves somewhat widest: flowers few in the axils: calyx cleft nearly to the middle, with obtuse lobes, at length surrounded by a transverse irregular lobed veinless wing a line broad: seed horizontal, $\frac{1}{2}$ line broad, obscurely reticulated." Eastern Washington to Nevada.

D. intermedia Watson Proc. Am. Acad. xiv, 296, under *Suæda*. "Perennial, the straight erect slender herbaceous stems from a short woody base, 9-18 inches high, glabrous or sometimes puberulent: branchlets also slender, ascending: leaves very narrowly linear, with a contracted base, acute, 6-10 lines long, much shorter on the branches: fertile flowers very small, often solitary the deeply cleft calyx unappendaged: seed very small ($\frac{1}{2}$ of a line broad), horizontal, not at all tuberculate under the microscope." Eastern Oregon to Utah and Arizona.

Tribe 6 Salsolæ Moq. Annal. Sci. Nat. series 2, 209. Stems not articulated. Leaves subterete. Flowers perfect, 2-bracted. Sepals persistent. Seeds horizontal or vertical, with simple membranaceous testa. Embryo spiral.

13 SALSOLA L. Sp. 222.

Annual or perennial branched herbs with rigid subulate prickly-pointed leaves and sessile perfect 2-bracteolate flowers solitary in the axils, or sometimes several together. Calyx 5-parted, its segments appendaged by a broad membranous horizontal wing in fruit and enclosing the utricle. Stamens 5. Ovary depressed: styles 2. Utricle flattened. Seed horizontal. Embryo coiled into a conic-spiral: albumen none.

S. TRAGUS L. Sp. ed. 2, 322. Annual, Glabrous, loosely bushy-branched 1-2 feet high: leaves 3-10 lines long succulent, lanceolate-subulate the midnerve excurrent into a stout yellowish-green prickly often bright red at maturity: calyx membranaceous, conspicuously veiny, its wing longer than the ascending lobe. In cultivated fields, eastern Oregon and Washington to the Atlantic States: naturalized from Europe.

ORDER LXXIX LAURACEÆ Lindl, Nat. Syst. ed. 2, 200.

Aromatic trees or shrubs with alternate, very rarely opposite, mostly thick, petioled leaves without stipules and small flowers in panicles, racemes or umbels. Calyx 4-6-parted, the segments imbricated in 2 series in the bud. Stamens inserted in 3 or 4 series of 3, on the calyx, distinct, some of them often imperfect or reduced to staminoidea: anthers 2-celled or 4-celled opening by valves. Ovary superior, free from the calyx, 1-celled with a solitary anatropous pendulous ovule. Style filiform or short, rarely almost wanting: stigma discoid or capitate. Fruit a drupe or berry. Embryo filling the seed, with large plano-convex cotyledons and short included radicle.

1 UMBELLULARIA Nutt. Sylv. i, 87.

Shrubs or trees with alternate thick evergreen leaves and small perfect flowers in axillary umbels which are included before expansion in involucre consisting of 4 broad caducous bracts. Calyx deciduous, 6-parted. Stamens 9, inserted on the throat in 3 rows, the 3 inner ones with a fleshy 2-lobed stipitate gland on each side at base, alternating with 3 ligulate staminoidea: anthers 4-celled, 4-valved, the outer introrse, the inner extrorse. Stigma dilated, somewhat lobed. Drupe subglobose, subtended by the thickened base of the calyx.

U. Californica Nutt. Sylv. i, 87. A handsome shrub or tree 10-70 feet high or more, young branches, petioles and inflorescence somewhat puberulent: leaves green, and shining, lanceolate-oblong, acute at each end or sometimes rounded at base, 2-4 inches long, short-petioled, very aromatic: peduncles in an apparently terminal panicle, or solitary in the upper axils, 6-12 lines long, 6-10-flowered: involucre bracts ovate, imbricated: pedicels 1-5 lines long, usually bracteate at base: sepals yellowish-green $1\frac{1}{2}$ -3 lines long, oblong to ovate: stamens included: drupes on short stout peduncles, ovate-elliptical or globose, nearly an inch long. Along streams, southwestern Oregon to California.

ORDER LXXX ELÆAGNACEÆ Lindl. l. c. 194.

Shrubs or trees, mostly silvery-scaly or stellate-pubescent, with entire alternate or opposite leaves and perfect polygamous or dioecious flowers clustered in the axils or at the nodes of branchlets of the previous season, rarely solitary. Lower part of the calyx of pistillate flowers tubular or urn-shaped, enclosing the ovary and persistent, the upper part 4-lobed or 4-cleft deciduous: calyx of the staminate flowers 4-parted or 2-parted. Stamens 4 or 8: those of perfect flowers borne on the throat of the calyx: anthers 2-celled, the cells longitudinally dehiscent. Ovary 1-celled, with a solitary anatropous erect ovule. Fruit drupe-like, the base of the calyx becoming thickened and enclosing the achene or nut. Embryo straight, with little or no albumen.

I SHEPHERDIA Nutt. Gen. ii, 240.

Shrubs with opposite petioled leaves and small dioecious or polygamous flowers subspicate at the nodes of the previous season's growth, or axillary: the pistillate few or solitary. Pistillate flower with an urn-shaped or ovoid calyx bearing an 8-lobed disk at its mouth which nearly closes it. Style somewhat exserted. Calyx of the staminate flowers 4-parted. Stamens 8, alternating with as many lobes of the disk. Fruit drupe-like, the fleshy base of the calyx enclosing a nut or achene.

S. Canadensis Nutt. Gen. ii, 240. A thornless shrub with dark brown or grayish bark, the young shoots brown scurfy: leaves ovate or oval, obtuse, entire, rounded at base, 12-18 lines long, green and sparingly stellate-scurfy above, densely silvery and brown-stellate beneath, on petioles 2-6 lines long: flowers in short spikes at the nodes of the twigs, yellowish: heads globose, less than a line in diameter, forming in summer, expanding with or before the leaves the following spring: calyx about 2 lines broad when expanded: fruit oval, red or yellowish, 2-3 lines long, the nut smooth. In the mountains, Brit. Columbia to eastern Oregon and across the continent.

S. argentea Nutt. l. c. A shrub 6-18 feet high, the twigs often terminating in thorns: leaves oblong to oblong-lanceolate, 1-2 inches long, obtuse, usually cuneate-narrowed at base, densely silvery-scurfy on both sides, 2-6 lines long: flowers fasciated at the nodes, the globose buds very silvery: fruit ovoid to oblong, sour, edible. Alaska to California and Minnesota.

ORDER LXXXI ULMACEÆ Mirbel Elem. ii, 905.

Trees or shrubs with alternate leaves with small fugaceous stipules, and small monoecious, dioecious, polygamous or perfect flowers in lateral or axillary clusters, or the pistillate solitary. Calyx 3-9-parted or of 3-9 distinct sepals. Stamens, in our species, as many as lobes of the calyx and opposite them: filaments straight: anthers longitudinally dehiscent, Ovary 1-celled, rarely 2-celled, mostly superior, with a solitary pendulous anatropous or amphitropous ovule: styles or stigmas 2. Fruit a samara, drupe or nut. Embryo straight or curved, with little or no albumen. Cotyledons mostly flat.

1 CELTIS L. Sp. 1043.

Trees or shrubs with alternate leaves and small monoecious or polygamous flowers borne in the axils of leaves of the season, the staminate clustered, the pistillate solitary or 2-3 together. Calyx 4-6-parted or of distinct sepals. Stamens as many as sepals: filaments erect, exserted. Ovary sessile: stigmas 2, recurved or divergent, tomentose or plumose. Fruit an ovoid or globose drupe.

C. occidentalis L. Sp. 1044. A tree or shrub 4-120 feet high, with dark brown rough bark, the twigs glabrous: leaves ovate or ovate-lanceolate, sharply serrate, mostly thin, acute or acuminate, somewhat oblique and 3-nerved at base, pinnately veined, 1½-4 inches long, glabrous above, pubescent. at least on the veins, beneath: staminate flowers numerous;

pistillate usually solitary, slender-peduncled: calyx-segments linear-oblong, deciduous: drupe globose and purple or nearly black when mature, sometimes orange, 4-5 lines in diameter. On dry soil, Idaho and eastward.

C. reticulata Torr. A shrub or small tree 4-20 feet high, with bright brown rough bark, the twigs pubescent: leaves thick, strongly reticulated, rough-glandular above, ovate or narrower, 1-4 inches long, serrate, acute or somewhat acuminate, obliquely cordate at base, on short petioles: staminate flowers numerous; pistillate usually solitary, slender-peduncled: calyx-segments ovate-lanceolate or oblong, deciduous: drupe globose 2-3 lines long, black when mature. Along streams eastern Oregon to Brit. Columbia and the Rocky Mountains.

ORDER LXXXII URTICACEÆ Reichenb. Consp. 83. (1820.).

Herbs, rarely shrubs with watery juice, alternate or opposite mostly stipulate simple leaves and small greenish diœcious, monoœcious or polygamous flowers variously clustered. Calyx 2-5 cleft or of distinct sepals. Stamens as many as lobes of the calyx or sepals and opposite them, the filaments inflexed and anthers reversed in the bud, straightening at anthesis. Ovary superior, 1-celled: style simple: stigma capitate and penicillate. Ovule solitary, erect or ascending. Fruit an achene. Embryo straight, in oily albumen.

1 **Urtica** Herbs with opposite leaves and stinging hairs.

2 **Parietaria** Herbs with alternate leaves without stinging hairs.

1 URTICA L. Sp. 983. (NETTLES.)

Herbs with 4-angled sulcate stems, stinging hairs, opposite leaves with distinct lateral stipules and small flowers clustered in axillary geminate racemes, spikes or loose heads without bracts. Staminate flowers on jointed pedicels with 4 sepals, 4 stamens and a rudimentary cup-shaped ovary: the pistillate with 4 sepals, the 4 outer small and spreading, the inner erect, becoming membranaceous and enclosing the flattened ovate achene. Stigma sessile, capitate, tufted.

U. holosericea Nutt. Pl. Gambel. 183. Stems stout, 4-8 feet high, usually simple ashy-scurfy and sparingly armed with stinging bristles: leaves ovate-lanceolate, 2-6 inches long, very coarsely serrate, acuminate green above, whitish beneath with a dense minute pubescence, rounded or subcordate at base, all petioled: stipules membranaceous, 6 lines long, oblong, obtuse or acute: staminate flowers in loose slender diffuse panicles, nearly equalling the leaves: pistillate panicles denser and shorter: inner sepals ovate, densely hispid $\frac{1}{2}$ line long, about equalling the broadly ovate achene. About springs and along streams in the dry interior regions, Washington to California and Utah.

U. Breweri Watson Proc. Am. Acad. x, 348. Grayish with a short: somewhat hispid pubescence or nearly glabrous: stem stout, 4-6 feet high, stipules membranaceous, oblong-lanceolate: leaves thin, finely pubescent soon glabrate, or roughish above, ovate to oblong-lanceolate, 2-6 inches long, acute or slightly cordate at base, coarsely serrate, on slender petioles, 1-3 inches long or more: flowers in short open panicles scarcely exceeding the petioles: sepals obovate or rounded, obtuse, minutely hispid, nearly a line long and nearly twice longer than the broadly ovate achene. Along streams, Southern Oregon to California and Colorado.

U. Lyallii Watson l. c. More or less pubescent, becoming nearly glabrous with scattered bristles: stems slender, 4-6 feet high: stipules large, membranaceous, broadly oblong, obtuse: leaves ovate, somewhat cordate at base, acute, 3-9 inches long or more, coarsely serrate, on slender petioles 1-4 inches long; flowers in loose slender spreading panicles, equalling or shorter than the petioles: sepals broadly ovate or rounded, obtuse, shorter than the broadly ovate achene, which is $\frac{2}{3}$ of a line long. Along streams, Brit. Columbia to California.

U. gracilis Ait. Hort. Kew. iii, 341. Perennial with long creeping yellow rootstocks armed with stinging hairs: stems erect, mostly simple, 2-7 feet high: leaves lanceolate to ovate, long-acuminate, coarsely and sharply serrate, sparingly pubescent, 2-7 inches long, narrowed to rounded or subcordate at base, on slender petioles shorter than the blade: stipules lanceolate: flower-clusters compound, commonly longer than the petioles. In rich soil, along streams, Alaska to California and across the continent.

2 PARIETARIA L. Sp. 1052.

Low annual or perennial herbs, the hairs not stinging, with alternate leaves without stipules and small greenish polygamous flowers in axillary involucrate clusters. Calyx in the perfect flowers 4-parted; in the pistillate tubular-ventricose and 4-cleft, with connivent lobes. Style slender or none; stigma spatulate, recurved, densely tufted. Achene ovoid, enclosed in the dry calyx.

P. debilis Forster Weddell in DC. Prodr. xvi, 235. A very slender annual, 3-12 inches high, usually diffusely branched from the base, somewhat hispid: leaves broadly ovate, obtuse, rounded at base or abruptly cuneate, 2-6 lines long or more, on petioles about as long as the blade: clusters few-flowered: bracts linear or narrowly oblong, $\frac{1}{2}$ -1 line long, about equaling the flowers: achenes $\frac{1}{2}$ a line long. Southern Oregon to California and eastward.

P. Pennsylvania Muhl. Willd. Sp. iv, 955. A pubescent annual: stem weak, simple or sparingly branched, ascending or reclining, very slender, 4-15 inches high: leaves lanceolate or oblong-lanceolate, membranaceous, dotted, acuminate at the base, 3-nerved and with 1-3 pairs of weaker veins above, slender-petioled, 1-3 inches long: flowers glomerate in all except the lowest axils, the clusters shorter than the petioles: bracts of the involucre linear, 2-3 times as long as the flowers: style almost none: achenes about $\frac{1}{2}$ line long. In dry rocky places, Brit. Columbia to eastern Oregon and the Eastern States.

ORDER LXXXIII EUPHORBIACEÆ J. St. Hil.
Expos. Fam. 276. (1805.)

Herbs shrubs or trees with acrid often milky juice, alternate opposite or verticillate leaves with or without stipules and monœcious or dicecious flowers variously disposed. Flowers mostly apetalous, sometimes the calyx also wanting or represented by a scale at the base of the stamens, in Euphorbia subtended by an involucre that resembles a calyx. Stamens one to many. Ovary usually 3-celled with one or two pendulous ovules in each cell. Styles as many as cells of the ovary, simple, divided or many-cleft. Fruit a mostly 3-celled, elastically dehiscent capsule. Seeds anatropous, with a straight or slightly curved embryo in fleshy or oily albumen.

- 1 **Eremocarpus** Flowers not involucrate: staminate flowers with a 5-6-parted calyx; pistillate without: capsule 1-celled and 1-seeded.
- 2 **Euphorbia** Flowers all without or with only a rudimentary calyx, subtended by a calyx-like involucre: capsule 3-celled.

1 EREMOCARPUS Benth. Bot. Sulph. 53, t. 20.

Low heavy-scented annuals with alternate entire petioled leaves without stipules and small flowers in axillary clusters without an involucre. Calyx of the staminate flowers 5- or 6-parted, slightly imbricated. Stamens 6 or 7, central on the hairy receptacle; filaments exerted: anthers inflexed in the bud. Pistillate flowers without calyx. Ovary with 4 or 5 glands at the base, 1-celled, 1-ovuled. Style simple, filiform, stigmatic at the apex. Capsule 2-valved. Seeds smooth and shining. Cotyledons broad, cordate, as long as the radicle.

E. setigerus Benth. l. c. Hoary throughout with a very dense stellate pubescence and hispid with stiff spreading hairs: stem stout, dichotomously branched from the base, the branches mostly procumbent or ascending, 4-12 inches long: leaves thick ovate, obtuse, cuneate or rounded at base, $\frac{1}{2}$ -2 inches long, on long petioles, the upper crowded and apparently opposite or ternate: staminate flowers pedicelled: calyx with oblong obtuse segments a line long: pistillate flowers in the lower axils, 1-3 together: ovary and style densely pubescent: capsule obovate-oblong, 2 lines long, smooth and shining, filled by the seed. In dry valleys, eastern Washington to California.

2 EUPHORBIA L. Sp. 450.

Herbs or shrubs with alternate, opposite or verticillate leaves and usually small monoecious flowers without floral envelopes but subtended by a top-shaped or campanulate involucre. Staminate flowers numerous, of a single naked stamen jointed upon a short pedicel which has usually a minute bract at base: anther-cells globose, distinct: pistillate flowers solitary in the center of the involucre, pedicellate and soon exerted. Ovary 3-celled and 3-ovuled: styles 3, usually 2-cleft. Cotyledons linear or ovate.

E. serpyllifolia Pers. Syn. ii, 14. Glabrous dark green or reddish annual: stem branched from the base, the slender branches prostrate or ascending, 2-15 inches long: leaves oblong to spatulate, 1-6 inches long, obtuse or retuse, nearly entire or serrulate to below the middle, short-petioled, the base oblique, mostly truncate or obtuse: stipules at length a fringe of weak setae: involucre solitary in the axils, sometimes clustered toward the ends of the branchlets, less than a line long, bearing 4 disk-like glands, each subtended by a narrow lobed appendage: capsule a line broad, slightly nodding: seeds ovoid, 4-angled, the face transversely wrinkled and pitted. In dry soil Washington to California and Wisconsin.

Var. consanguinea Boiss. Branches erect: leaves with an obtuse sharply serrate apex: lobes of the involucre lacerate: seeds darker and more nearly ovate, less sharp on the angles. Range of the type.

E. Greenei Millsp Pitt. ii, 88. Glabrous annual, radiately branched from the base, the branches prostrate and divaricately much branched, 5-6 inches long: stipules triangular at base, lacerate, leaves ovate, entire, oblique, mucronulate: involucre solitary in the axils, on peduncles twice

the length of the petioles, campanulate, glabrous without, hairy within: glands rose-red, orbicular, folded upward upon themselves. appendages white: capsule smooth, the carpels bluntly carinate: seeds ovate, sharply quadrangular, the faces irregularly transversely ridged. Beaver Canyon, Idaho.

E. glyptosperma Engelm. Bot. Mex. Bound. Serv. 187. Pale green and glabrous annual: stem branching from near the base, the branches ascending, spreading or prostrate, 2-15 inches long: leaves oblong to linear-oblong or ovate, 1-9 lines long, more or less falcate, obtuse at the apex, serrulate, very oblique and obtuse or subcordate at base, short-petioled: stipules becoming a fringe of setae: involucre solitary in the axils, campanulate, half a line long, with 4 dark ribs and 4 saucer-shaped glands, their appendages narrow, crenulate or slightly lobed: capsule depressed-globose, less than a line in diameter, nodding: seeds oblong, half a line long, ash-color, strongly transversely wrinkled, not pitted. In sandy places, Brit. Columbia to California, Ontario and Connecticut.

E. maculata L. Sp. 545. Puberulent or pilose annual: stem branched from the base, the branches slender, radiately spreading, 2-15 inches long, prostrate, often dark red: leaves usually blotched, oblong or ovate-oblong 2-8 lines long, obtuse, more or less serrate, short-petioled, the base oblique, subcordate: stipules a fringe of setae: involucre solitary in the axils, entire, half a line long, with 4 cup-shaped glands, the appendages narrow, white or red, crenulate: capsule ovoid, glabrous, about a line in diameter, pubescent: seeds ovoid-oblong, obtusely angled, ash-color, minutely pitted and transversely wrinkled. Throughout North America except the extreme north.

E. LATHYRUS L. Sp. 457. Annual or biennial, glabrous and glaucous. Stem stout 1-3 feet high, mostly simple below, umbellately branched above: leaves numerous, the lower scattered, those subtending the branches verticillate, the lower linear, reflexed, the upper lanceolate, 1-5 inches long, entire, sessile, subcordate: involucre 2-3 lines long, bearing 4 crescent-shaped unappendaged glands prolonged into short horns: capsule subglobose, 5-6 lines in diameter, its lobes rounded: seeds oblong-ovoid, 2-3 lines long, terete, usually wrinkled. In waste places, Native of Europe.

E. dictyosperma F. & M. Ind. Sem. Hort. Petrop. ii, 37. Glabrous annual: stem erect, rather slender, 4-15 inches high, simple, or branched from the base: leaves, except those subtending the inflorescence scattered, spatulate or oblong, 6-18 lines long, obtuse, serrate to below the middle, sessile, without stipules, the upper slightly auricled at base: bracts oblong or ovate, small, serrate, cordate: inflorescence dichotomously paniculate: involucre solitary in the axils, less than a line long, with 4 oblong naked nearly sessile glands: capsule depressed-globose, less than 2 lines in diameter, with elongated warts: seeds ovoid, lenticular, reddish-brown, finely but distinctly reticulated. Southern Oregon to California and the Atlantic States.

E. crenulata Engelm. l. c. Biennial or sometimes perennial: glabrous: stems erect or decumbent at the branching base, 6-12 inches high: leaves obovate-spatulate, obtuse, often mucronate, 6-15 lines long, without stipules, the upper ones sometimes erose-denticulate, those on the branches and floral ones opposite or usually ternate, deltoid or broadly rhombic-ovate, sometimes connate, acute 3-8 lines broad: floral branches 2-3 times dichotomous, the upper nodes much the shorter: involucre solitary in the axils, turbinate, the oblong lobes nearly entire: glands large crescent-shaped, the slender horns sometimes cleft: capsule 2 lines in diameter: seeds usually ash-color, oblong-ovate, conspicuously dark-pitted. In open woods, western Oregon to California.

ORDER LXXXIV EMPETRACEÆ Dumort. Fl. Belg. 106.

Low evergreen shrubs with watery juice, small narrow leaves without stipules and small dioecious or polygamous flowers in terminal heads or axillary. Calyx of 3 sepals sometimes a few petals also present. Staminate flowers with 2-4 stamens: filaments filiform: anther 2-celled, the cells longitudinally dehiscent: sometimes a rudimentary pistil present. Pistillate flowers with a 2-several-celled sessile ovary: the single style cleft into as many segments as cells of the ovary. Ovules one in each cell, amphitropous. Fruit a berry-like drupe containing 2-several 1-seeded nutlets. Embryo straight, terete, in copious albumen.

1 EMPETRUM L. Sp. 1022.

Depressed or spreading, freely branching shrubs with narrow sessile leaves and small flowers solitary in the upper axils. Sepals mostly 3, often with as many petals. Staminate flowers with 3 stamens, the anthers introrse. Pistillate flowers with a globose 6-9-celled ovary and short thick style with 6-9-toothed segments. Drupe black or red, containing 6-9 nutlets.

E. nigrum L. Sp. 1022. Glabrous or the young shoots pubescent: stems 6-18 inches long, usually much branched, the branches diffusely spreading: leaves crowded dark green, linear-oblong, obtuse, 2-4 lines long, the strongly revolute margins roughish: flowers very small, purplish: stamens exserted: drupe 2-3 lines in diameter, usually not maturing until the following season. On rocky banks near the coast, California to the Arctic regions, and on the northern Atlantic coast Europe and Asia.

ORDER LXXXV ARISTOLOCHIACEÆ Blume
Enum. Pl. Jav. 181. (1830.)

Herbs or shrubs with watery juice, alternate or all radical leaves without stipules and mostly large flowers solitary or clustered in the axils of the leaves or terminal. Calyx-tube adnate to the ovary, its limb 3-lobed, 6-lobed or irregular. Stamens 6-many, inserted on the pistil: anthers 2-celled, extrorse longitudinally dehiscent. Ovary wholly or partly inferior, mostly 6-celled. Ovules numerous in each cell, anatropous, horizontal or pendulous. Fruit a many-seeded mostly 6-celled capsule. Seeds ovoid or oblong, angled or compressed, the testa crustaceous, smooth or wrinkled, usually with a fleshy or dilated raphe. Embryo minute, in copious fleshy albumen.

1 ASARUM L. Sp. 442.

Acaulescent perennials with cordate long-petioled leaves and dull-colored flowers solitary in the axils of the leaves. Calyx campanulate or hemispheric, adnate to the ovary, at least below, regularly 3-lobed, the lobes valvate. Stamens 12, inserted on the ovary. Ovary partly or wholly inferior, 6-celled, the parietal placentæ intruded. Capsule coriaceous, crowned by the marces-

cent calyx and stamens, at length bursting irregularly, or longitudinally dehiscent. Seeds compressed.

A. caudatum Lindl. Bot. Reg. xvii, under t. 1399. Rootstocks creeping, 6-12 inches long: leaves rounded-cordate with large rounded auricles, dark green, not marked with white, 2-4 inches broad, rather sparsely pubescent with short stiff hairs, obscurely crenulate and finely ciliate, on sparsely hairy petioles 3-10 inches long, remaining green until the next pair are mature; flowers solitary in the axils of the leaves and thus becoming terminal, on slender peduncles 1-2 inches long, dark brown, the ovate lobes attenuate into slender appendages 1-3 inches long, more or less pubescent: filaments stout, the free apex of the connective much shorter than the anthers: styles united, equalling the stamens: seeds ovate, $1\frac{1}{2}$ lines long. In forests, Brit. Columbia to California.

A. Hartwegi Watson Proc. Am. Acad. x, 346. ? Rather stout, tufted, more or less floccose-pubescent: leaves usually large, 2-6 inches long, rather thick and marked with white above nearly smooth, deeply cordate with large rounded auricles, somewhat acuminate, finely ciliate, on woolly petioles 4-8 inches long: peduncles 6-18 lines long: ovary about 6 lines broad, white woolly: lobes of the calyx ovate, narrowed to linear appendages 1-2 inches long: filaments rather stout, nearly free from the styles: anthers about a line long, the produced connective setose, about a line long: styles short, nearly distinct, scarcely equalling the anthers: seeds ovate, 2 lines long. In forests, southwestern Oregon to California.

ORDER LXXXVI SANTALACEÆ R. Br.

Pl. Nov. Hol. i, 350. (1810)

Herbs shrubs or trees with alternate or opposite leaves without stipules and mostly small solitary or clustered axillary or terminal flowers. Calyx adnate to the base of the ovary or to the disk, 3-5-lobed, the lobes valvate. Stamens as many as lobes of the calyx and inserted near their bases, or opposite them upon the lobes of an annular disk. Ovary 1-celled: ovules 2-4, pendulous from the summit of the central placenta. Style cylindrical or conic, sometimes wanting: stigma capitate. Fruit a drupe or nut. Seed solitary, ovoid or globose, without testa. Embryo small, apical, with copious albumen.

1 COMANDRA Nutt. Gen. i, 157. (1818.)

Glabrous perennial herbs, mostly parasitic on the roots of other plants with alternate leaves and small perfect flowers in terminal and axillary bractless cymes. Calyx campanulate, the base of its tube adnate to the ovary, its limb 5-lobed. Stamens inserted at the base of the calyx-lobes and between the lobes of the disk, attached to the middle of the lobes by tufts of hairs. Anthers ovate, 2-celled. Fruit drupaceous, crowned by the persistent calyx.

C. umbellata Nutt. l. c. Stems slender, very leafy, branched, 6-18 inches high: leaves oblong or oblong-lanceolate, pale green, acute or acutish at both ends, sessile, ascending, 6-15 lines long, the lower smaller: cymes several-flowered corymbose at the summit of the stems and often axillary also: peduncles slender, 3-12 lines long: pedicels very short: calyx greenish-white or purplish, about 2 lines high: style slender: drupe globose, about 3 lines in diameter, crowned with the upper part of the calyx-tube

and its 5 oblong lobes. In dry open places, Brit. Columbia to California and the Eastern States.

C. pallida A. DC. Prodr. xiv, 636. Stems slender, simple or branched, 4-12 inches high, very leafy: leaves linear or linear-lanceolate, or the lower ones oblong-elliptic, acute, sessile: cymes few-several-flowered, corymbose-clustered at the summit: peduncles usually short: pedicels about a line long: calyx greenish or purplish, about 2 lines high: drupe ovoid-oblong, about 2 lines in diameter crowned by the very short upper portion of the calyx-tube and its 5 oblong acute lobes. On dry hillsides, in the interior, Brit. Columbia to California and Minnesota.

ORDER LXXXVII LORANTHACEÆ D. Don
Prodr. Fl. Nepal. 142. (1825)

Parasitic, green or reddish plants growing upon wood plants and absorbing food from their sap through specializy roots called haustoria, with mostly opposite leaves and regular monoecious or dioecious flowers in axillary or terminal clustered or solitary. Calyx-tube adnate to the ovary, its limb entire toothed or lobed. Stamens 2-6: anthers 2-celled, or confluent ly 1-celled. Ovary solitary, erect: style simple or none: stigma-terminal, entire. Fruit a berry with glutinous pulp. Seed solitary, its testa indistinguishable from the copious fleshy albumen. Embryo terete or angled.

1. **Phoradendron** Leaves thick and flat: anthers 2-celled: berry sessile.
2. **Razoumofskya** Leaves scale-like, united at base: anthers 1-celled: berry peduncled.

1 PHORADENDRON Nutt. Journ. Acad. Philad. ser. 2, i, 185.

Parasitic shrubs with mostly jointed branches, opposite flat leaves and small dioecious flowers in axillary spikes. Staminate flowers with a 2-4- usually 3-lobed globose or ovoid calyx, bearing a transversely 2-celled anther at the base of each lobe. Pistillate flowers with a similar calyx adnate to the inferior ovary. Style short, with obtuse or capitate stigma. Fruit a sessile ovoid or globose berry.

P. villosum Nutt. Pl. Gambel. 185. Stems stout, diffusely much branched, 1-2 feet long: leaves orbicular to spatulate, 6-20 lines long, permanently villous, rounded at the apex, narrowed below to a short petiole, very thick and obscurely veiny: spikes slender, rather short: berries white, 1-2 lines in diameter. On oak trees, from the Willamette valley Oregon to California.

P. juniperinum Engelm. Pl. Fendl. 85. Glabrous, stout, densely branched: 6-9 inches high: branches terete, the ultimate branchlets quadrangular: leaves mostly reduced to broadly triangular, obtusish connate or distinct ciliate scales: staminate spikes solitary, 6-8-flowered: anthers transverse, opening by pores: pistillate spikes 2-flowered: berries globose, whitish or light red, 1½ lines in diameter. On Junipers, south-eastern Oregon to California.

P. Libocedri. *P. juniperinum* var. *Libocedri* Engelm. ? Glabrous: stems fleshy, 6-12 inches long, densely branched: most of the leaves reduced to broadly triangular connate naked scales: staminate spikes solitary

6-18-flowered: anthers transverse, opening by pores: pistillate spikes 2-flowered: berries reddish. On *Libocedrus decurrens*, southern Oregon to California.

2 RAZOUMOFSKYA Hoff. Hort. Mosq. 1808.

ARCEUTHOBIUM Bieb. 1819.

Small fleshy plants parasitic on the branches of coniferous trees, with 4-angled jointed branches, opposite connate scales in the place of leaves and small naked dioecious flowers solitary or several together in the axils of the scales. Staminate flowers with a 2-5-parted calyx and usually an equal number of stamens, the anthers sessile on the segments. Pistillate flowers with the calyx-limb 2-parted. Fruit a fleshy more or-less flattened berry borne on a short somewhat recurved peduncle. Embryo enclosed in copious albumen.

R. Americana Kuntze Rev. Gen. ii, 587. *Arceuthobium Americanum* Nutt. Greenish-yellow, glabrous: stems slender, dichotomously or verticillately much branched: staminate plants 2-4 inches long with the flowers on terminal peduncle-like joints, paniculate, a line broad or more, with ovate-orbicular acutish lobes: pistillate plant much smaller, with the flowers a line long or less: berries 2 lines long. On *Pinus contorta*, Brit. Columbia to California and Colorado.

R. Douglasii Kuntze l. c. *Arceuthobium Douglasii* Engelm. Greenish yellow: stems slender, 3-12 lines high, much branched but not verticillately: spikes short, mostly 5-flowered: staminate flowers less than a line wide, with round-ovate acutish lobes, axillary, forming simple or compound spikes: accessory branchlets of fruiting plant flower-bearing: berries $2\frac{1}{2}$ lines long. On *Pseudotsuga Douglasii*, Idaho to California and New Mex.

Var. abietinum Greene Fl. Fr. 341. Fertile plants larger 1-3 inches high, the sterile smaller with spreading or recurved branchlets: fruit smaller. On *Abies concolor*. Oregon and California.

R. occidentalis Kuntze l. c. *Arceuthobium occidentale* Engelm. Greenish brown, glabrous: stems stout, 2-5 inches high paniculately much branched: staminate plants brownish-yellow, smaller, its flowers in long dense spikes, often 9-17 on a single axis, buds ventricose with the upper edge curved outward; calyx 3-5, usually 4-parted. $1\frac{1}{2}$ -2 lines wide: anthers sessile below the middle of the lanceolate acuminate lobes: pistillate plant comonly of a dark olive-brown color, accessory branchlets mostly leaf-bearing: fruit $2\frac{1}{2}$ lines long. On various conifers, Oregon to California and Idaho.

Var. abietinum. *Arceuthobium abietinum* Engelm. More spreading and less densely branched: the accessory branchlets in the fertile plant bearing fertile flowers as often as they do leaf-buds. On *Abies grandis*, Columbia river valley.

R. robusta Kuntze l. c. *Arceuthobium robustum* Engelm. Reddish-brown and glabrous: stems 2-4 inches long, much branched: staminate flowers in short spikes, flat, appressed to the rachis, 3-parted, with broad lobes, bearing the stamens above the middle fertile flowers mostly solitary: fruit 2-3 lines long. On *Pinus ponderosa*, Brit. Columbia to Oregon.

ORDER LXXXVIII FAGACEÆ Drude Phan. 40 9

Trees or shrubs with alternate leaves, deciduous stipules and small monoecious flowers, the staminate in aments, the pis-

tillate solitary or in small spikes, each surrounded by an involucre of partly or wholly united bracts which becomes a burr or cup. Staminate flowers with a 4-7-lobed calyx and 4-20 stamens: filaments slender, distinct: anther-cells adnate, longitudinally dehiscent. Pistillate flowers with a 4-8-lobed urn-shaped or oblong calyx adnate to the 3-7-celled ovary: ovules 1 or 2 in each cell, but only 1 in each ovary maturing, pendulous, anatropous. Styles as many as cells of the ovary, terminally or longitudinally stigmatic. Fruit a 1-seeded nut. Seed without albumen. Embryo straight, with small apical radical and large fleshy albumen.

1 **Quercus** Involucres 1-flowered, becoming a cup.

2 **Castanopsis** Involucre 1-5-flowered, becoming a prickly burr.

QUERCUS L. Sp. 994.

Trees or shrubs with alternate deciduous or evergreen leaves and small flowers. Staminate flowers numerous, in slender mostly drooping aments subtended by caducous bracts. Calyx mostly 6-lobed, campanulate. Stamens 6-12, with filiform filaments. Pistillate flowers with a mostly urn-shaped or oblong calyx, adnate to a 3-celled ovary: ovules 2 in each cell of the ovary, rarely more than one in each ovary maturing. Styles as many as cells of the ovary, short, erect or recurved. Fruit a solitary oblong, ovoid or subglobose coriaceous 1-seeded nut, called an acorn, subtended by or almost included in the more or less united bracts of the involucre.

§ 1. Staminate aments naked, from the previous season's bud or from the lower part of the present season's shoots: pendulous: filaments not longer than the anthers. Pistillate flowers above the staminate aments, from the axils of young leaves: stigmas dilated.

* Abortive ovules at the base or at the side of the seed: stamens 5-10, usually 6-8 stigmas sessile or subsessile.

+ Acorns maturing the first season, glabrous within.

++ Leaves deciduous.

Q. Garryana Dougl. Hook. Fl. ii, 159. A small shrub to a large tree, 2-150 feet high, the trunk often 3 feet in diameter, with light-colored bark: branchlets rather rigid, tomentose: leaves 4-6 inches long by 2-5 inches wide, coarsely lobed, the lobes broad or sometimes acutish, entire or again notched or lobed, dull green on the upper side, pale yellowish or whitish and strongly reticulated as well as somewhat pubescent beneath, on petioles 6-12 lines long: calyx lobes 7 or 8, linear-lanceolate, ciliate: anthers 6-8: acorns sessile or nearly so; cup shallow, its scales lanceolate, somewhat pubescent, flat or tuberculate-thickened at base: nut oval to obovate-oblong, obtuse, about an inch long. Common from Brit. Columbia to California.

Q. Jacobi R. Br. Campst. Ann. and Mag. Nat. Hist. 4th ser. vii 255. A middle-sized or large tree, branching from near the base and forming a compact head: trunk 1-3 feet in diameter, with rather thick fissured gray

bark: branchlets short, stout, very leafy, tomentose-pubescent: leaves broadly obovate: veinlets only gradually divergent from the midrib and directing the lobes somewhat digitately toward the apex of the leaf which is broadest far above the middle: acorns ovate, less than an inch long, well inserted into a hemispherical scaly cup. On Islands in Puget Sound and northward.

Q. Erstediana R. Br. Campst. l. c. A shrub 2-6 feet high, with pubescent branchlets: leaves 3-5 inches long, usually deeply pinnatifid, sometimes merely sinuate; lobes obtuse or acutish, entire or toothed: staminate aments rather few-flowered, erect: acorns rarely subsessile, usually several, crowded near the summit of a peduncle an inch long or more; cup shallow, strongly tuberculate: nut oval, obtuse, an inch long. On dry mountain sides at middle or high elevations, Southern Oregon to California.

++ ++ Leaves persistent through winter and mostly until the appearance of new leaves for the next season.

Q. Sadleriana R. Br. Campst. l. c. A shrub 4-6 feet high with rather dark-colored bark and glabrous branchlets: buds oblong densely silky: stipules filiform, densely silky: leaves oblong to obovate, not lobed, serrate, 1-3 inches long, on petioles 2-6 lines long, dark green above, at length becoming whitish and strongly reticulated beneath: aments densely flowered erect or spreading 1-4 inches long: bracts silky, sepals ovate: stamens about 8: acorns sessile or nearly so; cup shallow, tuberculate, 5-6 lines broad: nut oblong, obtuse, about 8 lines long. In moist places on top of the coast mountains along the old Wimer road, also on top of the Siskiyou Mountains near the Happy Camp trail.

+ + Acorns maturing the second season, the nuts often pubescent within.

Q. chrysolepis Leibm. in Benth. Pl. Hartw. 336. As represented in our region a small tree or low shrub 2-30 feet high, farther south a large tree, with ashy-gray flaky bark and glabrous branchlets: leaves oblong-lanceolate entire or sharply dentate, acute, cuspidate obtuse or subcordate at base, 1-3 inches long, at first fulvous-tomentose beneath, after a year glabrate and bluish or whitish, on petioles about 3 lines long: aments sometimes branched, tomentose, soon glabrate: calyx lobes 5-7, broadly ovate, acute glabrous, ciliate: anthers about 10, conspicuously cuspidate: pistillate flowers sessile, or rarely in spikes: cups covered with small triangular appressed scales, more or less hidden in the dense yellow or fulvous tomentum, very variable in shape and size, 4-12 lines wide, hemispherical and rather thin to flat saucer-shaped and very thick with a broad thick rim: nut oval, obtuse 6-13 lines long, and half as thick. Along streams, Southern Oregon to California.

Q. vaccinifolia Kellogg Proc. Am. Acad. i, 96. A low shrub 1-4 feet high, densely branched and very leafy: leaves ovate to oblong or lanceolate, entire or with a few sharp teeth on one or both margins acute and very shortly or not at all cuspidate, 6-13 lines long, on petioles 4-6 lines long yellowish green and glabrous on the upper side, white or whitish with a dense scurf beneath, obtuse or subcordate at base: stipules 4-6 lines long linear-lanceolate somewhat silky: aments glabrous: calyx-lobes 5-7, broadly ovate: anthers about 8, not cuspidate: pistillate flowers sessile or in spikes: cups covered with small appressed scales not tomentose: nuts 8-12 lines long. Common on dry rocky hillsides Southeastern Oregon and adjacent California.

* * Anthers usually 4 or 5: stigmas on long spreading or recurved styles: abortive ovules borne at the top of the seed.

Q. Kelloggii Newberry Pac. R. Rep. vi, 28. fig. 6. A middle-sized

tree 60-90 feet high and 1-6 feet in diameter, with rough black bark, the slender twigs soon glabrate: leaves deciduous, broadly oval in outline, deeply sinuate-lobed, the lobes entire or coarsely lobed and slender-pointed, obtuse to subcordate at base, on petioles about an inch long, puberulent both sides, 4-7 inches long: acorns maturing the second season, mostly short-pedicelled, solitary or 2-4 together; cups an inch or less broad, with ovate-lanceolate obtusish imbricated scales, hemispherical, often very deep; nuts oblong, 12-16 lines long by 10-12 in diameter, Common on plains and hillsides from the Willamette Valley Oregon to California.

§ 1 Aments erect persistent, pistillate at base and staminate above or entirely staminate. Filaments slender, many times longer than the very small anthers. Stigmas linear. Fruit maturing the same season.

Q. densiflora H. & A. Bot. Beech. 391. A middle-sized tree or shrub 10-100 feet high with mostly smooth bark and tomentose branchlets: leaves oblong, acute, obtuse or rarely acute at base, entire with revolute margins or sometimes dentate, tomentose, especially beneath, at length glabrate and whitish beneath, 2-5 inches long, $\frac{1}{2}$ -2 inches wide, on petioles 3-6 lines long: aments 4-6 inches long densely flowered, tomentose: flowers in glomerules of 3, supported by 3 bracts: calyx of 5 broad woolly lobes: anthers 10: acorns solitary or in short peduncled clusters: cups very shallow, 8-15 lines broad, covered with linear rigid spreading or recurved scales, silky-tomentose inside: nuts oval or oblong, acute or obtuse, 12-18 lines long, with very thick shell, densely tomentose inside. Along streams southwestern Oregon to southern California.

5 CASTANOPSIS Spach.

Trees or shrubs with coriaceous evergreen leaves and small monoecious flowers in axillary aments, the fruit maturing the following season. Staminate flowers in slender paniced aments upon the young shoots, with regular 5-6-lobed calyx and usually twice as many stamens. Pistillate flowers 1-3, in a scaly involucre, sessile at the base of the aments: lobes of the calyx 6, in 2 rows. Styles usually 3. Ovary 3-celled, with 2 amphitropous ovules at the lower angle of each cell. Nuts 1-3, enclosed in the subglobose involucre which is densely covered with stout branched prickles, at length bursting irregularly. Seed solitary.

C. chrysophylla A. DC. Seem. Journ. Bot. i, 182. A shrub or middle sized tree, 6-80 feet high: leaves lanceolate or oblong, 1-4 inches long, acuminate or only acuti-h, cuneate at base and shortly petioled, entire, glabrous, or sometimes scurfy, above, densely scurfy beneath with more or less yellow scales: aments 1-3 inches long, densely pubescent: styles 3, stout, glabrous, divergent: spines of the involucre 6-12 lines long, subverticillately many-branched: nuts usually solitary obtusely triangular, 6 lines long. On dry hillsides, from the Columbia river to California.

ORDER LXXXIX CORYLACEÆ.

Small trees or shrubs with alternate leaves and small flowers in axillary aments or clusters. Staminate flowers in aments, without floral envelopes each subtended by a scale-like bract: stamens several, with often divided filaments and distinct anther-cells. Pistillate flowers in short spikes, 2 to each bract, with

small bractlets which become much enlarged and involucrate in fruit. Ovary imperfectly 2-celled, with 2 pendulous anatropous ovules. Seed solitary.

1 CORYLUS L. Sp. 998. (HAZEL-NUT.)

Shrubs or small trees with broad thin leaves that are plicate in the bud and small flowers that appear before the leaves; the staminate in drooping cylindrical aments, from lateral buds, without calyx but subtended by a scaly bract, consisting of 4 stamens with forked filaments, each fork bearing one cell of an anther, the undivided portion adnate to the bract. Pistillate flowers several in a scaly bud, 2 to each scale, each with a pair of bractlets that enlarge and in fruit more or less envelope the nut: calyx minute, adnate to the ovary, without limb. Style short: stigmas elongated. Nut oblong or ovoid, large and bony.

C. rostrata Ait. Hort. Kew. iii, 364. A shrub 3-8 feet high, with pubescent branchlets and smooth bark: leaves ovate or narrowly oval, acuminate, cordate or obtuse at base, incised-serrate and serrulate, glabrous or with some scattered appressed hairs above, sparingly pubescent, at least on the veins beneath, $2\frac{1}{2}$ -4 inches long, on petioles 2-4 lines long: involucre bracts bristly hairy, united to the summit and prolonged into a tubular beak about twice as long as the nut, lacinate at the summit: nut ovoid, scarcely compressed, striate, 5-7 lines high. In thickets, Oregon to Brit. Columbia, the Eastern States and Nova Scotia.

C. Californica Rose. A shrub or small tree 4-30 feet high with pubescent branchlets: leaves orbicular to obovate, 1-4 inches broad, often shortly acuminate, obscurely 6-10-lobed, sharply serrate, on petioles 5-12 lines long, mostly subcordate at base, sparsely pubescent above, soft-pubescent on the veins beneath: involucre united to the summit, prolonged into a broad tubular beak about twice as long as the nut or less, setose-hispid below with short brittle hairs, erose to lacerate at the summit: nut ovoid 5-8 lines high. Common on low hillsides and in forests, Brit. Columbia to California.

ORDER XC BETULACEÆ Agardh Apho. 208 in part.

Trees or shrubs with deciduous alternate leaves, mostly caducous stipules and small monœcious flowers, the staminate in long aments, the pistillate in shorter cone-like aments with thickened and rigid scales. Staminate flowers 3-6 together in the axil of each bract, consisting of a membranous calyx and 2-4 stamens inserted on the receptacle, with distinct filaments and 2-celled anthers. Pistillate aments spike-like or capitate, its flowers with or without a calyx adnate to the 2-celled ovary which is crowned with 2 sessile filiform stigmas and becomes a winged or angled nutlet. Seed anatropous, pendulous, without albumen. Cotyledons flat, foliaceous in germination.

- 1 **Betula** Bracts 3-lobed, becoming coriaceous, deciduous: stamens 2, with bifurcate filaments and separate anther-cells: nutlets broadly winged.
- 2 **Alnus** Bracts entire, becoming woody, persistent: stamens 4; anther-cells contiguous.

1 BETULA L. Sp. 982.

Trees or shrubs with smooth or laminated outer bark, toothed simple leaves and small flowers appearing with or before the leaves. Staminate aments long and drooping, solitary or in pairs, from lateral or terminal leafless buds the flowers about 3 together in the axil of each shield-shaped bract, consisting of a membranaceous usually 4-toothed calyx and 2 stamens, subtended by 2 bractlets: filament short, deeply 2-cleft, each fork bearing an anther-cell. Pistillate aments oblong to cylindrical, solitary or racemose, from lateral 3-5-leaved buds, the flowers 1-3 in the axil of each bract, without calyx. Bracts usually 3-lobed and falling with the seed. Ovary sessile: styles 2, stigmatic at the apex, mostly persistent. Nuts small, lenticular, surrounded by a wing.

B. occidentalis Hook. Fl. ii, 155. A small or middlesized tree 20-60 feet high and 6-18 inches in diameter, with smooth dark brown bark and greenish-brown warty twigs: leaves broadly ovate to nearly orbicular, acute to rounded at the apex, sharply serrate, the teeth glandular tipped, rounded or obtuse at base, short-petioled glabrous, or sparingly pubescent on one or both sides, 1-2 inches long: staminate aments usually 3 together at the ends of slender branchlets, 2-3 inches long: pistillate aments manifestly peduncled, cylindrical, spreading or pendent, 12-18 lines long, 4-6 lines in diameter when mature: fruiting bracts ciliate, 2-3 lines long, their lateral lobes ascending, usually shorter than the middle one: nutlets much narrower than the wings. Along streams in the interior, Brit. Columbia to California and Nebraska. As here defined perhaps includes more than one species.

B. Hallii. *B. glandulosa* of authors as to the Oregon plant. An erect shrub 4-10 feet high, the twigs ashy-gray, glandular and somewhat pubescent, very leafy: leaves obovate, rounded at the apex, cuneately narrowed at base into short petioles, green and glabrous both sides, finely serrate, 10-12 lines long: pistillate aments cylindrical, erect or barely spreading, 10-14 lines long, 2-3 lines thick, dark green, on slender peduncles 4-6 lines long: fruiting bracts a line long, glabrous, the lateral lobes usually broader than the middle one which is spreading and hyaline-margined: nutlets as broad or broader than long, narrowly winged. Lake Labish, Marion Co. Oregon: specimens collected by Mr. Gorman at Ft. Selkirk, Yukon Ter. appear to be of this species.

2 ALNUS Gært. Fr. & Sem. ii, 54, t. 90. (1791.)

Shrubs or trees with alternate serrate or dentate leaves and small flowers in aments, opening with or before the leaves, making their first appearance during the previous season. Staminate aments fascicled, drooping. Bracts shield-shaped, stipitate, including the 5 bractlets and usually 3 flowers with regular 4-lobed calyx. Stamens 4, inserted opposite the lobes of the calyx, with very short filaments and contiguous anther-cells. Pistillate aments paniced, short and usually erect, their bracts fleshy and imbricated, including 4 bractlets and 2 flowers, connate and slightly 4-lobed, in fruit woody and persistent, thickened and truncate at the apex, at length divergent. Nutlets compressed, mostly wingless or nearly so.

A. Oregona Nutt. Sylva, i, 28. *A. rubra* Bong. A large tree 50-100

feet high and 1-4 feet in diameter, with dark brown bark blotched with white: leaves oval to elliptic, thickish, dark green above, pale or whitish beneath with prominent rusty-pubescent veins, coarsely serrate and finely serrulate, 2-8 inches long, acute or shortly acuminate, rounded or narrowed below to petioles 6-18 lines long: staminate aments reddish, 2-6 inches long; the pistillate ovoid to oblong, 6-12 lines long, the bracts much thickened above: nutlets more than a line long, nearly orbicular or oblong, surrounded by a narrow somewhat membranous wing. Common in moist places, California to Alaska.

A. rhombifolia Nutt. *Sylva*, i, 33. A tree 30-50 feet high, with white bark which becomes broken rectangular flakes: leaves rhombic-ovate to elliptic or obovate, mostly cuneate at base and obtuse at the apex, 2-3 inches long, irregularly glandular-dentate: fruiting aments oblong, 6-8 lines long; the bracts rather thin above: nutlets a line long, very broadly obovate with a thickened margin. Eastern Washington to California.

A. tenuifolia Nutt. *A. incana* var. *virescens* Watson. A shrub 4-20 feet high with brown bark: leaves more or less broadly ovate, 2-3 inches long, acute, rounded or slightly cordate at base, acutely doubly toothed, light green and glabrous on both sides, or sparingly pubescent: staminate aments rather slender, 1-2 inches long: fruiting aments ovate-oblong, 4-6 lines long: nutlets rounded-obovate, slightly margined, $1\frac{1}{2}$ lines long. In wet places in the mountains, Alaska to California and the Rocky Mts.

A. serrulata Willd. *Sp. Pl.* iv, 336. *A. rugosa* K. Koch. A shrub 5-10 feet high, or sometimes a small tree 40 feet high, with smooth bark, the young shoots sometimes pubescent: leaves green both sides obovate or oval, mostly obtuse or rounded at the apex, narrowed or rounded at base sharply and minutely serrulate when mature, glabrous above, usually pubescent on the veins beneath, 3-5 inches long, on petioles 4-12 lines long: aments appearing from naked buds much before the leaves, the staminate 2-4 inches long, the pistillate ovoid 5-9 lines long when mature: nutlets ovate, narrowly coriaceous-margined. In wet soil. Idaho to the Eastern States.

A. sinuata Rydb. A small tree or shrub 9-15 feet high, erect or ascending: bark rather dark except on old stems: leaves ovate, acuminate, obtuse or cuneate at base, bright green, doubly dentate, glabrous above, nearly so beneath, thin, very gummy when young, 2-4 inches long, on slender petioles 5-12 lines long: fruiting aments 7-9 lines long, on slender longer peduncles. Eastern Washington.

ORDER XCI MYRICACEÆ Dumort. Anal. Fam, 95.

Shrubs or trees with alternate simple leaves and small dioecious or monœcious flowers in bracted aments without calyx or corolla. Flowers solitary in the axils of the bracts: staminate with 2-15 stamens inserted on the receptacle: filaments short distinct or somewhat united: anthers ovate, 2-celled, the cells longitudinally dehiscent: pistillate with a solitary 1-celled ovary subtended by 2-8 bractlets: ovules solitary, orthotropous: style very short: stigmas 2, linear. Fruit a small drupe or nut, often waxy. Seed erect, orthotropous, with thin testa and no albumen.

1 MYRICA L. *Sp.* 1024.

Shrubs or small trees with alternate mostly resinous-dotted leaves and small flowers in bracted aments. Staminate aments oblong or narrowly cylindrical expanding before or with the leaves.

Stamens 4-8. Pistillate ovoid or subglobose: Ovary subtended by 2-4 bractlets. Fruit a globose or ovoid wax-coated drupe.

M. Gale L. Sp. 1024. An erect shrub 4-8 feet high with dark brown twigs: leaves deciduous, oblanceolate, obtuse and dentate at the apex, narrowed to a cuneate entire base, short-petioled, dark green and glabrous above, pale and puberulent or glabrous beneath, 1-3 inches long unfolding after the flowers; staminate aments linear-oblong, 6-10 lines long: pistillate aments ovoid-oblong, obtuse, about 4 lines long and 2 lines in diameter in fruit, their bracts imbricated; drupe resinous waxy, not longer than the 2 ovate persistent bractlets which clasp it on each side and are adnate to its base. Along the coast, Oregon to Alaska and the Atlantic States.

M. Californica Cham. Linn. vi, 535. An evergreen shrub or small tree 2-30 feet high of erect compact habit, leaves coriaceous, persistent usually, slightly tomentose beneath, dark green above, oblanceolate, 2-4 inches long, acute, attenuate below to a short petiole, entire, or serrate above the base: aments simple or somewhat compound, 3-5 lines long; the small very broadly ovate obtuse bracts more or less lacerately ciliate, especially near the base: staminate flowers few; stamens 5-15, the filaments united into an exerted panicle: bractlets usually 2, oblong, ciliate: fruit purple, papillose, thinly coated with grayish-white wax, 2 lines in diameter. In wet places along the coast, Washington to California.

ORDER XCII SALICACEÆ Lindl. Nat. Syst. ed. 2. 186.

Trees or shrubs with bitter bark, brittle twigs, alternate leaves with stipules and small dioecious flowers in axillary aments that appear with or before the leaves. Flowers solitary in the axil of each bract: the staminate consisting of one to numerous stamens inserted on the receptacle, subtended by a gland-like or cup-like disk: filaments more or less united: anthers 2-celled, the cells longitudinally dehiscent. Pistillate flowers of a sessile or short-stipitate 1-celled ovary subtended by a minute disk, with 2-4 parietal placentæ and numerous anatropous ovules. Style short, slender, or almost wanting. Stigmas 2, simple or 2-cleft. Fruit a 2-4-valved capsule. Seeds small, without albumen, covered with a coma of dense long silky hairs. Cotyledons plano-convex.

- 1 **Salix** Buds with a single scale: bracts entire: flowers with small glands: disk none: stamens few: stigmas short.
- 2 **Populus** Buds with several scales: bracts lacerate: flowers with a broad cup-shaped disk: stamens numerous: stigmas elongated.

1 SALIX L. Sp. 1016. (WILLOW.)

Trees or shrubs with terete branchlets and small flowers in aments. Buds covered with a single scale, with an adherent membrane within. Bracts of the aments entire. Disk gland-like, small or minute. Staminate aments dense, erect, spreading or drooping. Staminate flowers with 1-12, mostly 2, stamens, their filaments distinct or sometimes united. Pistillate aments usually erect or spreading. Ovary sessile or short-stipitate. Style filiform or wanting. Stigmas 2, entire or 2-cleft. Capsule mostly 2-valved.

§ 1 Trees. Bud-scales yellowish, falling before the maturity of the fertile aments. Filaments hairy below.

* Petioles not glandular.

S. nigra Marsh Arb. Am. 139. (1736). A tree with rough flaky brown bark, 50-120 feet high: stem slender, often crooked or leaning: leaves linear-lanceolate, tapering from the acute base to an extremely long point, often falcate, 4-6 inches long by 3-4 lines broad, closely serrate, smooth and green on both sides, the midrib prominent: stipules semicordate, often wanting: aments with leafy peduncles, elongated, the fertile becoming rather lax: scales entire or only slightly dentate, villous with crisp hairs: capsule ovate-conical, glabrous, brownish tawny, more or less pedicelled: styles very short; stigmas slightly notched. Along streams, eastern Oregon to California and the Gulf of Mexico.

S. amygdaloides Anders. Ofv. Handl. Vet. Akad. 1858, 114. A small tree 20-70 feet high, with light yellowish-brown flaky bark: leaves lanceolate to ovate-lanceolate, pubescent when young, glabrous when mature, dark green above, paler and slightly glaucous beneath, long-acuminate, 1-5 inches long by 5-12 lines broad, entire or more or less sharply serrulate, narrowed at base to short petioles: aments appearing with the leaves, terminal on short lateral leafy branchlets: the staminate 1-2 inches long, their bracts ovate, densely pubescent; stamens more than 2; filaments distinct, pubescent at base: pistillate aments loose, spreading, 2-4 inches long in fruit, their bracts lanceolate and densely pubescent: stigmas nearly sessile: capsule narrowly ovoid, acute, glabrous, at length about as long as its filiform pedicel. Along streams in the interior, Brit. Columbia to Oregon and Missouri.

S. congesta. *S. levigata* var. *congesta* Bebb. A small tree 20-30 feet high with pale ash-colored very rough bark and yellowish branchlets: leaves lanceolate or oblanceolate to spatulate, 1-3 inches long, silky-lanate when young, at length glabrous above, entire or at length glandular serrulate, narrowed below to short petioles: aments solitary at the ends of short lateral branchlets, appearing with the leaves: staminate aments numerous, at length an inch long, the scales orbicular, tomentose; stamens 5; filaments pubescent with spreading hairs; pistillate aments spreading, oblong, or shorter, 6-10 lines long, the scales lanceolate: capsules glabrous, ovoid, acuminate, on slender pedicels nearly a line long. Along rivulets near the Klamath river and southward.

** Petioles glandular.

S. lasiandra Benth. Pl. Hartw. 336. A slender tree 20-80 feet high with dark brown rough bark: and smooth yellow branchlets: leaves lanceolate, obtuse to acute at base, conspicuously acuminate, finely serrulate, 2-8 inches long, sparsely pubescent, dark green above, pale or whitish and somewhat glaucescent beneath: stipules semilunar or oblong, dentate: aments appearing with the leaves from short lateral leafy shoots: staminate aments rather loosely flowered, 2-4 inches long: their lanceolate pubescent scales 2-3 lines long: stamens 5-8, filaments slender, much longer than the scales, slightly pubescent at base: pistillate aments 1-3 inches long, their pubescent lanceolate scales about a line long, deciduous: capsule acuminate-ovoid, 2 lines long on pedicels a line long. Common along streams, Brit. Columbia to California.

S. Fendleriana Anders. Sal. Am. Bore. 115. A tree 30-60 feet high, with dark brown rough bark leaves lanceolate, long-acuminate, crenulate, green and glabrous on both sides, 3-8 inches long, the short petioles and very base of the leaves glandular: stipules oblong, sometimes large: aments on leafy branchlets; staminate dense, 2-3 inches long, their scales pale, oblong, more or less dentate; stamens 5 or more; filaments hairy at base, longer than the scales; pistillate aments rather loose, the pale oblong scales hairy at base, deciduous: capsules glabrous, short-pedicelled: stig-

mas nearly sessile. Common on stream-banks, eastern Washington to California and New Mexico.

§ 2 Shrubs or small trees. Leaves linear to lanceolate, remotely denticulate to entire. Aments borne on short lateral leafy branchlets, often clustered. Scales pallid, somewhat deciduous. Stamens only 2.

S. fluviatilis Nutt. *Sylva* i, 73. *S. longifolia* Muhl. not of Lam. A much branched shrub 2-12 feet high forming thickets, or sometimes tree-like and 20-30 feet high: leaves linear-lanceolate to linear-oblong, 2-4 inches long, silky-pubescent when young, glabrous when mature, entire or sparingly dentate, acuminate, shortly petioled: stipules minute or none: aments linear-cylindric; the staminate dense, 1-2 inches long, sometimes polygamous; stamens 2; filaments distinct, pubescent; pistillate looser, about 2 inches long in fruit, their scales deciduous: stigmas broad, sessile: capsule ovoid-conic, glabrous or silky, about 2 lines long. In moist soil along streams in the interior, Brit. Columbia to California and east to Missouri and Kentucky.

Var. tenerrima. *S. longifolia* var. *tenerrima* Henderson. "A smooth shrub 6-12 feet high with light bark up to the youngest branches: leaves shorter and narrower, $\frac{1}{2}$ -1 line wide on fructiferous branches, 1-2 lines wide on the sterile, glabrous or very early glabrate: pedicels slightly longer: capsule glabrous: scales glabrous save for the slightly ciliate edges. Shaded rocky banks of mountain rills Elmore Co. Idaho."

S. argophylla Nutt. *Sylva* i, 71. *S. Hindsiana* Benth. A shrub or small tree 3-15 feet high forming thickets but not growing in clumps, each stem being distinct from any other: leaves narrowly lanceolate, 2-3 inches long, closely sessile, entire or rarely minutely and remotely denticulate, appressed silky-pubescent both sides: stipules, obsolete, or on young vigorous shoots sometimes minute ones occur; aments 1-2 inches long, on short leafy branchlets appearing after the leaves in spring and intermitently all summer; staminate aments 1-3 at the ends of the branchlets, the scales oblong, obtuse, glabrous on the back, crisp-hairy on the margins and toward the base, arose toward the apex: stamens 2, the filaments densely hairy: pistillate aments rather loosely flowered, 1-3 inches long, the lanceolate acutish scales subpersistent, woolly except near the apex: capsule lanceolate, appressed silky when young, closely sessile: stigmas sessile. Along rivers, Brit. Columbia to California.

S. exigua Nutt. l. c. A low shrub or small tree 5-15 feet high: usually with a single trunk, rough bark and glabrous twigs: leaves narrowly lanceolate to oblanceolate, acute, subentire, 1-5 inches long, glabrate above, sparingly appressed-silky beneath, closely sessile: stipules none or minute: aments on leafy branchlets, solitary or 2-4 together: staminate aments 1-2 inches long, slender, the scales lanceolate, acute: capsule becoming glabrous, sessile: stigmas sessile. Along streams, Washington to California

S. sessilifolia Nutt. l. c. Shrubby or often tree-like 6-30 feet high, young shoots very leafy, hoary-pubescent, becoming glabrous and brown: leaves membranaceous, elliptical, acute at both ends, 1-5 inches long 1-2 inches wide, closely sessile, obscurely and remotely denticulate, hoary with rather long pubescence when young, glabrous when mature: aments borne upon lateral leafy shoots, 3-4 inches long often 3 together, very densely flowered: scales oblong or obovate, rounded or retuse at the apex, nearly or quite glabrous: stamens 2: lower half of filaments very hairy, upper half minutely puberulent: pistillate smaller, the scales narrower: capsule lanceolate, silky-pubescent when young, becoming nearly glabrous at maturity

closely sessile: style evident; stigmas linear, several times longer than thick. On sand bars along rivers, Oregon and Washington.

S. macrostachya Nutt. l. c. A shrub or small tree 3-18 feet high, often in dense thickets, with light brown bark and cinereous branches, the young branchlets villous: leaves 2-3 inches long, sessile, oblanceolate to elliptical, acute at both ends, more or less villous-pubescent, entire or nearly so: stipules obsolete: aments on short leafy lateral branchlets, appearing after the leaves, 1-2 inches long: lower half of the filaments crisp-villous: capsule closely sessile, clothed with long lax hairs: style evident; stigmas linear. Margins of ponds, Oregon to California.

§ 3 Shrubs or small trees. Scales of the aments persistent, darker at the apex.

S. Scouleriana Barratt in Hook. Fl. ii, 145. *S. flavescens* Nutt. A shrub or small tree 10-50 feet high, with light gray bark and cinereous branchlets: leaves oblanceolate to oblong or elliptic, obtuse to acute or acuminate, narrowed below to short petioles, entire or serrulate, 1-6 inches long, glabrous and dark green above, pale and more or less pubescent and becoming rusty in age beneath: stipules ovate to oblong, large and persistent on vigorous shoots: aments appearing long before the leaves, very densely flowered; staminate aments sessile, about an inch long and half as thick, the orbicular to oblong scales black or red at the apex, densely woolly with long white hairs: stamens 2, distinct; the filaments glabrous: pistillate aments short-peduncled, 1-2 inches long when mature, the scales oblong to lanceolate, silky with long white hairs: capsule oblong with a stout beak, pubescent, on pedicels a line or more long, maturing before the leaves appear; stigma sessile. Common from Brit. Columbia to California and the Rocky Mountains.

S. bella Piper Bull. Torr. Bot. Club xxvii, 399. A shrub or tree 6-12 feet high with slender erect branches and smooth gray bark: branchlets shining yellow, usually glabrous, very brittle: leaves lanceolate to oblong or oblong-obovate, acute, 1-3 inches long, green and glabrate above, densely silvery-woolly beneath, entire or nearly so, short-petioled: stipules lunate, usually persistent: aments appearing before the leaves; staminate sessile, short and thick, 6-12 lines long; scales acute, black, densely villous: stamens 2: pistillate aments short-peduncled, 6-18 lines long; scales black, obtuse, densely villous: capsules silky-hairy, nearly sessile: style about a line long. Along the Palouse river eastern Washington.

S. Geyeriana Anders. Sal. Monogr. 86, fig. 50. A shrub 10-15 feet high, the branchlets usually covered with a glaucous bloom: leaves lanceolate, acute at both ends 2-3 inches long by 4-6 lines wide, downy above, grayish beneath with soft silky hairs, entire: stipules none: aments at first small, subglobose, nearly equaled by the 3 or 4 silky bracts at their base, becoming short-peduncled in fruit: scales tawny, obtuse, sparingly villous: capsule tapering from an ovate base, silky tomentose: pedicels slender, puberulent, 4-5 times as long as the nectary: stigmas sessile, bifid. Oregon to California and the Rocky Mountains.

S. Hookeriana Barratt l. c. 445. A large shrub or small tree 10-50 feet high, with dark rough bark and gray pubescent branchlets: leaves lanceolate to oblong or elliptic, 1-5 inches long, green and smooth above, densely tomentose beneath, entire, rounded at base, short-petioled: aments appearing before the leaves, the staminate very densely flowered, 1-3 inches long, the scales densely tomentose with long white hairs. Along the coast, Oregon and Washington.

S. rostrata Richardson Franklin Journ. App. 753. A much branched shrub 6-9 feet high, with elongated branchlets: leaves oblong to lanceolate

acuminate, glandular-serrulate, rounded or cordate at base, glabrous above, glaucous beneath 2-4 inches long, on stout petioles: stipules reniform, conspicuous: aments appearing with the leaves, on leafy peduncles; staminate aments narrower, densely-flowered, 2-3 inches long, the black hairy scales persistent: pistillate looser, the linear scales pale and pink-tipped: capsule pubescent, long-beaked: on slender, pedicels as long or longer than the scales: stigma sessile. Common along streams, Oregon to Brit. Columbia, and Hudson Bay.

S. lasiolepis Benth. Pl. Hartw. 335. ? A large shrub or small tree 15-40 feet high, with yellowish bark and erect branches: leaves oblong to oblanceolate, obliquely acute or acuminate, serrulate, shining green above, densely glaucous and somewhat pubescent beneath, petioled: stipules rarely present, triangular: aments appearing with or before the leaves; the staminate cylindrical, 1-3 inches long, short-peduncled; scales black, hairy: stamens 2, the glabrous filaments united at the base for half their length: pistillate aments small, 6-18 lines long, on short leafy peduncles: style about as long as the stigmas. Common along streams, Washington to California.

S. cordata Muhl. Neue Schrift, iv, 246. A shrub 5-12 feet high, the twigs puberulent or glabrous: young leaves pubescent; mature leaves oblong-lanceolate, green on both sides or paler beneath, acuminate narrowed, obtuse or subcordate at base, sharply serrulate with glandular teeth, short-petioled: stipules oblique, serrulate, usually large and persistent: aments bracted at the base appearing before the leaves: staminate about 1 inch long, the pistillate 1-2½ inches long in fruit: scales silky, persistent, stamens 2, filaments glabrous: style short: capsule narrowly ovoid, acute, glabrous, 2-3 lines long, short-pedicelled. In wet soil Brit. Columbia to California and Virginia to New Brunswick.

Var. angustata Anders. Monogr. Sal. 159. Leaves linear-lanceolate. Range of the type.

Var. Mackenziana Hook. Fl. ii, 149. A small tree with lanceolate or oblanceolate leaves. California to Oregon and Manitoba.

S. myrtilloides L. Sp. 1019. An erect glabrous shrub 1-12 feet high, with light brown terete twigs: leaves oblong, elliptic or somewhat obovate, obtuse or acute, entire, mostly narrowed at base 1-3 inches long, short-petioled, bright green above, pale or glaucous beneath, the margins slightly revolute: aments appearing with the leaves, leafy-bracted at base, rather dense, an inch or less long, or the pistillate longer in fruit: scales persistent, obtuse, slightly villous: stamens 2; filaments glabrous: style shorter than or equalling the stigmas: capsule oblong-conic, obtuse, glabrous, 2-3 lines long, much longer than the filiform pedicels which slightly exceed the scales. In bogs, Brit. Columbia to Oregon and New Jersey.

S. Barclayi Anders. Ofv. Handl. Vet. Akad. 1858, 125. ? A shrub 3-6 feet high with dark brown glabrous twigs, the young shoots pubescent: leaves obovate to oval or somewhat lanceolate, often short-acuminate, serrulate, bright green and glabrous above when mature, paler beneath, 1-2 inches long, short-petioled: stipules ovate, mostly acute, deciduous: aments appearing with the leaves, borne at the ends of short branchlets, densely flowered, spreading or erect: the staminate about an inch long, the pistillate 2-3 inches long in fruit: scales persistent, slightly villous: stamens 2: filaments distinct: capsule narrowly conic, glabrous, acute, 3 lines long: style longer than the stigmas. On wet banks in the highest mountains, Oregon to the Arctic regions.

S. Sitchensis Sanson Bong. Veg. Sitch. 162. A straggling ascending shrub 6-40 feet long, with light brown bark; branches slender, brownish,

downy when young, soon smooth: leaves oblong-obovate to oblanceolate, acute, or the earliest obtuse with an abrupt point, narrowed at base into short petioles, dark green above except the whitish-pubescent midrib, covered beneath with a lustrous white and satiny tomentum, entire or obsoletely crenate: stipules reniform, often wanting: aments appearing with the leaves, with a few small bracts at base, slender, densely flowered; the staminate 1-2 inches long, the obovate obtuse dark scales pubescent with long hairs; pistillate aments 12-18 lines long, the dark-colored scales pubescent: capsule ovate-conic, acute, densely white-tomentose: style elongated: stigmas scarcely emarginate, thick, erect. Common along streams, California to Alaska.

S. pellita Anders. Monogr. Sal. 139, fig. 72, g. A shrub with greenish-red to dark red shining twigs, when young, sometimes covered with a glaucous bloom: leaves numerous, narrowly oblanceolate, acute or acuminate, or the lower obtuse, $1\frac{1}{2}$ -2 inches long, 4-6 lines wide, the margins entire or obscurely crenate, revolute, dull green and thinly pubescent above, becoming glabrous, densely and persistently silvery-tomentose beneath: petioles slender, 2-3 lines long: stipules only on vigorous shoots, semi-cordate, 2-3 lines long: pistillate aments on short bractless peduncles, thick, very densely flowered, about an inch long: scales pilose, acute, tawny, dark at the apex: capsule tomentose, becoming glabrate, ovate-conical, acute, a line long, on short pedicels: style elongated; stigmas thick, entire, erect. Brit. Columbia to California.

S. Lemmoni Bebb Bot. Cal. ii, 88. A shrub 6-15 feet high: branches slender, at first covered with short appressed hairs, becoming smooth: leaves lanceolate, acute or acuminate at both ends, entire or remotely subserrate, silky-pubescent, when young, paler beneath, slender-petioled: stipules small, semi-ovate, acute, serrate, deciduous: aments oblong or cylindrical, rather densely flowered, appearing with the leaves, on short peduncles bearing 2-3 small acute leaf-like bracts: scales obovate, obtuse or somewhat acute, black, thinly pilose: capsule ovate-lanceolate, acute, grayish-tomentose, 2-3 lines long: style medium sized: stigmas erect, entire. Along streams, eastern Oregon to California.

S. glaucops Anders. in DC. Prodr. xvi, 281. I have neither specimens nor description of this species: it is a low caespitose shrub growing on the sides of high mountains, Idaho to Montana and Wyoming.

S. glauca var. villosa Anders. Sal. Bor. Am. 22. A diffuse shrub 3-7 feet high, with short and stout branches: leaves oblanceolate, acute or short acuminate, attenuate at base, 2-4 inches long, varying from soft-villous to scarcely pilose when young, at length glabrate and rigid, more or less glaucous beneath: stipules linear-lanceolate rather persistent: aments short-peduncled, the pistillate when mature sometimes very large, 2-3 inches long and $\frac{3}{4}$ inch thick: scales oblong-obovate, rather acute, brownish: capsule lanceolate, acuminate, tomentose, at length subglabrate, shortly pedicelled: style short or scarcely produced: stigmas bifid or entire. Mount Hood Oregon to California.

S. petrophila Rydb. Bull. N. Y. Bot. Garden i, 268. *S. arctica var. petraea* Anders. A dwarf creeping shrub with suberect branches only 2-4 inches long, leafy at the top: leaves lanceolate, tapering somewhat equally to the base and apex, an inch long, entire, green on both sides, slightly paler and prominently nerved beneath: aments terminal, erect, at length thick and densely flowered, an inch or two long: scales thin, brownish, sparsely pilose: capsule ovate-conical, 2-3 lines long, silky, sessile: style very much elongated, slender: stigmas bifid, divaricate. On high mountains, eastern Oregon to California and the Rocky Mountains.

S. tenera Anders. in DC. Prodr. xvi, 288. I have not seen specimens

of this, it said to be nearly related to the preceding, differing in the narrow oblanceolate leaves, few-flowered aments and much shorter capsule: it grows on the high mountains of Washington to California, Utah and Montana.

S. saximontana Rydb. l. c. 161. *S. reticulata* Bebb, not L. A densely caespitose and intricately branched shrub 1-3 inches long above ground, with light yellow glabrous branches: leaves oblong or elliptic-oblong, commonly acutish at both ends, glabrous both sides, light green above, rather strongly veined and glaucous beneath, 9-12 lines long; petioles about 6 lines long, aments 6-12 lines long, somewhat loosely many-flowered: bracts cuneate-oblong, truncate, light yellow, glabrous: capsule conical, sessile, densely and finely white-tomentose: stigma nearly sessile. On high mountains, eastern Oregon to the Rocky Mountains.

S. vestita Pursh Fl. 610. A low shrub with 4-sided green twigs: leaves obovate, thick, mostly retuse or emarginate at the apex slightly crenulate, narrowed or rounded at base, dark green and glabrous above, persistently silky beneath, 1-2 inches long, shortly petioled: aments terminal, appearing after the leaves, peduncled: stamens 2, : filaments distinct: capsule narrowly ovoid-conic, sessile, densely silky-tomentose, about 3 lines long. Eastern Oregon to Quebec and Labrador.

3 POPULUS L. Sp. 1034.

Trees or shrubs with scaly resinous buds, broad or narrow usually long-petioled leaves with minute fugacious stipules and small diœcious flowers in bracted aments. Bracts of the aments fimbriate or incised. Disk cup-shaped, oblique, lobed or entire. Calyx none. Staminate aments dense, pendulous, the flowers, with from 4-60 stamens, their filaments distinct. Pistillate aments sometimes raceme-like by the elongation of the pedicels. Ovary sessile. Style short. Stigmas 2-4, entire or 4-lobed. Capsule 2-, 3- or 4-valved.

P. ALBA L. Sp. 1034. A large tree with smooth light gray bark, 50-120 feet high and 2-6 feet in diameter: leaves broadly ovate or nearly orbicular in outline, acute or somewhat acuminate, truncate or subcordate at base, 3-5-lobed or irregularly dentate, 2-4 inches broad, densely white-tomentose when young, becoming glabrate and dark green above, persistently white-tomentose beneath, on terete petioles shorter than the blade. Escaped from cultivation in the Willamette valley.

P. balsamifera L. Sp. 1034. A large tree 50-80 feet high and 3-7 feet in diameter, the branches stout and spreading: leaves glabrous, broadly ovate, dark green and shining above, pale beneath, acute or acuminate, rounded or subcordate at base, crenulate, 3-5 inches long: petioles terete: aments and bracts somewhat pubescent: stamens 18-30: lobes of the stigma broad: capsule ovoid, 2-valved. In moist or dry soil, eastern Oregon to Alaska, Hudson Bay and the Eastern States.

P. angustifolia James Long's Exp. i, 497. A slender tree 40-70 feet high and 1-2 feet in diameter, the crown narrowly pyramidal with ascending branches and terete gray twigs: leaves glabrous, lanceolate, ovate-lanceolate or ovate, gradually acuminate or acute, narrowed, rounded or rarely subcordate at base 2-5 inches long, finely crenulate: petioles not flattened laterally, 3-6 lines long: staminate aments oblong-cylindrical, 1-3 inches long: lobes of the stigma broad: capsules ovoid, 2-valved. Eastern Oregon to Dakota and Arizona.

P. trichocarpa T. & G. Hook. Incon. t. 878. A large tree 50-200 feet

high and 2-8 feet in diameter, with thick dark longitudinally fissured bark and stout spreading branches: buds shining and viscid: leaves broadly ovate to oblong-lanceolate, acuminate, narrowed, rounded or subcordate at base, 2-10 inches long, finely puberulent when young, dark green above, pale beneath: petioles usually an inch or 2 long: staminate aments dense, 1-3 inches long, its bracts slightly villous: pistillate aments becoming 6-10 inches long in fruit, pubescent: capsule subglobose pubescent, 3-4 lines in diameter 3-valved: styles 3, broadly dilated and lobed: seeds light-colored. Common along streams, Brit. Columbia to California and the Rocky Mts.

P. deltoides Marsh Arb. Am. 106. A large tree 100-150 feet high and 5-8 feet in diameter, with grayish green bark somewhat rough when old: leaves glabrous, broadly deltoid-ovate, abruptly acuminate at the apex, crenulate, truncate at base, 4-7 inches long: petioles flattened laterally, stout, about as long as the blades: bracts glabrous, deeply fimbriate: staminate aments drooping, 3-5 inches long: pistillate aments loosely flowered, becoming 6-10 lines long in fruit: capsule ovoid, acute, 4-5 lines long, 2-4-valved, shorter than or equalling their pedicels. Along streams, eastern Washington to the Eastern States.

P. tremuloides Michx Fl. ii, 243. Usually a shrub or small tree 6-30 feet high, but sometimes attaining a height of 100 feet and 3 feet in diameter, with smooth light green bark: leaves broadly ovate or orbicular short acuminate, finely crenulate and ciliate, truncate, rounded or subcordate at base, 1-3 inches broad: petioles about as long as the blade, flattened laterally, causing the leaves to quiver in the slightest breeze; bracts silky, deeply 3-5-cleft into linear lobes: staminate aments 1-3 inches long, the pistillate longer, dense: stigma-lobes linear: capsule conic, acute, 2-valved, about 3 lines long. Common in moist places, California to Alaska and across the continent.

SUBCLASS 2 ENDOGENÆ.

Stems with the woody fibres scattered irregularly, not forming a separate zone of annual woody layers between the bark and pith. Leaves mostly parallel-veined, alternate, entire, sheathing at base. Floral envelopes usually in threes. Embryo with only one cotyledon.

SYNOPTICAL KEY TO THE ENDOGENOUS ORDERS.

A Herbaceous perennials with conspicuous perianth. Ovary inferior.

93 **Orchidaceæ** Leaves mostly flat and not grass-like: flowers perfect, irregular: stamens and style coherent: anthers 1 or 2: capsule 1-celled, with 3 parietal placentæ: Seeds numerous, with obscure embryo and no albumen.

94 **Iridaceæ** Leaves equitant and grass-like: flowers regular, perfect, spathaceous: stamens 3, at the base of the perianth: capsule 3-celled: embryo distinct, with albumen.

B Perianth regular or none. Ovary superior or nearly so.

* Perianth colored, at least the inner series: carpels united into a compound ovary: seeds with albumen.

95 **Smilacæ** Woody plants climbing by tendrils: flowers diœcious, 6-parted: anthers 1-celled: fruit a berry.

- 96 Liliaceæ** Stems from bulbs, corms or rhizomes: anthers 2-celled: fruit a loculicidal or septicidal capsule: embryo in copious albumen.
- 97 Convalariaceæ** Leafy-stemmed herbs from rootstocks: anthers 2-celled: fruit a fleshy berry: embryo small in copious albumen.
- 98 Melanthaceæ** Leafy-stemmed plants with rootstocks or bulbs: anthers 2-celled: fruit a 3-celled septicidal or loculicidal capsule: seeds usually with tails or appendages.
- 99 Pontederiaceæ** Herbaceous aquatic plants with spathaceous tubular flowers: ours with grass-like leaves, solitary axillary flowers and 1-celled 3-valved capsules.
- 100 Araceæ** Ours acaulescent herbs with the flowers crowded upon a spadix with 4-lobed perianth, 4 stamens, 2-celled anthers and 2-celled 2-ovuled ovaries which become fleshy and coalescent in fruit.
* * Aquatic herbs: perianth none: ovary 1-celled, utricular or nut-like in fruit: seeds with albumen.
- 101 Typhaceæ** Stems solid, terete, with linear leaves and creeping rootstock: flowers monœcious, in heads or crowded upon a spadix.
- 102 Lemnaceæ** Very small stemless floating plants with disk-like fronds and inconspicuous flowers.
* * * Aquatic or marsh plants: perianth herbaceous or petal-like or none: carpels 1-several, distinct or separable: seeds without albumen.
- 103 Valisneriaceæ** Flowers axillary and mostly solitary, with tubular perianth: fruit indehiscent.
- 104 Naladaceæ** Perianth of fertile flowers of 4 herbaceous valvate sepals or none: carpels 1-6, 1-ovuled.
- 105 Scheuchzeriaceæ** Perianth of 4-6 segments in 2 series: carpels 3-6, 1-2-ovuled.
- 106 Alismaceæ** Perianth-segments 6, distinct, 3 herbaceous 3 petal-like: carpels numerous, verticillate or capitate, becoming achenes.
* * * * Perianth of 6 equal persistent glumaceous segments; fruit a capsule.
- 107 Juncaceæ** Flowers perfect: capsule loculicidally 3-valved: seeds with albumen.
* * * * * Flowers in the axils of scales or glumes, without evident perianth: stamens 1-3: ovary 1-celled, 1-ovuled: seeds with albumen.
- 108 Cyperaceæ** Stems solid, often triangular, with closed sheaths: glume single; perianth represented by bristles, or wanting: anthers attached by the base: fruit a spike of lenticular or triangular achenes.
- 109 Gramineæ** Stems hollow, terete: sheaths split to the base: glumes in pairs: perianth represented by minute scales or none: anthers versatile: fruit a caryopsis or grain.

ORDER XCIII ORCHIDACEÆ Lindl. Nat. Syst. ed. 2, 336.

Perennial herbs with parallel-veined flat leaves and perfect irregular flowers in racemes or spikes, or solitary and terminal. Perianth superior, of 6 segments, the 3 outer similar or nearly so, 2 of the inner similar, the third inner one, called the lip, dissimilar often markedly so, usually larger. Stamens coherent with the style, forming an unsymmetrical column, with usually

only the anther opposite to the lower sepal perfect and 2 rudimentary lateral ones, in *Cypripedium* the lateral ones perfect, the third sterile. Anthers 2-celled. Pollen more or less coherent in 1-4 masses, rarely wholly granular. Stigma oblique and concave, mostly viscous, the upper margin often produced into an erect beak. Capsule coriaceous or membraneous, dehiscing usually by 3 placentiferous valves which separate from the persistent midveins of the carpels. Seeds very numerous, scobiform, without albumen.

TRIBE I Anther one, resting like a lid upon the column, deciduous. Pollen masses 4, smooth and waxy.

- 1 **Calypso** Scape solitary and 1-flowered, from a solid bulb, with a single green leaf: lip saccate: column broadly winged.
- 2 **Corallorhiza** Stems one to several from a branched coral-like root: leaves all reduced to scale-like bracts: flowers in a terminal raceme, spurred or gibbous at base: lip expanded or concave, bilamellate-crested: column semiterete.

TRIBE II Anther one, connate with the column and resting upon its face just above the stigma. Pollen masses 2, of coarse grains united by an elastic web.

- 3 **Habenaria** Stems one to several from a solid corm: flowers numerous, in a terminal raceme: lip flat, spurred.

TRIBE III Anther 1, erect and sessile or nearly so upon the top of the column, more or less covering and declinate upon the back of the stigma. Pollen masses 2 or 4, of loosely cohering grains.

- 4 **Gyrostachys** Stems one to several from fleshy fascicled roots: flowers numerous in a twisted spike: lip flat, the base embracing the short column.
- 5 **Peramium** Stem solitary from a somewhat creeping rootstock: flowers several in a terminal spike; lip saccate, entire, free from the column.
- 6 **Listera** Stem solitary from a fascicle of fleshy-fibrous roots with a pair of sessile leaves in the middle; flowers rather few, in a terminal raceme: lip flat. 2-lobed.
- 7 **Epipactis** Stems stout, leafy, several from fleshy-fibrous roots: lip concave, somewhat jointed in the middle and auriculate at base: anther sessile behind the beaked stigma.
- 8 **Cephalanthera** Stems stout, from a somewhat creeping rootstock: flowers in a terminal raceme: lip concave and auriculate at base: anther shortly stipitate: stigma beakless.

TRIBE IV Perfect anthers 2, lateral. Pollen pulpy-granular.

- 9 **Cypripedium** Stems leafy, from more or less creeping rootstocks: flowers mostly few, in a terminal raceme: lip an inflated sac.

Tribe 1 Malaxidæ Lindl. Orch. 3. Herbs with simple stems without green foliage, or a single green radical leaf. Anther one, terminal and resting like a lid upon the column, deciduous. Pollen masses 4, smooth and waxy.

1 CALYPSO Salisb. Par, Lond, t. 89.

Low herbs with a single bracted scape-like stem, solitary green radical leaf and a large terminal showy flower. Smaller lobes of the perianth similar and nearly equal: the lip comparatively large, saccate, with 2 short spurs below the apex, becoming inferior by the pedicel curving backward. Column erect broadly winged and petaloid, oval and concave, bearing the hemispherical anther on the summit. Pollen masses in 2 pairs, the lower smaller, compressed, sessile upon a nearly square membranaceous gland.

C. borealis Salisb. l. c. Stem 3-8 inches high with 2 or 3 membranaceous brownish-green sheaths and a linear bract at the summit, leaf broadly ovate or slightly cordate, 1-2 inches long, petioled: flowers drooping, pedicelled: sepals and petals lanceolate, acuminate, light rose-color, 6-9 lines long lip usually slightly longer, inflated saccate, brownish-pink mottled purple, the edge margined at the apex and bifid or entire nearly equalling the tooth-like spurs and with a tuft of (in ours white) hairs at base: column half the length of the petals: capsule oblong-cylindric, an inch long, about equalling the slender pedicel. (In damp open forests California to Alaska and the Atlantic States: also in Europe.)

2 CORALLORHIZA R. Br. Ait. Hort. Kew. ed. 2, v, 209

Scapose perennial herbs without green leaves from coral-like branched roots, the leaves all reduced to sheathing scales, and more or less showy flowers in terminal racemes. Sepals and petals ascending, the upper somewhat incurved, similar and nearly equal, but the lateral sepals oblique at base and either decurrent in a short spur adnate to the side of the ovary, or forming a projecting gibbosity above it: lip dilated and more or less recurved, flat or concave, with a pair of somewhat prominent longitudinal ridges near the base. Column semiterete and narrowly margined, broader at base, somewhat incurved, bearing the caducous anther on the summit. Pollen-masses in 2 pairs, distinct, sessile upon a short oblong gland. Capsules reflexed.

* Spur present: flowers small, yellowish-green or whitish, often tinged or mottled with purple.

+ Spur more or less prominent: sepals and petals 3-nerved: capsule oblong-cylindric.

C. multiflora Nutt. Journ. Acad. Philad. iii, 138, t. 7. Stems 8-20 inches high, purplish, clothed with several appressed scales: racemes 2-8 inches long, 10-30-flowered: flowers 6-9 lines high, brownish-purple, short-peduncled: petals and sepals somewhat connivent at base, linear-lanceolate, about 3 lines long: lip white spotted and lined with purple, oval or ovate in outline, deeply 3-lobed, crenulate, the middle lobe broader than the lateral ones, its apex curved, spur manifest, but wholly adnate to the ovary: column stout $\frac{3}{4}$ the length of the petals, the margins broader and somewhat thicker at base: capsule ovoid or oblong, 6-9 lines long, narrowed to a stout rather long pedicel. Rather common in open forests at low and middle elevations, Brit. Columbia to California and the Atlantic States.

C. Mertensiana Bong. Veg. Sitch. 165. Stems 6-20 inches high, dark red or purple, many-flowered: sepals and petals linear-lanceolate, 3-4 lines long, dark red: spur a line long, the lower half free from the ovary: rip

oblong obtuse entire or with a tooth on one or both sides near the base, narrowed to a short claw, thin and concave, the ridges only slightly prominent: column nearly equalling the petals. slender, the narrow margins scarcely broader or thicker below: stigma projecting and cucullate: capsule 5-8 lines long, attenuate into the short slender pedicels, reflexed. Common in the high mountains, Alaska to California.

+ + Spur very short or not at all prominent: sepals and petals 1-nerved: capsule elliptic-oblong.

C. innata R. Br. Ait. Hort. Kew. ed. 2, v, 209. Stems slender, glabrous, 4-12 inches high, clothed with 2-5 closely sheathing scales: racemes 1-3 inches long, 3-12-flowered: flowers dull purple, about 6 lines long, on very short minutely bracted pedicels: sepals and petals narrow, about 3 lines long: lip shorter than the petals, oblong, whitish, 2-toothed or 2-lobed above the base: spur a sac or small protuberance adnate to the summit of the ovary: capsule oblong or somewhat obovoid, 4-6 lines long. In wooded districts, eastern Washington to Alaska and across the Continent: also in Europe.

* * Flowers larger, striate-veined, not spotted: spur none, the lateral sepals oblique and with the base of the column strongly gibbous over the top of the ovary: lip entire, more or less concave, somewhat fleshy.

C. striata Lindl. Orch. 534. Stems stout, purplish, 1-2 feet high, clothed with several scarios bracts: racemes 2-6 inches long, 10-25-flowered: flowers brownish-purple: sepals and petals narrowly elliptic, striate with purple lines, 6-8 lines long: lip oval or obovate, entire or a little undulate, somewhat narrowed at base, about as long as the petals: capsule ellipsoid, reflexed 8-10 lines long. In open forests Brit. Columbia to California, Ontario and New York.

Tribe 2 Ophrydeæ Lindl. Orch. 257. Flowers mostly spicate or racemose. Anther one, connate with the column and persistent upon its face immediately above the stigma. Pollen-masses 2, of coarse grains united by an elastic web, each mass attached by a stalk to a viscid gland.

3 HABENARIA Willd. Sp. Pl. iv, 44. (1804)

Leafy-stemmed plants with bulbous or fleshy-fibrous roots, entire mostly green leaves and rather small flowers in terminal bracted racemes or spikes. Perianth ringent: sepals and petals nearly alike, convergent, or the lower sepals spreading: lip flat and spreading, 3-lobed or entire, with a slender spur at base, without ridges or callosities: column very short. Anther persistent upon the face of the column immediately above the stigma, the cells parallel, or divergent at base. Pollen-masses one in each cell, of coarse grains united by an elastic web, each attached at base by a pedicel to an exposed viscid gland on the upper edge or at the side of the stigma.

* Stem mostly slender. from an ovate or oblong tuber, with 2-3 leaves at base and bracteate above: flowers numerous, small, greenish white, the lip scarcely exceeding the uniform 1-nerved sepals.

H. elegans Bolander Cat. Pl. St. Franc. 29. Stem rather stout, 1-3 feet high: leaves lanceolate, acuminate, 4-8 inches long: spikes usually dense, many-flowered, 4-8 inches long: the subulate acuminate bracts a

little shorter than the flowers: sepals and petals equal, about 2 lines long: sepals oblong, obtuse: petals ligulate and fleshy, obscurely 3-nerved; the lip similar, with a filiform spur equalling or exceeding the ovary, 3-5 lines long: pollen-masses large, half a line long: beak of the stigma prominent, broad and rounded: capsule oblong, nearly sessile, 3-4 lines long. In dry open forests, California to Brit. Columbia.

H. Unalaskensis Watson Proc. Am. Acad. xii, 277. Stem usually slender, 10-20 inches high: leaves narrowly lanceolate to linear, thin, 2-6 inches long, often attenuate below: bracts ovate, acutish or rarely acuminate, not exceeding the ovary: spikes 4-6 inches long, rather loose: flowers unpleasantly fragrant; sepals, petals and lip nearly equal, about a line long, at first erect, becoming nodding by the curving of the ovary; sepals oblong, obtuse: petals thicker, lanceolate, acute: lip oblong, obtuse: spur clavate, shorter than the ovary: capsule oblong, sessile or nearly so, 3 lines long. On dry wooded hills, California to Unalaska.

* * Stem stouter, from a fusiform tuber, often tall, leafy throughout: sepals 3-nerved, the lateral ones oblique at base, the upper one broader: petals thin: lip fleshy, several-nerved.

+ Spur elongated, much longer than the sepals.

H. leucostachys Watson Bot. Cal. ii, 134. Stem stout 1-6 feet high bearing a many-flowered dense or open spike of rather large pure white flowers: leaves lanceolate to linear, 2-18 inches long diminishing upward: bracts linear-subulate, acuminate longer than the ovary: lateral sepals oblong, the upper ovate-oblong, 2-3 lines long: petals lanceolate and subfalcate, oblique at base, more or less connivent with the base of the sepals: lip 3-4 lines long, rhombic-lanceolate: spur narrow, 4-6 lines long: beak of the stigma very prominent, ovate, more than half the length of the connective: glands linear-oblong, vertical: capsule oblong, sessile, 6-9 lines long. In marshes, California to Alaska and Idaho.

H. dilatata Hook. Exot. Fl. ii, t. 95. Stem rather slender, 1-2 feet high: leaves lanceolate, 3-12 inches long: spikes 2-10 inches long, loosely flowered: bracts lanceolate, acuminate, the lower longer than the flowers, the upper shorter than the ovary: flowers white: sepals ovate, obtuse, nearly 3 lines long: lip entire, dilated or obtusely 3-lobed at base, 4-5 lines long, about equalling the blunt incurved spur: stigma with a trowel-shaped beak between the bases of the anther-cells: capsule sessile or nearly so. In marshes and wet woods, Oregon to Alaska and across the Continent.

H. aggregata. Stem rather slender, 1-2 feet high, growing in dense tufts: leaves linear to linear-lanceolate, acute or acuminate, 4-10 inches long, reduced to sheaths below: bracts linear-lanceolate, acuminate, 6 lines long, about equalling the ovaries: flowers 10-30, in a long loose spike, greenish-white: lateral sepals ovate, acuminate, about 3 lines long, obtuse, the upper broadly ovate, obtuse, equalling the lateral ones: petals lanceolate subfalcate, obtuse, 4-5 lines long: lip linear, 6 lines long equalling the slender spur and sessile ovary. In springy places along streams in the Coast Mountains of southern Oregon.

+ + Spur short, scarcely exceeding the sepals.

H. hyperborea R. Br. Ait. Hort. Kew. ed. 2, 193. Stem rather stout, 6 inches to 3 feet high: leaves ovate to lanceolate, 1-12 inches long: spike narrow, 3-8 inches long: sepals and petals ovate, obtuse, 2-3 lines long, upper sepal slightly crenulate at the apex, lip lanceolate, entire, obtuse, about 3 lines long: spur about equalling the lip, shorter than the ovary, blunt slightly incurved, sometimes clavate: glands small. In bogs and wet woods, Oregon to Alaska and across the Continent.

H. gracilis Watson Proc. Am. Acad. xii, 276. Stem usually slender,

6-30 inches high: leaves oblong-lanceolate to lanceolate or linear, 2-6 inches long, gradually reduced upward and passing into the bracts of the narrow sparsely-flowered spike: flowers small, greenish yellow: lateral sepals ovate, obtuse, about 2 lines long, the upper one broadly ovate or nearly orbicular, equalling the lateral ones: petals lanceolate, a little longer than the sepals: lip linear, longer than the petals: spur short and saccate, dilated downward: capsule oblong, half-inch long. In mountain marshes, California to Alaska.

* * * Stem slender and scape-like, with a pair of large green leaves at base: flowers comparatively large, greenish, the lip longer than the petals.

H. orbiculata Torr. Comp. 318. Scape stout, bracted, rarely bearing a small leaf, 1-2 feet high: leaves orbicular, spreading flat on the ground, green and shining above, silvery beneath, 4-7 inches in diameter: raceme loosely many-flowered: pedicels 5-6 lines long, erect in fruit: flowers greenish-white; upper sepal short and rounded, the lateral ones spreading, falcate-ovate, obtuse, 4-5 lines long: petals smaller: lip oblong-linear, entire, obtuse, white, about 6 lines long: spur much longer than the ovary, often 18 lines long: anther-cells prominent, converging above: glands small, orbicular, about 3 lines apart. In rich woods. Washington and Idaho to Brit. Columbia and across the Continent.

Tribe 3 Neottieæ Lindl. Orch. 441. Stems mostly leafy and flowers spicate or racemose. Anther one, connate with the column and persistent upon its face immediately above the stigma. Pollen-masses 2, of coarse grains united by an elastic web, each mass attached at base by a stalk to a viscid gland.

4 GYROSTACHYS Pers. Syn. ii, 511. (1807.)

SPIRANTHES Richard.

Erect herbs with fleshy-fibrous or tuberous roots, leafy stems and small spurless flowers in 1-3-rowed more or less twisted spikes. Perianth ringent, oblique on the ovary: the lateral sepals somewhat decurrent, the upper and the petals coherent: lip sessile or nearly so, the base embracing and adherent to the column and with a callous protuberance on each side, the dilated summit spreading and undulate, usually entire. Column very short, oblique, terminating in a short erect stipe, bearing the ovate stigma on the face, the beak above usually acuminate and at length bifid by the separation of the oblong and viscid gland. Anther sessile or nearly so, at the base of the stipe behind, mostly acuminate. Pollen-masses 2, thin and powdery, becoming attached above the gland.

G. Romanzoffiana Mc M. Met. Minn. [171. *Spiranthes Romanzoffiana* Cham. Glabrous, rather stout 4-18 inches high, leafy, bracteate above: leaves oblong-lanceolate to linear: spike dense, 3-ranked, conspicuously bracted, 1-4 inches long: perianth white, about 4 lines long, curved, the sepals and petals all connivent; lip recurved, ovate-oblong, contracted below the narrower wavy-crenulate summit: callosities smooth, often obscure: the oblong-linear gland and very slender bifid beak $\frac{3}{4}$ of a line long: capsule oblong, 3-4 lines long. On wet banks California to Alaska and across the Continent.

G. porrifolia Kuntze. *Spiranthes porrifolia* Lindl. Glabrous, rather

slender, 6-18 inches high, leafy below, bracteate above: leaves oblong-lanceolate to lanceolate, 2-4 inches long, acute: spike dense, rather slender, 1-3 inches long: bracts acuminate from an ovate or oblong base, not surpassing the flowers: perianth about 3 lines long; sepals and petals all connivent, linear: lip slightly recurved, not exceeding the sepals, callosities at the base very prominent and nipple-like, pointing downward. In wet places in the Coast Mountains of southern Oregon to California.

5 PERAMIUM Salisb. Trans. Hort. Soc. i, 310. (1812.)

GOODYERA R. Br. l. c. (1813.)

Herbs with bracted erect scapes from creeping rootstocks with fleshy-fibrous rootlets, all radical, often blotched with white, thick evergreen leaves and small flowers in terminal spikes. Lateral sepals free, the upper one united with the petals into a galea. Lip sessile, entire, roundish-ovate, concave or saccate, without callosities, its apex reflexed. Anther without a lid, erect or incumbent, attached to the column by a short stalk. Pollen-masses 2, attached to a small disk which coheres with the top of the stigma.

P. Menziesii Morong Mem. Torr. Bot. Club. v. 124. *Goodyera Menziesii* Lindl. Scapes and inflorescence pubescent, 6-15 inches high: leaves smooth, dark green blotched with white, ovate-oblong to lanceolate, acute, 2-3 inches long, narrowed into a short petiole usually somewhat reticulated with light greenish markings: spikes many-flowered, rather dense, somewhat secund: bracts ovate-lanceolate, equalling the ovary: perianth dull white, pubescent, 2-4 lines long: lip strongly concave and erect, narrowing above into the slightly spreading summit: column short and straight: anther acuminate: gland and bifid beak very narrow and elongated: capsule ovate-oblong, very nearly sessile, 4 lines long. In open forests, California to Alaska and Canada.

6 LISTERA R. Br. Ait. Hort. Kew. ed 2, 201.

Small herbs with fleshy-fibrous roots, simple stems with a pair of flat leaves near the middle and small flowers in a terminal raceme. Sepals and petals similar: lip free, longer than the sepals, flat and dilated, more or less deeply bifid: column free and naked, bearing the ovate anther at the back of the summit. Pollen-masses 2, powdery, united to a very minute gland upon the rounded and entire beak of the stigma.

L. cordata R. Br. l. c. Stem very slender 2-10 inches high: leaves broadly ovate 6-12 lines broad, truncate or somewhat cordate at base but abruptly contracted at the point of insertion, mucronate: racemes rather loose, 6-20 lines long, 4-20-flowered: bracts $\frac{1}{2}$ line long: flowers purplish or yellowish: sepals broadly ovate, about a line long: petals broadly oblong: lip narrow, often with a subulate tooth on each side at the base, fully twice as long as the petals, cleft to near the middle, the segments setaceous and ciliolate: column very short; capsule ovoid, 2 lines long. In damp places in forests, California to Alaska and across the Continent.

L. convallarioides Torr. Comp. 326. Stem slender, 4-10 inches high, glandular-pubescent above the leaves, rarely with a bract below the raceme: leaves smooth, round-oval or ovate, obtuse or cuspidate, slightly cordate or reniform at base, 3-9-nerved: raceme 1-3 inches long, loosely 3-12-flowered: flowers greenish-yellow, 3-4 lines long: sepals and petals

linear-lanceolate, 2-3 lines long: lip broadly cuneate, with 2 obtuse lobes at the dilated apex, 4-5 lines long, generally with a tooth on each side at base: column elongated but shorter than the lip, a little incurved, with 2 short projecting wings above the anther: capsule obovoid, about 3 lines long. In wet places in forests, southern Oregon to California and the Atlantic States.

L. caurina Piper Eryth. vi, 32. *L. convallarioides* Hook. not Torr. Stem slender, 5-12 inches high, glabrous below, densely glandular-pubescent above the leaves: leaves obovate to oval, or elliptic-ovate, 1-4 inches long, thin, obtuse and slightly apiculate to acute, rounded or truncate at base: raceme loosely many-flowered: bracts 1-3 lines long, rhombic-ovate, acuminate, the lower sometimes 2-flowered and bifurcate: flowers dull yellowish, on slender pedicels 4-6 lines long: sepals and petals lanceolate to linear-lanceolate, about 2 lines long, spreading: lip about 3 lines long, narrowly oblong, dilated and rounded at the retuse apex, a slender or almost filiform tooth on each side at the base, with a papilla at the base of each tooth: column short, not stout: capsule ovoid, 3 lines long. In damp woods in the high mountains, Oregon to Alaska and Idaho.

7 EPIPACTIS R. Br. Ait. Hort. Kew. ed. 2, v, 201.

Tall herbs with fibrous roots, simple leafy stems and rather large flowers in terminal leafy-bracted racemes. Sepals and petals nearly equal: lip free, deeply concave at the base, without callosities, narrowly constricted and somewhat jointed in the middle, the upper portion petaloid. Column short, erect. Anther sessile behind the broad truncate stigma, on a slender jointed base, 2-celled, obtuse. Pollen-masses coarsely granular, becoming attached above to the gland capping the small rounded beak of the stigma.

E. gigantea Dougl. Hook. Fl. ii, 220, t. 202. Stem stout, leafy, 1-5 feet high, nearly smooth: leaves from ovate below to narrowly lanceolate above, 3-8 inches long, acute or acuminate, somewhat scabrous on the veins beneath: racemes pubescent: bracts large and foliaceous, lanceolate or linear-lanceolate, as long or longer than the flowers: pedicels slender, 2-4 lines long: sepals ovate-lanceolate, 6-8 lines long, the upper concave: petals slightly smaller: lip as long as the petals, the saccate base with erect wing-like margins, strongly nerved and the nerves callous tuberculate near the base, the dilated summit ovate-lanceolate, entire, somewhat wavy-crested: anther nearly 2 lines long: capsule oblong, 8 lines long, reflexed. In springy places along streams, California to Brit. Columbia.

Corvallis
June 14

8 CEPHALANTHERA Richard. Annot. 21.

Mostly leafy-stemmed herbs from creeping rootstocks, with flat leaves, or leafless, and middlesized flowers in bracted spikes. Sepals and petals nearly equal, connivent, the latter somewhat united and galeate. Lip free, concave, contracted and somewhat jointed in the middle. Column slender, elongated. Anther shortly stipitate, so as to be nearly or quite above the level of the top of the stigma. Pollen-masses not connected nor attached to a gland. Stigma wholly beakless.

C. Oregana Reichenb. f. Linneæ xii, 53. Whole plant white and without leaves, parasitic, 10-18 inches high, with 3-5 somewhat dilated sheaths below and usually a few free linear-lanceolate bracts above: raceme

rather short: floral bracts very small: flowers few to many, sessile or nearly so: perianth about 6 lines long, gibbous at base: sepals and petals oblong-lanceolate, nearly equal; lip a little shorter, the saccate base with broad wing-like margins, the nerves somewhat tuberculate-crested within, upper portion very broad and suborbicular, the nerves in the centre wavy-crested: column 2 lines long, about twice longer than the anther. In damp places in forests, California to Washington.

Tribe 4 Cypripediæ Lindl. Orch. 525. Stamens 3, the 2 lateral ones perfect, the other sterile and forming a dilated fleshy appendage above the terminal stigma. Pollen pulpy-granular.

9 CYPRIPEDIUM L. Sp. 951.

Glandular-pubescent herbs with coarse fibrous roots, flat many-nerved leaves with sheathing base and few large flowers in leafy-bracted racemes. Sepals spreading, the lateral often united into one under the lip: petals similar but usually narrower: lip an inflated sac, the incurved margin auricled near the base. Column very short, incurved, bearing at each side a 2-celled anther on a short filament. Stigma terminal, disk-like, broad and obscurely 3-lobed, covered above by the fleshy triangular and pedicelled sterile anther. Pollen pulpy-granular.

C. parviflorum Salisb. Trans. Linn. Soc. i, 77. Stems slender, 1-2 feet high, leafy: leaves oval or elliptic to lanceolate, 2-6 inches long: sepals and petals longer than the lip; petals usually twisted; lip 7-15 lines long, bright yellow, more or less marked with purple stripes, spots or blotches: sterile stamen triangular, yellow and purple spotted like the lip. (In woods and thickets, Washington and Brit. Columbia to Newfoundland, Georgia and Missouri.)

C. montanum Dougl. Lindl. Orch. 528. More or less roughly and glandular-pubescent, stout, 1-2 feet high, leafy: leaves ovate to broadly lanceolate, acuminate, 3-6 inches long: flowers 1-3, shortly-pedicelled: sepals and petals brownish, narrowly to linear-lanceolate, 18-30 lines long, the lower sepals united nearly to the apex; lip oblong, an inch long, dull-white veined with purple: sterile anther ovate-triangular to oblong-lanceolate, 4-6 lines long, on a slender filament, deeply channeled above, yellow with purple spots, somewhat longer than the stigma: capsule erect or nearly so, oblong, 10 lines long. In open woods, California to British Columbia and Idaho.

C. Californicum Gray Proc. Am. Acad. vii, 386. Rather rough pubescent: stems stout, 1-4 feet high leafy: leaves ovate-lanceolate, acute or acuminate, 3-6 inches long, the upper lanceolate and gradually reduced to foliaceous bracts of the long loose raceme: flowers 1-20, shortly pedicelled: sepals and petals greenish-yellow; sepals broadly oval, the lateral united to the apex, acute, 6-20 lines long, equalling the oblong-linear acutish petals; lip obovoid, white or light rose-color, veined with purple, 8-10 lines long, pubescent within at the base: sterile anther rounded and arching, nearly sessile, 2 lines long, equalling the roughened stigma: capsule reflexed, oblong, 8-15 lines long. Along streams and in springs, southern Oregon and northern California.

C. fasciculatum Kellogg in Herb. Watson Proc. Am. Acad. xvii, 380. Stems slender, 2-10 inches high, pubescent, scariously sheathed at base and bearing a pair of nearly opposite leaves near the middle, and a small lanceolate bract above: leaves ovate to nearly orbicular, 1-3 inches broad, obtuse or rounded to acutish, pale green and with 3 prominent ribs

beneath: flowers solitary or several together in a small terminal cluster: sepals and petals lanceolate, acuminate, 6-12 lines long, greenish-brown, with brown veins, the lateral sepals wholly united or very nearly so; lip depressed-ovate, greenish-yellow with brown or purplish margins, 4-6 lines long: sterile anther oblong, obtuse, equaling the stigma. On dry open hillsides California to Washington.

ORDER XCIV IRIDACEÆ Lindl. Nat. Syst. ed. 2, 328.

Perennial herbs, with equitant sheathing narrow leaves and few showy perfect flowers subtended by spathaceous bracts. Perianth of 6 segments or 6-lobed, its tube adnate to the ovary, the segments or lobes in 2 series, convolute in the bud, withering-persistent. Stamens 3, inserted on the base of the 3 outer segments or lobes of the perianth: filaments filiform, distinct or united: anthers 2-celled, extrorse. Style 3 cleft, its branches sometimes divided. Ovary inferior, mostly 3-celled, with numerous or few anatropous ovules in each cell becoming a 3-celled, loculicidally dehiscent capsule. Embryo straight in fleshy or horny albumen.

- 1 **Iris** Outer segments of the perianth recurved; the inner erect: branches of the style petal-like, opposite to the anthers: filaments distinct: seeds flattened.
- 2 **Sisyrinchium** Segments of the perianth similar, spreading: branches of the style filiform alternate with the anthers: filaments united: seeds globular.

1 IRIS L. Sp. 38.

Herbs with creeping or horizontal, often woody and sometimes tuber bearing, rootstocks, erect or ascending stems, ensiform or linear leaves and large flowers in terminal racemes. Perianth of 6 clawed segments united below into a tube, the 3 outer dilated, spreading or reflexed; the 3 inner usually narrower and erect. Stamens inserted at the base of the outer segments of the perianth, distinct: anthers oblong or linear. Style 3-parted, its base adnate to the tube of the perianth, its branches thin and petal-like, resting upon the outer segments of the perianth and covering the stamens, stigmatic at the thin apex, above which is a broad 2-parted crest. Ovules numerous, in 2 rows in each cell. Seeds horizontal, flattened, or more or less turgid.

* Stems leafy: leaves linear: bracts of the spathe closely approximate, foliaceous: tube of the perianth narrow, more or less elongated.

I. chrysophylla. Stems low and very slender, 2-8 inches high, from tender rootstocks: radical leaves linear, 6-18 inches long by 2-3 lines wide, light green, finely striate, thick and persistent for at least one winter: bracts lanceolate, long-acuminate, contiguous, 2-4 inches long: flowers 1-3, sessile or nearly so, yellow to white, with blue veins: perianth with filiform tube 2-3 inches long; outer segments 2-3 inches long, with long claw and broadly lanceolate blade, inner ones spatulate: filaments flat, bearded at base: capsule oblong or broader, nearly an inch long: seeds slightly compressed. In Pine woods, southern Oregon.

I. bracteata Watson Proc. Am. Acad. xx, 375. Stems rather stout, 6-12 inches high, covered with imbricated sheathing bracts 2-4 inches long; leaves solitary, evergreen, rigid 1-2 feet long, 6-8 lines wide, or sometimes much smaller, striate, one side green, the other glaucous with numerous stomata: bracts of the spathe approximate: 2-3 inches long, short-acuminate usually 2-flowered: perianth yellow, with a short funnelform tube; outer segments oblong, naked, 2-3 inches long, the inner ones oblanceolate, somewhat shorter: capsule on exserted pedicels, ovate-oblong, an inch long. In open forests, about Waldo, southern Oregon.

I. Douglasiana Herbert, H. & A. Bot. Beech. 395. Stems stout, 6-18 inches high: leaves linear, 12-30 inches long, 4-8 lines broad, thick and rather rigid; long acuminate, finely striate: bracts of the spathe lanceolate, 3-4 lines long, acuminate flowers several, somewhat paniced, on pedicels 6-18 lines long: perianth blue or purplish, the outer segments with a white centre veined with purple, its tube narrow, 6-12 lines long: capsule oblong, acutely triangular, 18-20 lines long: seeds nearly globular. Along the coast, southern Oregon to California.

* * Tube of the perianth short and funnelform above the ovary,

Rootstock slender: stems leafy: leaves not evergreen: bracts foliaceous, separate and often distant.

I. tenuis Watson Proc. Am. Acad. xvii, 380. Rootstock very slender and creeping: stems 8-10 inches high, with 2 or 3 bract-like leaves 2-3 inches long, 2-flowered: the longer leaves of the sterile branches of the rootstock equalling the stem and 4-6 lines broad, acuminate and very acute: bracts contiguous or distant, 1-2 inches long, flowers white, lightly blotched and striped with pale yellow and purple: perianth tube 2-3 lines long, the segments naked, the outer 15 lines long, a little exceeding the emarginate inner ones: capsule depressed-globose, 6 lines in diameter, on pedicels as long or longer than the bracts. In the Cascade Mountains along the Clackamas river and its tributaries in Oregon.

I. tenax Dougl. Bot. Reg. t. 1218. Rootstock slender, usually short and forming dense tufts 6-18 inches in diameter: stems slender 6-12 inches high, bearing several sheath-like short leaves and a single purple flower: leaves very numerous, 12-20 inches long, much longer than the stems, about 2 lines broad acuminate and mostly very acute: bracts lanceolate, acute: 1-2 inches long: tube of the perianth very short, its outer segments 2 inches long or more, with oblong blade and broad claw, the inner ones spatulate and nearly as long: capsule oblong, 8-12 lines long, obtuse at both ends: seeds scarcely flattened, somewhat angled obtusely. Common in open places, Brit. Columbia to Oregon. There is a white flowered form with narrow perianth and narrower ovary but it has scarcely enough characters for a species.

+ + Rootstock stout: stems naked or nearly so, usually tall: bracts contiguous or rarely separated.

I. longipetala Herbert H. & A. Bot. Beech. 369. Stems stout, 1-1½ feet high, 3-5 flowered: leaves about as high, 3-5 lines broad: bracts foliaceous, large and acuminate, 3-4 inches long: flowers very large, bright lilac, on stout pedicels 1-2 inches long, the tube funnelform, 3 lines long. outer segments 2½-3 inches long by 1-1¼ broad, narrowed to a short claw, white below and veined with violet, the midvein yellow: inner segments oblanceolate, 2 inches long: anthers shorter than the stigmas: style broadly crested: capsule oblong, narrowed at each end, 2 inches long: seeds flattened, nearly 3 lines long. In moist meadows, eastern Washington to California.

I. Missouriensis Nutt. Journ. Acad. Philad. vii, 58. Stems rather

slender, terete, naked or with 1 or 2 leaves, 6 inches to 2 feet high, usually 2-flowered: leaves two to three lines broad, mostly shorter than the stems: bracts dilated and scarious, $1-1\frac{1}{2}$ inches long, acute or acuminate: flowers pale blue, on pedicels $\frac{1}{2}$ -2 inches long, : tube of the perianth 3-4 lines long, narrowed below; outer segments $2-2\frac{1}{2}$ inches long, the inner ones a little shorter, all with narrow claws: anthers not exceeding the filaments, equalling or exceeding the stigmas: capsule oblong, triangular or subterete, 1-2 inches long, acute at each end: seeds obovate, acute at base, 2 lines long. Eastern Washington to California and the Rocky Mountains.

2 SISYRINCHIUM L. Sp. 954.

Perennial herbs with short rootstocks, simple or branched stems, narrow grass-like leaves and showy flowers in small terminal clusters on filiform pedicels subtended by a pair of erect green bracts. Perianth 6-parted, the segments similar and spreading. Stamens 3, the filaments united, at least at base. Stigmas filiform, alternate with the stamens, involute. Ovary 3-celled, with several ovules in each cell. Capsule globose, oval or ovoid. Seeds subglobose or ovoid, smooth or pitted.

* Stems ancipital, usually branched: flowers blue: filaments united to the top: anthers short, sagittate: stigmas short.

S. bellum Watson Proc. Am. Acad. xii, 277. Stems 6-20 inches high, somewhat scabrous on the narrow margins, of a single node, or often with 2 or 3 nodes, each node bearing 1-4 peduncles: leaves a line or two wide, shorter than the stems: peduncles 2-4 inches long, usually about equaling the nodal bract: spathes of 2 nearly equal bracts 6-12 lines long, scabrous on the keel, 4-7-flowered: segments of the perianth broad-lanceolate, about 6 lines long, truncate but scarcely emarginate, shortly aristulate, light purple, darker below and yellow at base, somewhat pubescent as well as the ovary: staminal column 3 lines long, purplish, pubescent at base, : capsule depressed-globose or ovoid, 2-3 lines long; the cells about 10-seeded: seeds irregularly and obtusely angled, roughened, $\frac{2}{3}$ of a line in diameter. In wet places, Oregon to California.

S. segetum Bicknell Bull. Torr Bot. Club xxvi, 449. Rather pale green and somewhat glaucescent, growing in close tufts: stems erect, slender, 4-11 inches high, simple: leaves 4-6 inches long, a line or less wide, sometimes roughish toward the setaceous or aculeate apex: spathes stiffly erect, the outer bract very slenderly attenuate, sometimes for fully half its length, $1-1\frac{1}{2}$ inch long, subequal with or surpassing the inner one by $\frac{1}{2}$ or more: flowers on very slender subspreading pedicels, deep violet-blue: segments of the perianth oblanceolate, obtuse aristulate, 6-7 lines long: capsule oblong or obovoid, transversely corrugated, many-seeded: seeds irregularly obovoid, less than a line long. On dry grassy plains, Washington and Oregon to Nevada.

S. angustifolium Mill. Gard. Dict. ed 7, 1859. Pale glaucous-green: stems slender 4-20 inches high, of a single node, or rarely forked: leaves rigid and often almost setaceous, 4-8 inches long, $\frac{1}{4}$ - $1\frac{1}{4}$ lines wide, shorter than the stem: spathes stiffly erect, the bracts very unequal, the outer one usually about twice as long as the inner: pedicels erect, about 8 lines long, shorter than the bracts: segments of the perianth oblanceolate, emarginate, 6-8 lines long, pale blue: capsule subglobose, 2-3 lines in diameter: seeds $\frac{1}{2}$ - $\frac{3}{4}$ line in diameter. On grassy plains, Oregon to Brit. Columbia and Virginia.

S. occidentale Bicknell l. c. 447. Glaucous to pale glaucous-green, usually with a yellowish tinge: stems 7-12 inches high, stiff and erect, constricted just below the spathe: leaves firm and erect, very acute, much shorter than the stems, a line wide: spathes erect or slightly deflexed, the bracts often rather thin, the outer one mostly straight, the inner one more or less convex in outline; outer bract 1-2 inches long, longer than the inner one, attenuate, acute, hyaline-margined below: flowers 3-6, deep violet-blue, on erect exerted pedicels: capsule subglobose, about 3 lines high. Idaho to Nevada and N. Dakota.

S. septentrionale Bicknell l. c. 452. Pale and glaucous: stems 5-12 inches high growing in small tufts: leaves 5-8 inches long, stiff and erect, less than a line wide, mostly setaceous: spathes small, often partly double, one or more flowers arising from between the short proper spathes and the closely subtending slenderly prolonged outer bract; inner bract 10-12 lines long, mostly attenuate and acute; the outer bract 1-2 inches long: flowers very small, apparently not more than 3 or 4, on erect pedicels usually shorter than the inner bract: segments of the perianth 3-5 lines long, acuminate and short-aristate, not retuse, pale rose or violet: capsule subglobose, 2-3 lines long. Eastern Washington and Idaho to Assinibolia.

S. Idahoense Bicknell l. c. 445. Pale-green and glaucous: stems 10-18 inches high straight and erect, or somewhat flexuously curved, often twisted, mostly simple: leaves 5-15 inches high, varying from thin and somewhat lax to firm and closely erect, 1-2 lines wide, attenuate to somewhat abruptly acute: spathes often deflexed, long and narrow, the keel of one or both often serrulate or hispidulous; outer one $1\frac{1}{2}$ -3 inches long, commonly $\frac{1}{4}$ - $\frac{1}{2}$ longer than the inner one: flowers 3-6, on erect pedicels, deep violet-blue with rather small yellow eye: segments of the perianth 7-10 lines long: ovary glandular-puberulent: capsule globose or ovoid, 2-3 lines high. Washington to Idaho and California.

S. sarmentosa Suksdorf in Herb. Greene Eryth. iii, 121. Dull green and glaucous, growing in dense tufts: stems very slender, erect or ascending, 6-10 inches high, simple or with a leaf and branch or a tuft of leaves and branches near the top: leaves very narrow, equalling or shorter than the stems, attenuate, acute: spathes erect, the bracts very unequal, the outer one $1\frac{1}{2}$ -3 inches long, acuminate, rather abruptly acute, the inner one 6-18 lines long: flowers 1-3, bright blue: segments of the perianth 4-5 lines long, not emarginate but abruptly contracted into the short aristate tip: capsule thin-walled, subglobose, 2-3 lines high. Borders of wet meadows, Skamania Co. Washington.

* * Scapes with a solitary sessile spathe: filaments united only at base: anthers linear, sagittate.

+ Scapes 2-edged: flowers yellow: style very deeply cleft.

S. Californicum Ait. f. Hort Kew. iv, 135. Scapes broadly winged, 6-15 inches high: leaves much shorter than the scapes, 2-3 lines wide: bracts of the spathe more or less unequal, the longer about equalling the pedicels: flowers 3-7, bright yellow; segments of the perianth 4-6 lines long, 5-7-nerved, obtuse or acutish: anthers $1\frac{1}{2}$ lines long, about equalling the filaments: style cleft to below the middle, the linear branches as long as the anthers: capsule obovate-oblong, 4 lines long: seeds half a line in diameter. Along the coast, Vancouver Island to California, in various forms.

+ + Scapes compressed but not margined: flowers large, purple: style cleft at the apex.

S. grandiflorum Dougl. Lindl. Bot. Reg. xvi, t. 1364. Glabrous and bright green: scapes slender, 4-12 inches high, growing in dense tufts or

solitary, leafy at base: leaves linear, 2-6 inches long, 1-2 lines wide: spathes 1-4-flowered, its bracts broad, very unequal, the outer 2-3 inches long, long-acuminate, inner one about an inch long, acute or short-acuminate, scarious-margined: flowers bright reddish-purple to white: segments of the perianth 6-10 lines long, cuneate-oblong, abruptly acute and often shortly acuminate: filaments broad at base, 3-6 lines long, much shorter than the style; anthers 2 lines long: capsule obovoid, 2-3 lines high. Common in moist places in the interior, California to Brit. Columbia.

ORDER XCV SMILACEÆ Vent. Tabl. ii, 146. (1799)

Shrubby or herbaceous climbing plants with alternate net-veined petioled leaves that develop stipular persistent tendrils by which the stem is secured to shrubs, and small diœcious flowers in axillary umbels. Perianth-segments 6, similar. Stamens mostly 6, distinct; filaments ligulate; anthers attached by the base, 2-celled, introrse. Ovary 3-celled, the cells opposite the inner segments of the perianth. Ovules 1 or 2 in each cell, orthotropous, suspended. Style very short or none: stigmas 1-3. Fruit a globose berry containing 1-6 seeds. Embryo small, in copious horny albumen.

1 SMILAX L. Sp. 1028.

Climbing plants with broad leaves and small greenish flowers in axillary umbels. Rootsock usually very large and tuberous. Flowers regular, perianth-segments distinct, deciduous, with the anthers inserted on their bases. Staminate flowers without an ovary: the pistillate usually with 1-6 abortive stamens. Embryo lying under a tubercle at the upper end of the seed.

S. California Gray in Herb. Watson Bot. Cal. ii, 186. Glabrous: stems woody, 4-20 feet long, terete or somewhat angled, naked or covered with weak spreading prickles: leaves broadly ovate, abruptly acute, somewhat cordate at base, $1\frac{1}{2}$ -4 inches long, thin and deciduous, roughish on the margins, on petioles about an inch long peduncles slender, flat, 2-3 times longer than the petioles: flowers 20 or less: segments of the perianth 4-9, green narrowly oblong, 5 lines long: fruit black, 2 lines in diameter. In thickets along streams, southern Oregon and northern California.

ORDER XCVI LILIACEÆ Adans. Fam. Pl. 42. (1763)

Scapose or leafy-stemmed plants from bulbs or rarely from rootstocks with various leaves and regular mostly perfect usually showy flowers mostly in umbels or racemes. Perianth parted into 6 distinct or nearly distinct segments, or these more or less united into a tube, inferior or partly superior. Stamens 6, hypogynous or borne on the perianth at the base of its segments: anthers 2-celled, mostly introrse. Ovary 3-celled, with few or numerous anatropous or amphitropous ovules in each cell. Style united: stigma 3-lobed or capitate. Fruit a loculicidal or septicial capsule. Seeds various, winged or wingless. Embryo in copious albumen.

I Flowers with scarious bracts, a persistent perianth with

1-several-nerved segments, perigynous stamens with introrse anthers and an undivided mostly persistent style.

* Inflorescence umbellate upon a naked scape from a bulb or corm: fruit a loculicidal capsule: seeds more or less turgid, with close black testa.

+ Bulb mostly tunicated: bracts broad and spathaceous.

1 **Allium** Pedicels not jointed: perianth deeply parted; segments 1-nerved: filaments naked, in 1 row: style filiform, jointed upon the very short axis, seeds 1 or 2 in each cell.

+ + Root a coated corm: bracts several, distinct: capsule scarcely lobed, several-seeded.

2 **Brodiaea** Perianth funnellform, not contracted at the throat nor saccate at base: stamens 6, in 1 or 2 rows, with winged or naked filaments, or 3 and alternate with as many staminodia.

3 **Brevoortia** Perianth deep scarlet with short yellowish lobes, the broad tube 6-saccate at base: stamens 3, with alternate broad truncate staminodia.

** Flowers on subterranean pedicels, in a sessile umbel with long linear scarious bracts, upon a short rootstock: capsule loculicidal: seeds more or less turgid, with close black testa.

4 **Leucocrinum** Perianth white, salverform, with very narrow tube and several-nerved segments: stamens 6, in 1 row: leaves linear, flat.

*** Root a bulb or corm: inflorescence racemous or paniculate: fruit a loculicidal capsule.

+ Flowers rather large, on jointed pedicels in a simple open raceme: segments several-nerved: capsule obovate or oblong: seeds black, several in each cell.

5 **Camassia** Scapes naked: flowers blue to white; segments distinct, spreading: seeds several, ovate, angled.

+ + Flowers small, racemes paniced: capsule triangular-obovate: cells 1-2-seeded.

6 **Hastingsia** Stems sparingly leafy, from tunicated bulbs: flowers white or greenish, numerous: perianth lax, scarious, the segments apparently 1-nerved: style short.

7 **Chlorogalum** Stem leafy, from a tunicated bulb: flowers white or pinkish, scattered; segments distinctly 3-nerved: style long.

II Pedicels not jointed. Floral bracts none or foliaceous. Flowers with distinct netted-veined and deciduous segments, hypogynous stamens with more or less extrorse anthers and usually deciduous styles united at least at base.

* Perianth-segments similar, naked: styles long.

+ Bulb scaly: stem simple, strict leafy and leafy-bracteate: anthers versatile: seeds flat, horizontal.

8 **Lilium** Bulb-scales lanceolate: segments of the perianth oblanceolate, with a linear nectariferous groove, usually spotted: style undivided.

9 **Fritillaria** Bulb-scales short, very thick: segments of the perianth lanceolate or broader, concave, often mottled; nectary a shallow pit: styles united, or distinct to the middle.

- + + Stem simple, low, from a small tunicated bulb: leaves linear, without veinlets: anthers attached to the base: seeds flat.
- 10 **Lloydia** Stem sparingly leafy, bearing a solitary flower with spreading persistent 3-nerved equal segments.
- + + + Stem low, 2-leaved, from an oblong corm: anthers attached by the base: seeds turgid.
- 11 **Erythronium** Leaves broad: perianth-segments oblanceolate, callous-toothed each side of the grooved nectary.
- * * Outer segments of the perianth smaller, somewhat sepal-like; the inner broad and usually bearded: stigmas sessile.
- 12 **Calochortus** Stem usually lax or flexuous, from a coated corm: anthers attached by the base: capsule usually septical.

1 ALLIUM L. Sp. 294,

Perennial herbs mostly with tunicated bulbs, a peculiar odor, lanceolate or linear leaves and rather small flowers in a terminal simple umbel. Perianth of 6 nearly equal distinct lanceolate to linear more or less spreading 1-nerved segments that are often gibbous at base, and subtended by 2 or 3 membranous separate or united bracts. Pedicels not jointed. Stamens 6 inserted on the base of the segments: filaments filiform: anthers mostly ovate-oblong, versatile. Ovary sessile, subglobose, deeply 3-lobed with a very short axis: ovules mostly 2, 1-several, at the base of each cell, ascending: style filiform, jointed on the axis: stigmas small. Capsule obtusely 3-lobed, loculicidally dehiscent. Seeds obovoid and wrinkled, with thin black testa.

§ I Bulbs cespitose, narrowly oblong and crowning a more or less persistent rhizome, coats membranaceous without peculiar reticulation: spathes mostly 2-valved: scapes terete.

* Leaves terete and hollow.

A. Schenoprasum L. Sp. 301. Scapes stout, 1-2 feet high, from oblong bulbs: umbel subcapitate, densely many-flowered, erect: spathe 2-valved, its bracts broadly ovate: pedicels 1-3 lines long: flowers, rose-color, longer than the pedicels: segments of the perianth 4-6 lines long, lanceolate, acuminate: stamens included: filaments subulate: ovules 2 in each cell: capsule obtusely 3-lobed, about half as long as the perianth, not crested. Along rivers in moist or wet soil from the Columbia river to Alaska and the Great Lakes: also in Europe and Asia.

* * Leaves flat or channeled.

A. cernuum Roth. Roem. Arch. i, part 3, 40. Bulbs usually clustered on a short rootstock, narrowly ovoid, with a long neck, 1-2 inches long: scapes slender, slightly rigid, 6-20 inches high: leaves linear, channeled, or nearly flat, 1-4 lines broad, often equalling the scape: umbel loosely many-flowered, nodding: spathe 2-valved, the bracts lanceolate or shorter, deciduous: pedicels filiform, 8-15 lines long: flowers rose color to white. the segments 2-3 lines long, broad and acutish: stamens and style exserted: filaments filiform: ovules 2 in each cell: capsule 3-lobed shorter than the perianth, with 2 crests on the summit of each valve. On rocky banks and bluffs along streams, Oregon to Brit. Columbia and the Alleghany Mts.

A. validum Watson Bot. King 350. Scapes very stout, 1-2½ feet

high from a stout rhizome; leaves ample, 2-8 lines broad, often nearly as long as the scape: umbel often slightly nodding, with 2-4 bracts, densely many-flowered; pedicels rather stout, 4-8 lines long: flowers rose-color to nearly white; segments 3-4 lines long, narrowly acuminate: stamens and style usually exerted: capsule subglobose, not crested. In wet places in the mountains, Oregon to California and Nevada.

§ 2 Bulbs globose to ovoid, mostly solitary, not rhizomatous; coats fibrous or membranaceous. Leaves narrowly linear, flat or channeled. Scapes terete or nearly so. Umbels erect.

* Bulb-coats more or less fibrous: leaves several.

A. Geyeri Watson Proc. Am. Acad. xiv, 227. Scape slender, 10-25 inches high: bulb elongated: leaves 2-4, slender, 5-10 inches long, rather rigidly erect: spathe 2-valved; the bracts broadly lanceolate, acuminate, 6-10 inches long: umbel densely many-flowered: pedicels slender, 6-12 lines long, spreading or reflexed: segments of the perianth pale rose-color to white, about 4 lines long, lanceolate, acute or acuminate, strongly nerved, rigid in fruit, sometimes but little exceeding the stamens: capsule crested. In low meadows, Oregon and Washington to Idaho.

** Bulb-coats not fibrous: leaves 2-4, shorter than or about equaling the scape.

A. Douglasii Hook. Fl. ii, 184. Scape stout, 7-15 inches high: bulb ovate, about an inch long, the coats not reticulated: leaves 2, flat, 5-10 inches long, about 6 lines wide: flowers very numerous, in a dense globose umbel dark red, 3-4 lines long: segments lanceolate acuminate, scarcely exceeding the stamens ovary not at all crested. Eastern Washington.

A. madidum Watson l. c. 228. Scapes rather stout, 4-8 inches high: bulbs ovoid, 4-8 lines in diameter: leaves 2, thick and channeled, 3-6 inches long, 1-3 lines broad: spathe 2-valved, the bracts ovate to lanceolate, acute, 4-5 lines long: umbel usually many-flowered: pedicels 4-12 lines long, segments of the perianth pink to white, 4 lines long, ovate-oblong, acute, a little exceeding the stamens: cells of the ovary with two fleshy ridges at the summit. In wet places, eastern Oregon and Washington.

A. collinum Dougl. in Herb. I have no specimens of this, it is poorly described as follows. "Perianth-segments ovate-lanceolate, acute, 4 lines long, twice longer than the slender stamens and style: capsule very obscurely ridged toward the summit". Blue Mountains, Oregon.

A. scilloides Dougl. in Herb. This is equally obscure with the last. "Perianth-segments oblong-lanceolate obtuse, 3 lines long, a half longer than the stamens: ovary not at all crested. Priest's Rapids, Columbia river.

A. acuminatum Hook. Fl. ii, 184, t. 196. Scape 3-10 inches high: bulb globose, 3-5 lines in diameter: leaves 2, terete, shorter than the scape: spathe 2-valved, the bracts lanceolate, narrowly acuminate: pedicels 5-40, erect or ascending: segments of the perianth 5-7 lines long, lanceolate with acuminate recurved tips, dark rose-color to nearly white, rigid in fruit, a third longer than the stamens, the inner ones undulate-serrulate: capsule obscurely crested. Common on dry plains, Brit. Columbia to California.

Var. cuspidatum Fernald. "Perianth-segments smaller, abruptly cuspidate. Near Wawawai, Washington."

A. Bolanderi Watson l. c. 229. Scape very slender, 3-10 inches high: bulbs oblong, propagating by filiform runners; the one producing the scape remaining firm until the following season but not flowering again, but producing a new bulb that flowers the following season: leaves terete,

almost filiform, shorter than the scape: spathe 2-valved; the bracts lanceolate, long acuminate, 4-8 lines long: umbel rather few-flowered: pedicels erect or ascending, 6-10 lines long: flowers rose-color to yellowish, 4-6 lines long; the segments narrowly lanceolate, long acuminate, nearly straight, twice as long as the stamens, the inner ones strongly serrulate: filaments filiform, adnate to the middle. Dry ground, southern Oregon to California.

A. attenuifolium Kellogg Proc. Calif. Acad. 110, f. 34. Scape rather slender, 6-20 inches high: bulb globular, 3-5 lines in diameter: leaves 2-4, narrow and becoming convolute-filiform above the sheathing base: spathe 2-valved; the bracts short and abruptly acute: umbel densely many-flowered: pedicels filiform, 8-15 lines long, spreading or recurved: segments of the perianth pale rose-color to white, oblong-ovate to broadly lanceolate, shortly acuminate, about 4 lines long, usually inflexed, exceeding the stamens: capsule globose, distinctly 6-crested. In moist or wet places along bluffs, usually growing in dense masses, western Oregon to California.

A. serratum Watson Bot. King 487, t. 37, fig. 4. "Bulb-coats conspicuously transversely serrate-reticulate; scapes usually slender, 4-12 inches high; leaves very narrowly linear; umbel usually many-flowered and often large, the spreading pedicels 9-15 lines long; sepals pink or crimson, 4-9 lines long, usually broad and acuminate, erect or recurved, exceeding the stamens; capsule slightly crested.—Quite variable." Idaho to California.

A. Nevii Watson l. c. 231. Scape slender, 3-8 inches high: bulb ovoid, 3-6 lines long: leaves two, channeled, less than a line wide, equaling or exceeding the scape: spathe 2-valved; the bracts ovate, rather abruptly acuminate, 4-6 lines long: umbel rather loosely few-several-flowered: pedicels slender, 4-8 lines long, erect or ascending, segments of the perianth white to rose-color, ovate-lanceolate, long-acuminate, about 3 lines long, somewhat keeled, the midnerve dark red, but little if at all exceeding the stamens: capsule depressed-globose, with a thick crest on each side near the summit of each cell. On top of high hills, eastern Oregon.

* * * Leaves one or two, greatly exceeding the short scape: capsule not crested or very obscurely so.

A. macrum Watson l. c. 233. Scape 1-4 inches high, slender: bulb round-ovate, 3-5 lines in diameter: leaves two, slightly falcate 3-6 inches long, 1-2 lines wide: spathe two-valved; the bracts lanceolate, abruptly acuminate, 5-8 lines long: pedicels slender 4-8 lines long, erect to somewhat recurved: segments of the perianth white to pinkish, lanceolate, acuminate, about 3 lines long, scarcely exceeding the stamens and style: cells of the ovary bordered by a thick obtuse ridge. In moist places in the Blue Mountains of Oregon and Washington.

A. tribracteatum Torr. Pac. R. Rep. iv, 148. Scape slender, 1-4 inches high: bulb ovoid to oblong, 4-8 lines long: leaves usually two, somewhat falcate, 5-6 inches long, $\frac{1}{2}$ -3 lines wide: spathe 3-valved; the bracts broadly ovate to almost orbicular, abruptly acuminate: umbel densely many-flowered: pedicels 4-6 lines long erect or ascending: segments of the perianth oblong or almost linear, obtuse or barely acute, about 4 lines long, deep rose-color with darker veins, but little longer than the stamens: capsule not crested. On top of Table Rock, Jackson County Oregon to California and Utah,

§ 3 Bulbs ovoid, not rhizomatous, the membranaceous coats mostly without reticulation. Leaves 2, broadly linear, flat and falcate, thick. Scapes stout, much compressed and more or less wing-margined, low and mostly shorter than the leaves. Spathe in ours 2-valved.

A. Watsoni. Scape slender, 2-3 inches high, narrowly margined: bulb ovoid, 4-6 lines in diameter: leaves 4-6 inches long, about 2 lines wide: bracts of the spathe lanceolate to ovate, acuminate, about 6 lines long: umbel rather loosely several- to many-flowered: pedicels erect or ascending, 4-8 lines long: segments of the perianth lanceolate, acute, 3-4 lines long, light rose-color to pink, with dark mid-nerves, slightly exceeding the stamens. In open places in the Coast Mountains of middle Oregon. Dedicated to the late Sereno Watson, who in 1881 recognized it as an undescribed species but did not publish it for want of good material. Specimens from the Blue mountains of Oregon appear to be of this species.

A. Cusickii Watson Proc. Am. Acad. xiv, 228. Scape 3-4 inches high: bulb ovoid, 5-6 lines in diameter: leaves falcate, 4-6 inches long, 2-4 lines wide: bracts of the spathe ovate, acuminate, 6-8 lines long: pedicels slender, 8-12 lines long: segments of the perianth broad lanceolate, gradually acuminate, 5-6 lines long, nearly white to pink, distinctly gibbous at base nearly twice as long as the stamens: cells of the ovary shortly apiculate. Union County, Oregon.

A. falcifolium H. & A. Bot. Beech. 400. Scape stout, prominently winged, 2-6 inches high: leaves narrowly lanceolate, 2-6 inches long, 4-6 lines wide, strongly falcate: bracts of the spathe broadly lanceolate to ovate, gradually acuminate, 6-8 lines long: umbel loosely many-flowered: pedicels rather stout, 6-15 lines long, erect or ascending: segments of the perianth with broadly lanceolate base and long attenuate somewhat spreading tips, rose-color to pink, gibbous at base, minutely serrulate, 7-8 lines long, nearly twice as long as the stamens: capsule acute, with 3 short narrow central crests. On dry rocky ridges, southern Oregon to California.

A. anceps Kellogg Proc. Am. Acad. ii, 109, fig. 32. Scapes 2-4 inches high, somewhat flattened and margined: leaves longer than the scape, 2-5 lines wide: umbel rather densely many-flowered: pedicels very slender, 6-9 lines long, erect or spreading: segments of the perianth very narrowly lanceolate, acuminate, lax, scarcely gibbous at base, nearly white with purple midveins, 3-5 lines long, little longer than the stamens and style: cells of the capsule with two broad obtuse crests. Eastern Oregon to Nevada and California,

A. pleianthum Watson l. c. 233. Scape slender, 3-5 inches high: leaves falcate, 5-7 inches long, 2-5 lines wide: bracts of the spathe broadly ovate, acute and shortly acuminate: umbel rather loosely many-flowered: pedicels slender, 8-15 lines long, erect or ascending: segments of the perianth lanceolate, acuminate, gibbous at base, white to light rose-color, about 5 lines long, nearly twice as long as the stamens: ovary and capsule prominently 6-crested. On high hills in the John Day Valley, eastern Oregon.

A. crenulatum Wiegand Bull. Torr. Bot. Club xxvi. 135. Scape 2-3 inches high, the wings crenulately roughened: leaves 2-3 inches long, about a line wide, recurved, the margins crenulate: bracts of the spathe ovate-oblong, acute, about 5 lines long: umbel few-flowered: pedicels shorter than the flowers: segments of the perianth pink, lanceolate, acutish, 4 lines long, twice as long as the stamens: ovary 6-crested at the summit. In loose ground near the summit of the Olympic Mountains, Washington.

A. Tolmiei Baker Bot. Mag. under t. 6227. Scapes 3-5 inches high, conspicuously winged, smooth: leaves falcate, 4-6 inches long by 3-4 lines wide: bracts of the spathe broadly ovate, abruptly acuminate, 6-8 lines long: umbel rather densely few- to many-flowered: pedicels slender, 5-8 lines long, erect or spreading: segments of the perianth light rose-color to white, lanceolate, acute, about 5 lines long twice as long as the stamens: ovary very obscurely crested. On rocky ridges, eastern Oregon and Washington to Utah.

A. simillimum Henderson Bull. Torr. Bot. Club xxvii. 355. Scape 1-2 inches high from the ovoid bulb, slender, flattened and very narrowly winged: leaves 4-5 inches long, less than a line wide, falcate to recurved: bracts of the spathe broadly ovate, acute or acutish: umbel 6-9-flowered: pedicels slender, 1-2 lines long: segments of the perianth narrowly oblong, obtuse, delicately denticulate with spreading papillæ half way up, pinkish-white with strong green midnerve, $\frac{1}{2}$ - $\frac{1}{3}$ longer than the stamens: filaments dilated at base and adnate for $\frac{1}{3}$ their length: ovary slightly crested. On Sesesh Peak, Idaho.

2 BRODIAEA Smith Trans. Linn. Soc. x, 2. Including
HOOKERA Salisb. and TRITELIA Lindl.

Perennial herbs with slender scapes from fibromembranaceous-coated corms bearing a several-bracted umbel of few to many blue, purple, white, or yellow flowers on jointed pedicels. Perianth persistent, funnelform, often narrowly so, not contracted at the throat nor saccate, or but slightly so, at base. Segments of the perianth one-nerved. Stamens 3, inserted on the throat opposite the inner segments and alternate with as many staminodia, or six in one or two rows with the filaments naked or appendaged. Style persistent, about equalling the anthers, with short diverging entire stigmas. Ovary three-celled, with 3-8 ovules in each cell. Capsule ovate to oblong, more or less attenuate above. Seeds angled, black.

§ 1 EUBRODIAEA Watson Proc. Am. Acad. xiv, 236. Perianth broadly funnelform, the tube mostly shorter than the limb. Stamens in one row. Anthers attached by the base.

* Segments of the perianth 2-3 times longer than the tube: stamens 3, alternate with as many staminodia.

B. grandiflora Smith Trans. Linn. Soc. x, 2. Scape smooth, 3-10 inches high: leaves about a line broad, thick and somewhat terete, about as long as the stem: pedicels 1-10 or more, $\frac{1}{2}$ -3 inches long: perianth varying from purple to light rose-color, 10-20 lines long: segments of the perianth linear-oblong, obtuse or acutish, strongly 1-nerved: filaments rather slender, 1-2 lines long, the anthers twice as long: staminodia ligulate, entire, obtuse, whitish about equalling the anthers: capsule sessile, narrowed at base, oblong, attenuate into the short rigid style: cells 6-8-seeded: seeds a line long. Common in open places, California to British Columbia. Cornwall
June 10. 19

B. minor Watson Proc. Am. Acad. xiv, 236. Scapes very slender, 3-6 inches high, smooth, bearing an umbel of 2-6 rays an inch or two long: perianth 7-14 lines long; anthers oblong 2 lines long shorter than the broadly ligulate usually emarginate staminodia: capsule obovoid, sessile or nearly so, 3 lines long, acute, the cells 3-seeded: seeds a line long. Oregon to California. Cornwall
June 10. 1

B. congesta Smith l. c. 3, t. 1. Scapes slender, 2-4 feet high, smooth: leaves carinate, glaucous, 6-18 inches long, 4-9 lines wide: umbel densely few- to many flowered, often produced into a short dense raceme: pedicels 1-3 lines long: perianth 8-10 lines long, blue-purple, the oblong lanceolate segments twice as long as the tube: anthers very nearly sessile, deeply emarginate at each end, 2-3 lines long: staminodia deeply cleft, exceeding the anthers: capsule sessile, ovate, 5 lines long including the short thick style: cells several-ovuled, usually 1-seeded: seed 2 lines long. Common

on rocky hillsides. California to Brit. Columbia.

B. multiflora Benth. Pl. Hartw. 339. Scape 1-2 feet high, somewhat scabrous: umbel not produced; staminodia entire, broad and obtuse, about equalling the anthers: seeds several in each cell. From the Sacramento valley to Oregon.

* * Flowers subcapitate; the segments little longer than the tube, stamens 6, the inner with a free lanceolate appendage on each side; the outer ones naked.

B. capitata Benth. l. c. Scapes 1-2 feet high: leaves a foot long or more, sometimes longer than the scape, 2-10 lines wide, carinate, usually glaucous: flowers few to many, nearly sessile or on pedicels 2-6 lines long: perianth rather broadly funnellform, 6-10 lines long, from blue or purple to white: inner anthers nearly sessile, linear, 2 lines long, slightly shorter than the oblong-lanceolate appendages; the outer smaller, on short naked filaments broadly dilated at base: capsule ovoid, sessile, about 3 lines long, beaked by the slender style nearly as long: seeds several in each cell, 2 lines long. On dry open ridges, southern Oregon to California. 1

§ 2 TRITELIA Lindl. Bot. Reg. as genus. Segments of the perianth equalling or shorter than the tube. Stamens in 2 rows, with more or less distinctly versatile anthers. Capsule stipitate

B. Douglasii Watson l. c. *Tritelia grandiflora* Lindl. Scape 1-3 feet high, smooth, erect and usually stout: leaves 15-18 inches long, 2-8 line^s wide, carinate: umbel subcapitate, usually many flowered: pedicels 1-1² lines long: perianth 8-12 lines long, dark blue; the tube subsaccate at base, about as long as the ovate obtuse lobes: anthers oblong, a line long, the lower 3 inserted on the throat opposite the outer segments attached near the base and erect on very short filaments; the upper 3 inserted on the inner segments, attached near the middle and versatile on short free filaments which form below prominent wings within the tube: style slender, about 3 lines long: capsule ovoid, about 4 lines long, on a stipe nearly as long: seeds several in each cell. On sandy plains, eastern Oregon and Washington to Wyoming and Utah.

B. Howellii Watson l. c. 301. Scape 1-3 feet high: leaves 8-12 inches long, 1-4 lines broad: umbel usually few-flowered subcapitate: flowers white with light blue base to light blue, 8-10 lines long; the broad tube longer than the oblong-ovate obtuse lobes: stamens in 2 rows, the lower inserted on the throat opposite the 3 outer segments, on very short deltoid filaments, the upper inserted at the base of the inner segments, with broadly winged filaments about 2 lines long; anthers all attached near the middle, nearly 2 lines long: capsule oblong, attenuate upward into the style, the cells about 6-seeded. On dry plains, eastern Washington and Oregon near the base of the Cascade Mountains.

§ 3 CALLIPRORA Stamens in 1 row, with deltoid or wing-dilated filaments and versatile anthers. Capsule stipitate.

B. lactea Watson l. c. 238. Scape usually slender, 1-5 feet high, smooth or scabrous: leaves 6-8 inches long 2-6 lines wide: umbel subcapitate, few- to many-flowered: pedicels $\frac{1}{2}$ -2 inches long: perianth white with green mid-nerve, 4-8 lines long, the short and broad tube not half as long as the oblong obtuse segments: stamens in one row, inserted on the base of the segments, with broad deltoid filaments and short anthers attached a little below the middle: style slender, 3-4 lines long: capsule subglobose, on a stipe 1-2 lines long. Common in wet places and moist meadows, California to Brit. Columbia and Idaho.

B. Bridgesii Watson l. c. 237 Scape slender, 6-18 inches high: leaves

6-8 inches long, 2-3 lines wide, usually falcate: pedicels 10-20, $\frac{1}{2}$ -2 inches long: perianth blue or purplish to nearly white, 12-15 lines long, the tube very narrow and longer than the segments: stamens inserted on the throat; the nearly equal filaments dilated downward, the free portion 1-2 lines long; anthers linear, 2 lines long: capsule ovoid, 4 lines long, shorter than the stipe, beaked by the very slender style: seeds 2-3 in each cell, $1\frac{1}{2}$ lines long. On dry ridges in the Coast Mountains, southern Oregon to California.

B. Hendersoni Watson Proc. Am. Acad. xxiii, 266. Scapes 6-18 inches high, smooth: leaves as long or longer than the scape, 2-6 lines wide: umbel subcapitate, few- to many-flowered: pedicels slender, 1-2 inches long: perianth an inch long, yellow with blue mid veins, the funnel-form tube nearly as long as the lanceolate segments: stamens inserted at the base of the tube, the filaments adnate to it and winged below, the free portion slender and half as long as the segments: anthers small, oblong, attached near the base: ovary subglobose, on a stipe as long as the tube of the perianth, beaked by the slender style. On dry ridges, southern Oregon.

3 BREVOORTIA Wood Proc. Philad. Acad. 1867, 82.

Scapose herbs from coated corms, with all radical leaves and showy flowers on jointed pedicels in subcapitate umbels. Perianth persistent, broadly tubular, shortly 6-saccate at the truncate base, slightly constricted above, the short segments usually erect, faintly one-nerved. Stamens 3, inserted on the throat opposite the inner segments, alternate with 3 very broad truncate corona-like staminodia: filaments very short, naked; anthers attached by the base, emarginate at each end. Ovary stipitate, with elongated persistent style: cells 4-6-ovuled. Capsule triangular-ovate, acuminate. Seeds angled, black.

B. Ida-Maia Wood l. c. Scape slender, 1-3 feet high: leaves 1-2 feet long or more, 2-4 lines wide carinate, glaucous: umbel 6-15-flowered: pedicels 6-12 lines long or more: perianth 1- $1\frac{1}{2}$ inches long, dark red, the segments ovate, 2-3 lines long, bordered with greenish yellow: anthers oblong, equalling the segments; staminodia a half shorter, yellow: capsule on a stipe 2-3 lines long, ovate-oblong, attenuate upward into the somewhat persistent style: seeds 2 lines long. Along the coast and in the mountains, southern Oregon to California.

4 LEUCOCRINUM Nutt. Gray Lyc. N. Y. 110. (1837.)

Low acaulescent herbs with short rootstocks, narrow leaves surrounded at base by scarious bracts, and a central sessile umbel of white flowers, the pedicels and ovaries underground, sheathed by the floral bracts. Perianth salverform, persistent, the segments several-nerved. Stamens 6: filaments filiform, inserted below the throat: anthers linear, attached near the base, introrse. Ovary sessile, ovate-oblong: style persistent, elongated and filiform-tubular, the orifice somewhat enlarged and slightly 3-lobed: ovules several in each cell. Capsule triangular-obovate subcoriaceous loculicidally dehiscent. Seeds obovate, strongly angled, with a dull black testa.

L. montanum Nutt. in herb. Gray l. c. Leaves 8-15, flat and rather thick, 4-8 inches long, 1-3 lines wide, the underground portion 1-3 inches long, broad, surrounded by scarious acutish bracts; inner bracts very narrow: flowers 4-8, on pedicels 6-18 lines long from the summit of the

rhizome: tube of the perianth 1-3 inches long; segments 6-9 lines long; anthers 2-3 lines long; capsule somewhat wrinkled, truncate above 3-4 lines long; seeds 4-6 in each cell. In mountain valleys, eastern Oregon to California, Nebraska and Dakota.

5 CAMASSIA Lindl. Bot. Reg. t. 1486. (1832.)

Perennial herbs with scapose stems from tunicated bulbs, flat leaves and rather large blue to white flowers in simple bracted racemes on jointed pedicels. Perianth of 6 distinct 3-7-nerved persistent segments. Stamens 6, inserted on the base of the perianth, shorter than its segments: filaments filiform-subulate: anthers introrse, versatile. Ovary sessile, with several ovules in each cell. Style filiform, slightly 3-lobed at the apex, the base persistent. Capsule 3-lobed and angled, thick-membranaceous, loculicidally 3-valved. Seeds several in each cell, often more or less compressed or angled, with thin black testa.

C. esculenta Lindl. l. c. Scape rather stout, 1-2½ feet high, from an ovoid bulb ½-1½ inches in diameter: leaves 10-12 inches long, 3-8 lines wide, usually attenuate above and nearly as long as the scape: bracts subulate, 1-2 inches long, acuminate: pedicels shorter than the bracts: perianth somewhat oblique, one of the outer segments turning downward, all of the others upward, dark to light blue, the outer ones narrowly lanceolate nearly an inch long, the inner ones broader and abruptly contracted at base to a short claw not twisted over the young capsule but loose at its base, stamens nearly equalling the segments, with oblong anther 1-2 lines long: ovules 16-18 in each cell: capsule oblong obovate, somewhat narrowed at base, rather obtusely angled, 6-12 lines long. Common in wet meadows, Brit. Columbia to California and the Rocky mountains.

C. Leichtlinii Watson Proc. Am. Acad. xx, 376. Scape rather slender 1-2 feet high: leaves about a foot long, 4-6 lines wide, the edges involute at the apex and thus apparently attenuate: bracts scarious or colored, or the lowest ones green, linear-lanceolate, often longer than the bracts: perianth regular or nearly so, dark blue: the segments rather broadly lanceolate, an inch or more long, but little longer than the stamens, connivent over the young capsule and at length deciduous together: capsule oblong-obovate, slightly emarginate at the apex, usually 8-10 lines long and shorter than the pedicels: seeds obovate, dull. In wet meadows in the Cascade Mountains Oregon and Washington.

C. cusickii Watson l. c. xxii, 479. Bulbs clustered (1-12), large. 1-2 inches thick or more, and bearing 8-20 large glaucous leaves 12-18 inches long, 6-18 lines wide: stem 2-3 feet high: pedicels 6-12 lines long or more: flowers large, pale blue, the narrow segments 3-5-nerved, persistently spreading: capsule oblong, abruptly acute, transversely veined, 6-8 lines long: seeds obovate, shining. On slopes of the Eagle Creek Mountains, eastern Oregon.

C. azurea Heller Bull. Torr. Bot. Club. xxvi, 547, under *Quamasia*. Scape 14-16 inches high from a deep seated bulb, glabrous, sparingly leafy below: leaves about ¾ the length of the scape below the inflorescence, 2-3 lines wide, somewhat glaucous beneath: pedicels slender, 10-12 lines long: bracts about as long as the pedicels, bluish or straw-color, chaffy, lanceolate, tapering into a long slender acumination, prominently veined: perianth bright blue, about an inch long, the segments persistent, about 2 lines wide. 5-nerved: capsule about ¾ inches high, 3 angled: seeds shining black. On grassy plains near Montesano Washington

C. Howellii Watson. l. c. 135. Scape rather slender, 16-24 inches high, from an ovoid bulb about an inch in diameter: leaves 6-8, 12-18 inches long, 2-6 lines wide: raceme many-flowered, 12-18 inches long: bracts filiform-subulate, 6-12 lines long: pedicels slender, spreading, 6-18 lines long, longer than the bracts: perianth dark blue or purple, the lanceolate segments 8-10 lines long, regular, opening about 2 P. M. remaining open until sunset, then closing over the ovary and not opening again, at length deciduous: capsule broadly triangular-ovate, very obtuse, 3 lines long, the cells 2-3-seeded seeds ob-void, shining, a line long. On a gravelly plain east of Grant's Pass, southern Oregon.

6 HASTINGSIA Watson Proc. Am. Acad. xiv, 217.

Perennial herbs with scape-like sparingly branched stems from coated bulbs, rather numerous all radical flat narrow leaves and numerous small whitish flowers in somewhat paniced bracted racemes on jointed pedicels. Perianth lax, becoming somewhat scarious but persistent, of 6 distinct oblong closely 3-nerved segments. Stamens 6 adnate to the base of the segments: anthers linear-oblong, versatile. Ovary ovoid, very shortly stipitate: the cells 2-ovuled. Style short, persistent. Seeds oblong, with black shining testa.

H. alba Watson l. c. 242. Bulbs membranously coated, or the outer somewhat fibrous: stem often stout, erect, 1-2½ feet high: leaves 12-18 inches long, 2-6 lines wide, attenuate above: raceme simple or sparingly branched, densely many-flowered: bracts narrowly acuminate, pedicels 1-2 lines long, shorter than the bracts: segments of the perianth about 2½ lines long, oblong, obtuse, white or tinged with green or pink, prominently 3-nerved: stamens about equalling the perianth: capsule broadly ovoid, 3 lines high, very shortly stipitate: seeds oblong, 2 lines long. On dry hillsides, southern Oregon to California.

H. bracteosa Watson l. c. xx, 377. Bulb narrowly oblong, membranously coated: stem 1-3 feet high, often stout: leaves 12-20 inches long, 1-4 lines wide, acuminate above: racemes simple or sparingly branched, loosely many-flowered: bracts filiform-subulate from a broad base, 6-10 lines long or more: pedicels ascending, about 2 lines long: segments of the perianth dull white, lanceolate, acuminate, 4-5 lines long, prominently 3-nerved: stamens about half as long as the segments: mature fruit not seen. In marshes near Waldo southern Oregon.

7 CHLOROGALUM Kunth Enum. iv, 683.

Coarse herbs with fibrous or membranous coated bulbs, narrow radical leaves, scape-like stems paniculately branched above and small scarious-bracted flowers on jointed pedicels. Perianth white or pinkish, of 6 distinct oblong or narrowly ligulate more or less spreading segments with 3 close but distinct nerves down the middle, at length twisted over the ovary and persistent. Stamens 6, a little shorter than the segments, inserted on and adnate to their bases: anthers versatile. Ovary sessile or nearly so, with a pair of ascending ovules in each cell. Style filiform, slightly 3-cleft at the apex, deciduous. Capsule thick-membranaceous, broadly turbinate, 3-lobed, loculicidally dehiscent. Seeds 1 or 2 in each cell, obovate, with a close thin somewhat rugose blackish testa.

C. pomeridianum Kunth l. c. Bulb oblong-ovoid, 2-4 inches in diameter, densely covered with coarse brown fibres: stem and spreading panicle 1-6 feet high: leaves 6-18 inches long, 3-10 lines wide, carinate, glaucous, the margins strongly undulate; the cauline one or two much shorter and attenuate: flowers numerous, scattered, in a much branched open panicle: bracts lanceolate, 1-2 lines long, acuminate: pedicels slender, 6-10 lines long: segments of the perianth white with purple veins, 8-10 lines long, linear, opening only in the afternoon and closing over the ovary in the night: capsule 3 lines high, the valves pinnately nerved: seeds $1\frac{1}{3}$ -2 lines long. On dry ridges, southern Oregon to California.

8 LILIUM L. Sp. 302.

Herbs with simple leafy stems from scaly bulbs, with flat sessile whorled or scattered leaves and usually large flowers in foliaceous-bracted racemes or subumbellate clusters. Pedicels not jointed. Perianth funnellform, of 6 distinct equal deciduous segments with a nectariferous groove toward the base. Stamens 6, hypogynous, included: anthers linear to oblong, versatile, extrorse, longitudinally dehiscent. Ovary sessile, many-ovuled. Style long, clavate, deciduous: stigma 3-lobed. Capsule coriaceous, loculicidally dehiscent, somewhat 6-angled. Seeds numerous, flat, horizontal, in 2 rows in each cell, with brownish thin testa.

* Flowers white to purplish or red: segments of the perianth with long narrow claws, the tips spreading but not revolute.

L. Washingtonianum Kellogg Proc. Calif. Acad. ii, 13. Bulb large, somewhat rhizomatous and oblique, 2-12 inches long, the scales imbricated, lanceolate, 2-3 inches long, not jointed: stem terete, 1-7 feet high, glabrous or somewhat scabrous: leaves in several whorls of 6-18, the upper and lower usually scattered, oblanceolate, acute or acutish, 3-5 inches long, 8-15 lines wide, more or less undulate: flowers one to many, very fragrant, white, becoming purplish with age, often finely dotted with purple, horizontally declinate on stout nearly erect pedicels 1-4 inches long; segments 3-4 inches long, 3-10 lines wide, the upper third spreading; stamens a little shorter, with yellow anthers 5-6 lines long: capsule obovate-oblong, truncate, obtusely angled or sometimes narrowly winged, $1-1\frac{1}{3}$ inches long. In loose soil on dry open mountain ridges, Oregon to California.

L. rubescens Watson Proc. Am. Acad. xiv, 256. Bulb smaller, but little oblique, 1-3 inches in diameter, the thick lanceolate scales about an inch long: stem stout, 1-7 feet high, smooth: leaves glabrous, glaucous beneath, undulate or flat, the lower scattered the upper in 3-7 whorls, oblanceolate, acute or acutish, 1-4 inches long, 6-12 lines wide: flowers usually several, on ascending pedicels 1-3 inches long, pale lilac to white, becoming rose-purple, somewhat dotted with brown, segments $1\frac{2}{3}$ -3 inches long, the upper third spreading: stamens and style a third shorter: anthers two to three lines long: ovary wing-angled, attenuate downward, half inch long. On wooded hillsides, southern Oregon to California.

L. Bolanderi Watson l. c. 377. Bulb small, ovoid, one to two inches in diameter, the thick lanceolate scales $1-1\frac{2}{3}$ inch long: stem rather stout, six inches to four feet high, one- to several-flowered: leaves verticillate in one to four approximate whorls, lanceolate to obovate, obtuse to acute, often apiculate, glaucous beneath, one to two inches long: flowers one to several in a subumbellate cluster, somewhat nodding on erect pedicels 1-4 inches long, segments lanceolate, one to two inches long, three to six lines wide, acute, dull purplish-red outside, bright red dotted with maroon inside, the upper third spreading: stamens and style about two thirds as

long as the segments: anthers two to three lines long: capsule oblong or shorter, an inch long. On dry rocky ridges in the Coast Mountains of southern Oregon and northern California.

* * Flowers yellow, orange or reddish, mostly conspicuously spotted; segments of the perianth usually revolute.

L. parvum Kellogg l. c. 176. Bulb small, the thick jointed scales one half to one inch long, upon a branching rhizome: stem slender, two to six feet high: leaves scattered or in whorls, lanceolate to linear, acute or acuminate, two to six inches long, an inch or less wide: flowers few to many, erect or nearly so on slender pedicels two to four inches long, yellow or orange and usually dotted with purple within, reddish above; segments one to two inches long, more or less spreading or the tips recurved, pubescent toward the apex: stamens an inch long about equalling the style; anthers oblong, one to two lines long: capsule subspherical, 7-9 lines long, truncate above. In the mountains at 4000-8000 feet altitude, southern Oregon and northern California.

L. pardalinum Kellogg l. c. 12. Rhizome thick and branching, forming mat-like masses of roundish bulbs, the scales jointed near the base: stem slender, 3-7 feet high: leaves usually in 3-4 whorls of 9-15, scattered above and below, narrowly lanceolate and sharply acuminate, 3-7 inches long, 2-12 lines wide, thin and faintly-nerved, glabrous and glaucous: flowers few to many, racemose or the lower in whorls, on stout pedicels 2-10 inches long: segments of the perianth 2-3 inches long, 6-9 lines wide, lanceolate, strongly revolute, bright orange-red with lighter orange centre and large purple spots on the lower half: stamens $1\frac{1}{2}$ -2 inches long: with red anthers 4-5 lines long: style little exceeding the anthers: capsule narrowly oblong, with acutish angles, $1-1\frac{3}{4}$ inches long, umbilicate at the summit. In springy places, Southern Oregon to California.

L. Columbianum Hansen. Baker Gard. Chron. 1871, 1257. Bulb small $\frac{3}{4}$ -2 inches in diameter with lanceolate acute closely appressed scales about an inch long: stem slender, 2-6 feet high: leaves in whorls of 3-9 or more, the upper and lower often scattered, usually oblanceolate, 1-6 inches long, 9-15 lines wide, usually acute, the lower often obtuse, smooth: flowers few to many, on slender curving more or less divergent pedicels 3-6 inches long: segments of the perianth $1\frac{1}{3}$ -2 inches long, 4-6 lines wide, strongly revolute, bright orange thickly dotted with purple within: stamens about equalling the style, with yellow oblong anthers 2-3 lines long: capsule short-oblong, about an inch long, acutely 6-angled. Common from Brit. Columbia to California and Idaho.

L. Purdyi Waugh. *L. Bakeri Purdy Eryth. v.* 104. Bulb ovoid, about an inch in diameter the lanceolate acute, scales closely appressed: stem 2-6 feet high, rather stout, terete, smooth: leaves lanceolate, mostly in whorls: flowers 1-10: segments of the perianth $1\frac{1}{2}$ inch long, 5 lines wide acute: lower half of segments forming a closely constricted tube from which the upper half spreads rotately, tips not recurved, orange red, the lower portion thickly dotted with maroon spots, very fragrant: stamens a little shorter than the segments, equalling or exceeding the style: capsule about an inch long acutely 6-angled. In sandy woods along Puget Sound, Washington to Brit. Columbia.

9 FRITILLARIA L. Sp. 303.

Perennial herbs with simple leafy stems from scaly bulbs, flat leaves and mostly large nodding flowers in terminal leafy-bracted racemes. Perianth campanulate to funnellform, of 6 distinct equal concave deciduous segments with a smooth shallow nectariferous pit near the base. Stamens 6, inserted on the base of the

segments, included: filaments slender: anthers oblong, versatile, extrorse, dehiscent laterally. Ovary sessile or nearly so, many-ovuled. Styles slender, usually exceeding the stamens, united to the middle or throughout, deciduous. Capsule membranaceous, obtusely or acutely 6-angled or 6-winged, loculicidally 3-valved. Seeds numerous, horizontal, flat, in 2 rows in each cell, with thin light brown testa.

F. recurva Benth. Pl. Hartw. 340. Bulb-scales thick, 3-4 lines long or less: stem rather stout, 1-2 feet high, bearing 1-9 narrow funnel-form flowers: leaves linear-lanceolate, 2-4 inches long, usually in two whorls of four to eight each near the middle of the stem: segments of the perianth narrowly oblanceolate, scarlet outside, yellow spotted with scarlet within, 1-1½ inch long, 4-5 lines wide, the tips recurved; nectary obscure: stamens and style a little shorter than the segments: style slender distinct above; stigmas linear: capsule obscurely angled. On dry hillsides, southern Oregon to California.

F. lanceolata Pursh Fl. 230. Bulb of thick scales three to six lines long: stem usually stout, 6-18 inches high: leaves lanceolate; to linear-lanceolate, 2-5 inches long, obtuse, usually in a whorl of 5 near the middle of the stem: flowers 1-15, mottled purple and greenish yellow, broadly campanulate, only rather slender recurved pedicels. Segments of the perianth narrow oblong-lanceolate, strongly arch, with a large oblong nectary, about an inch long: stem 6-8 lines long: style distinct to the middle: stigmas linear: capsule short and thick, broadly winged. Common in copses Brit. Columbia to California and Idaho.

F. glauca Greene Eryth. i, 153. Bulb of few thick scales: stem 2-8 inches high, rather stout: leaves 2-4, scattered, oblong-lanceolate, 1-3 inches long, thick, glaucous: flowers 1-3, open campanulate, purple marked with greenish yellow: segments of the perianth oblong-lanceolate, obtuse, 8-10 lines long, about four lines wide, with large oblong nectaries: stamens about six lines long, the filaments dilated downward; anthers oblong, little more than a line long: styles distinct to the middle; stigmas linear: capsule short, acutely angled. On barren slopes near Waldo, southern Oregon.

F. atropurpurea Nutt. Journ. Acad. Philad. vii, 54. Bulb of numerous thick scales half-inch long or less: stem usually slender, 8-20 inches high: leaves 6-20, linear, scattered on the upper part of the stem or somewhat verticillate, two to three inches long: flowers 1-6, on slender pedicels, dull purple with more or less green, open campanulate; segments broadly lanceolate 6-9 lines long spreading, with obscure nectaries: stamens about four lines long: style slender, distinct to the middle, with linear stigmas: capsule broadly obovate acutely angled. From the Blue Mountains of Oregon to California and Nebraska.

F. pudica Sprengle Syst. ii, 64. Bulb of numerous very small rounded scales: stem 2-10 inches high: leaves 3-8, linear to narrowly oblanceolate, scattered or somewhat verticillate, 2-4 inches long: flower usually solitary, nodding, yellow or orange, sometimes tinged with purple, narrow-campanulate: segments of the perianth 5-9 lines long, oblong-spatulate, obtuse, somewhat spreading: stamens nearly equalling the style, 6-8 lines long: anthers 2 lines long: styles connate to the top; stigma shortly 3-lobed: capsule oblong to subglobose, 6-12 lines long, obtusely angled. Common in the interior, Brit. Columbia to California and Utah.

10 LLOYDIA Salisb.

Bulbous herbs with simple leafy stems, narrow grass-like leaves

and whitish flowers in terminal racemes or solitary. Perianth of 6 distinct equal persistent segments with a transverse margined nectariferous fold above the base. Stamens 6, inserted at the base of the segments: filaments subulate-filiform: anthers versatile, oblong, rounded at the apex, deeply perforated at the emarginate base for the insertion of the filament, dehiscent along each margin. Ovary triangular, 3-celled, the ovules numerous, in two rows in each cell, horizontal, anatropous. Style persistent, with shortly 3-lobed stigma. Capsule chartaceous, loculicidally 3-valved at the apex. Seeds flat, with a brown membranously margined testa and very small embryo.

L. serotina Reichenb. Fl. Excurs. 102. Stem slender, erect or ascending, 2-5 inches high: radical leaves filiform, equalling or exceeding the stem, triangular to teretish, the cauline ones short and diminishing upward, linear-lanceolate, somewhat sheathing: flowers erect, usually solitary: segments of the perianth oblanceolate, obtuse, obscurely pitted at base, 4-5 lines long, white with 3 purplish lines: capsule obovate, obtusely angled, 4 lines long. Eastern Oregon to the Rocky Mountains and the Arctic coast.

11 ERYTHRONIUM L, Sp. 305.

Low herbs from membranous-coated corms with 2-3 apparently radical flat leaves and one to several large flowers in a terminal raceme. Perianth broadly funnelform, of 6 distinct nearly equal lanceolate deciduous segments that are mostly revolute from near the base, the inner usually auriculate below and callous-toothed on each side of a nectariferous groove. Stamens 6, hypogynous, with rather short slender filaments and linear anthers attached by the base and longitudinally dehiscent. Ovary nearly sessile, many-ovuled. Style slender, entire with short 3-lobe stigma, or 3-cleft and the stigmas at length revolute, deciduous. Capsule membranaceous, obtusely triangular, loculicidally 3-valved. Seeds in two rows in each cell, ascending, with brown or black rugulose testa somewhat loose at the apex.

E. grandiflorum Pursh Fl. 231. Scape stout, 1-2 feet high: leaves broadly lanceolate, 4-6 inches long, acute and shortly cuspidate, pale green, not mottled: segments of the perianth bright yellow with whitish base; outer ones lanceolate, obtuse; inner ones narrower, acuminate, with 4 stout hyaline teeth at base, all strongly revolute, $1\frac{1}{2}$ -3 inches long: style clavate; the stigmas at length distinct and recurved. In the mountains of eastern Oregon to Brit. Columbia and the Rocky Mountains.

Var. parviflorum Watson Proc. Am. Acad. xxvi, 129. Scape usually 8-12 inches high: leaves oblong-lanceolate; flowers smaller, the segments 12-15 lines long. In the mountains California to Brit. Columbia and the Rocky Mountains.

E. revolutum Smith in Rees' Cyc. Scape 10-12 inches high, 1-3 flowered: leaves narrowed below to a usually narrow petiole, 2-6 inches long, conspicuously marked with dark brown and white: segments of the perianth narrowly lanceolate, acuminate, 18 lines long, 3-4 lines wide, strongly revolute, white to pinkish-rose outside, golden-orange deepening to a dark purple inside, the 3 inner auricled and with 4 blunt teeth: anthers about 4 lines long, bright yellow: stigmas at length distinct and recurved.

Near the coast, Vancouver Island to Oregon. *E. Johnsoni* Bolander Eryth. iii, 127, appears to be a pink-flowered form of this species.

E. giganteum Lindl. Bot. Reg. t. 1786. Scape 6-18 inches high, 1-6 flowered: leaves broadly lanceolate, or in poorly developed specimens narrower, green mottled with brown and white, 4-6 inches long, mostly acute and shortly apiculate, rather abruptly narrowed below to a short and broadly margined petiole: outer segments of the perianth lanceolate, acuminate, $1\frac{1}{4}$ -2 inches long, 4-6 lines wide; inner ones a little wider and more acuminate, all cream-color marked with yellow and orange near the base, strongly revolute; the inner ones auricled and 4-toothed at base: style clavate, about as long as the stamens, the stigmas distinct and at length strongly revolute. On stony ridges, western Washington to Calif.

E. montanum Watson Proc. Am. Acad. xxvi, 130. Scape slender, 6-18 inches high, 1-3 flowered: leaves broadly lanceolate to almost ovate, more or less abruptly contracted at base into a winged petiole, the blade 2-4 inches long, pale green, not mottled: segments of the perianth pure white with orange base, often turning pinkish in age, $1-1\frac{3}{4}$ inches long, broadly lanceolate, slenderly acuminate, the inner ones with small teeth at base: style clavate, much longer than the stamens; the stigmas distinct and at length spreading. On grassy slopes in the highest parts of the Cascade Mountains in Oregon and Washington.

E. citrinum Watson Proc. Am. Acad. xxii, 480. Corm oblong, 1-2 inches long, 4-6 lines in diameter; scape rather stout, 6-10 inches high, 1-9 flowered, the flowers approximate and all opening at near the same time: leaves very broadly lanceolate, 4-6 lines long, obtuse and very shortly apiculate, attenuate at base to a very short petiole, the margins more or less undulate, green marked with dark brown and white: segments of the perianth broadly lanceolate, obtuse, 12-15 lines long, bright lemon-color with orange base, the tips drying pinkish, strongly revolute, the teeth at the base of the inner ones thin: filaments not dilated downward: style rather thick shorter than or barely equalling the stamens: the stigmas coalescent by the edges: capsule, an inch long, very obtuse. On dry ridges in pine woods, near Deer Creek southern Oregon.

E. Hendersoni Watson l. c. 479. Scape slender, 6-12 inches high, 1-3 flowered: leaves lanceolate to oblong, obtuse and very shortly apiculate, narrowed below to a short petiole, the blade 3-6 inches long, green mottled with white and brown: segments of the perianth lanceolate, obtuse, 12-18 lines long, purple with very dark base bordered above with yellow; the inner ones auricled above the very short claw, the auricles fleshy and subsaccate, the 2 scales subglobose-inflated: filaments purple, very slender and attenuate upward, thrice longer than the brownish anthers: style narrowly clavate, shorter than or about equalling the stamens, the triangular cupulate stigma very shortly 3-lobed. Common in the Rogue river valley, southern Oregon.

E. Howellii Watson l. c. 480. Scape rather slender, 6-18 inches high, 1-3 flowered: leaves oblong-lanceolate to lanceolate, 3-6 inches long, an inch or less wide usually acute and shortly apiculate, green mottled with white and brown: segments of the perianth lanceolate, 18 lines long, straw-color to white, with orange base, often drying pinkish: the inner narrowed downward, without auricles or scales: stamens white, the filaments very slender: style slightly clavate, shorter than the stamens; the cupulate stigma faintly 3-lobed. In dry open woods near Waldo southern Oregon.

12 CALOCHORTUS Pursh Fl. 240.

Perennial herbs from coated corms, simple or branched leafy stems, linear leaves, the radical in our species solitary, and large

flowers in bracted racemes. Perianth of 3 narrow greenish sepals and 3 broad more or less concave distinct deciduous petals usually with a conspicuous glandular pit near the base. Stamens 6, inserted on the bases of the the segments, included: anthers linear to oblong, attached by the base, longitudinally dehiscent. Ovary sessile, triangular, 3-celled, many-ovuled. Stigmas sessile, recurved, persistent. Capsule membranaceous, 3-angled or 3-winged, mostly septically dehiscent. Seeds numerous, in two rows in each cell, somewhat flattened, with a thin membranous white or brownish often loose testa.

C. Maweanus Leichtlin Baker Journ. Linn. Soc. xiv, 305. Stem flexuous 3-10 inches high, usually branched and 3-10-flowered: leaves glaucous, exceeding the stem, 4-6 lines wide: bracts lanceolate, an inch long or more: sepals ovate-lanceolate acute or acuminate, purplish; petals a little longer, white, or purplish at base, 6-8 lines long, broadly obovate, acute, somewhat pitted and arched, the broad naked claw covered above by a transverse semicircular scale, the rest of the surface more or less densely covered with long erect white or purplish hairs: anthers lanceolate, acuminate, 2 lines long: capsule oblong-elliptic, acutish. Near the coast, southern Oregon to California.

Var. roseus Purdy Proc. Calif. Acad. 3d ser. ii, 121. Bulbs with mahogany-colored coats: flowers tinged with rose. Southern Oregon.

C. elegans Pursh Fl. 240. Stem very slender, 4-8 inches high 1-4-flowered: leaf lanceolate, acuminate, 2-4 lines wide, exceeding the stem: bracts about half the length of the pedicels, acuminate from a base 2 lines wide: sepals ovate, acute, greenish-white outside, purplish at base: petals obovate, obtuse, whitish, or slightly tinged with green, with a purple spot on the claw, thickly covered with rather short soft hairs, except a band around the margins, which are white on the upper and purple on the lower portion: scale narrow, ascending, deeply fringed, covering about $\frac{1}{3}$ the width of the claw: anthers long-acuminate: capsule elliptical, rounded at each end. In pine woods, eastern Washington and Idaho.

C. Lyallii Baker l. c. *C. elegans* var. *nanus* Wood. Stem slender, 3-10 inches high, umbellately 3-5-flowered: leaf lanceolate, 4-6 lines wide, acute, often $\frac{1}{3}$ longer than the stem: bracts lanceolate, long acuminate, about an inch long: sepals oblong-lanceolate short acuminate, 6-10 lines long, greenish-purple, strongly arched below, the pit thus formed dark purple inside: petals light yellow to nearly white with purplish base, longer than the sepals, often an inch broad, triangular-ovate, finely erose, rounded and often shortly acuminate at the apex, strongly arched below, the scale broad and covered with retrorse hairs, the portion above the scale pubescent with short soft hairs except a narrow belt around the apex: filaments broad, abruptly narrowed at the apex: anthers lanceolate, long-acuminate above, 4 lines long: capsule elliptical 10-12 lines long nodding. On grassy slopes on the highest parts of the Cascade Mountains, Oregon to Brit. Columbia.

C. Lobbii Purdy l. c. 122. Stem 3-5 inches high: leaf 3-5 lines wide, longer than the stem, abruptly acute: sepals ovate-lanceolate, acute, greenish with a dark spot below, 6-8 lines long; petals a little longer, white tinged with green, broadly rhombic-ovate, very deeply pitted, the pit showing as a prominent knob on the back, hairy above the gland: scale very narrow, deeply bordered with long feathery fringe and concealed in the recess of the pit: filaments subulate; anthers oblong, acuminate, ending in a hooked cusp: capsule narrowly beaked. Only known from Mount Jefferson, Oregon.

C. uniflorus H. & A. Bot. Beech. 398, t. 94. Stem low, flexuous, usually branched, 4-12 inches high, umbellately 1-9-flowered: leaves 1-2, 4-6 lines wide, exceeding the stem: bracts linear-lanceolate, long and conspicuous: flowers open-campanulate, on flexuous pedicels 3-10 inches long: sepals ovate-lanceolate, acuminate, greenish-lilac; petals cuneate, somewhat truncate, erose-denticulate, 10-12 lines long, lilac to rose-color, often with a purple spot on each side of the scale, sparingly hairy immediately above the gland, otherwise naked; gland shallow, not pitted; scale narrow, triangular: filaments slender; anthers obovate, obtuse, 2 lines long: capsule elliptical nodding. In wet meadows, southern Oregon to California.

C. Tolmiei H. & A. l. c. Stem erect or ascending, 6-18 inches high, usually branched: leaf 4-8 lines wide, shorter than or exceeding the stem: bracts foliaceous, long acuminate, 1-4 inches long: flowers broadly campanulate; sepals oblong-lanceolate, acuminate, 6-10 lines long, purplish; petals yellowish purple, cuneate-obovate, a little longer than the sepals, rounded and acutely apiculate at the summit, deeply pitted near the base, pubescent with long crisped purple and white hairs; the gland without scale but the upper circular edge with a dense fringe of reflexed hairs: anthers lanceolate, acute, 2-3 lines long: capsule elliptical, acute at both ends 10-15 lines long, nodding. On dry grassy plains, Willamette valley Oregon to northern California.

C. Purdyi Eastwood Proc. Calif. Acad. 3d ser. i, 137, pl. xi, figs. 8a & 8b. Stem 8-16 inches high, rather stout, erect, branching, 2-many-flowered: leaf linear-lanceolate, acuminate, about 8 inches long, 4-6 lines wide: bracts foliaceous, acuminate: sepals from elliptical to narrowly ovate, abruptly acuminate, green tinged with purple outside; petals broadly obovate-cuneate, acute or rounded at the apex, creamy-white or tinged with purple, the inner surface bearded all over with white and purple hairs, somewhat arched by the narrow semicircular gland, the shallow pit covered by a densely hairy narrow scale: anthers lanceolate, abruptly acuminate: capsule elliptical, $1\frac{1}{2}$ inches long, nodding. On grassy hillsides, Willamette valley Oregon.

C. apiculatus Baker Journ. Linn. Soc. xiv, 305. Stem stout, erect, 12-18 inches high: leaf 6-12 inches long, 3-9 lines wide: bracts linear, acuminate, 1-3 inches long: sepals lanceolate, greenish-white, acute, 6-9 lines long; petals straw-color, broadly obovate, an inch long, sparingly hairy above inside, distinctly pitted, the pit densely hairy and without scale: anthers 4 lines long, acuminate: capsule 12-15 lines long, narrowly olong, nodding. Lake Pend Oreille Idaho.

C. nitidus Dougl. Trans. Hort. Soc. vii, 277, t. 9, fig a. Stem 1-2 feet high, rather stout, stiffly erect: leaf linear-lanceolate, 8-13 inches long, 3-6 lines wide: bracts lanceolate, long acuminate, 1-2 inches long: flowers large, open-campanulate; sepals lanceolate, long-acuminate 16-18 lines long, hyaline-margined on one side; petals very broadly ovate, as long as the sepals, white or straw-color to lavender, with an Indigo spot near the centre, rounded above, sparsely bearded except a broad belt at the summit, gland small, rounded, densely matted with short hairs: anthers linear-oblong, 6-8 lines long, obtuse at both ends: capsule round to broadly elliptic, 8-10 lines long, with short stout beak, erect. Powder river Mountains, eastern Oregon to Nevada.

C. Nuttallii T. & G. Pac. R. Rep. ii, 124. Stem slender, 3-15 inches high, umbellately 1-5 flowered: radical leaf linear, deeply channeled, cauline 1-3, narrow, glaucous, the margins revolute: bracts long-acuminate, 1-2 inches long: sepals ovate-lanceolate, with scarious margins, yellowish within, with or without a dark spot at base which is sometimes hairy, 10-12 lines long, much shorter than the petals, acute; petals broadly obovate-cuneate with rather narrow claw, $1\frac{1}{2}$ inches long, abruptly acute or

rounded at the apex, white above, yellowish below, with a small round or oblong gland which is densely covered with agglutinated hairs, a few hairs scattered above: anthers oblong, obtuse, more or less sagittate: capsule lanceolate, 1-2 inches long, erect. Eastern Oregon to Nevada and Nebraska.

C. Howellii Watson Proc. Am. Acad. xxiii, 266. Bulb large, 6-12 lines in diameter, very deep-seated: stem stiffly erect, 1-2 feet high, umbellately 1-3-flowered, sometimes branched: radical leaf about a foot long, 4-6 lines wide, cauline leaf narrow, 3-6 inches long, long acuminate: bracts long acuminate from a broad base, 1-2 inches long: flowers open-campanulate: sepals broad lanceolate, acuminate, about 6 lines long, one margin hyaline, purplish outside: petals cuneate-obovate rounded at the apex, 1-1¼ inches long, white with dark base, sparsely bearded with short crisp hairs inside: gland transversely oblong, densely covered with yellow hairs: anthers oblong, acute and apiculate, about 3 lines long: capsule elliptical, 8-10 lines long, erect. In moist places near Waldo southern Oregon.

C. longibarbus Watson l. c. xvii, 381. Stem slender, 10-15 inches high, strictly erect, umbellately one- to several-flowered: radical leaf broadly linear, acute, nearly as long as or longer than the stem; cauline linear and bract-like: bracts linear-lanceolate, acuminate, 1-2 inches long: sepals rather narrowly lanceolate, acuminate, 8-10 lines long, greenish lilac within: petals lavender-color, lighter below with a dark-purple circular band above the gland, cuneate-obovate, about an inch long, the apex rounded to almost truncate, denticulate: gland small, roundish, covered with dense matted brown hairs with some long silky hairs above and beside it, the margins not ciliate: filaments slender, dilated downward, 2-3 times as long as the narrowly ovate obtuse anthers: capsule elliptical, 9-10 lines long, erect. In low grassy grounds, eastern Oregon and Washington near the base of the Cascade Mountains.

C. pavonaceus Fernald Bot. Gaz. xix, 335. Stem slender, strictly erect, 1-2 feet high: radical leaf lanceolate, not channeled, 1-1½ feet long, cauline bract-like, 3-4 inches long: bracts subulate, 1-3 inches long: sepals purplish, ovate-lanceolate, acuminate, an inch long: petals cuneate-obovate, 15-18 lines long, lavender-color to purple, with a circular band above the small round gland which is covered with densely matted yellow hairs, the margins sparsely ciliate, the lower third sparingly bearded with silky hairs: filaments slender, winged; anthers 3-5 lines long, shorter than the filaments: capsule elliptical, acutely angled and strongly beaked, erect. In low meadows near Pullman, Washington.

C. macrocarpus Dougl. Trans. Hort. Soc. vii, 276, t. 8. Stem stout, erect and rigid, 1-2 feet high, one- to several-flowered: radical leaf deeply channeled, a foot or more long; cauline 3-5, narrow and convolute, 3-6 inches long: sepals lanceolate, acuminate, 15-18 lines long, purplish with a dark base inside, sometimes spotted and hairy, with a broad scarious margin: petals cuneate-obovate, 1½-2 inches long and half as wide, purple, with a greenish line down the centre, the lower third above the gland sparingly bearded with glandular hairs: gland oblong, densely hairy: anthers lanceolate, obtuse 4-6 lines long, about as long as the filaments: capsule lanceolate, attenuate upward, 1-2 inches long, erect. On dry or sandy plains in the interior, California to Brit. Columbia.

ORDER XCVII CONVALLARIACEÆ Link. Handb. i, 184.

Scapose or leafy-stemmed plants with simple or branched rootstocks or bulbs, mostly broad parallel-veined leaves and numerous or solitary flowers in terminal racemes or panicles. Perianth inferior, 4-6-lobed or parted. Stamens 6, hypogynous, or borne on the perianth: anthers introrsely or exextrorsely

or laterally dehiscent. Ovary 1-3-celled: ovules anatropous or amphitropous. Style slender or short: stigma mostly 3-lobed. Fruit a fleshy few- to numerous-seeded berry. Embryo small, in copious albumen.

- 1 **Vagnera** Leaves alternate: flowers small, in a simple terminal raceme or panicle, six-merous: filaments subulate.
- 2 **Unifolium** Leaves alternate: flowers small, in a simple terminal raceme, four-merous: filaments filiform.
- 3 **Streptopus** Leaves alternate, sessile: flowers small or middle-size, six-merous, extra-axillary: filaments flattened, short and broad.
- 4 **Disporum** Leaves alternate: flowers middle-size, in terminal fascicles, six-merous: filaments filiform or somewhat flattened, longer than the anthers.
- 5 **Clintonia** Leaves all radical: flowers middle-size, six-merous in a terminal umbel: filaments filiform.
- 6 **Scoliopsis** Leaves a pair upon an otherwise naked stem: flowers middle-size, umbellate upon a very short peduncle, tri-merous: filaments filiform-subulate.
- 7 **Trillium** Leaves 3, whorled at the summit of the otherwise naked stem: flowers large, solitary and terminal, tri-merous: filaments short.

1 VAGNERA Adans. Fam. Pl. ii, 496. (1763)

SMILACINA Desf. (1807)

Herbs with simple leafy stems, broad mostly sessile alternate leaves and small white flowers on jointed pedicels in terminal bracteate racemes, or panicles. Perianth persistent of 6 distinct, 1-3-nerved segments. Stamens 6: filaments subulate, inserted at the base of the segments: anthers versatile, introrse. Ovary sessile, ovate, 3 celled, with 2, usually collateral ovules in each cell. Style short and thick, 3-lobed at the summit, persistent. Fruit a globose 1-3-seeded berry. Seeds subglobose, with thin testa and horny albumen.

* Flowers paniced, very small: stamens exceeding the oblong-lanceolate segments of the perianth.

V. amplexicaulis Greene. *Smilacina amplexicaulis* Nutt. Stems several from a stout elongated rootstock, 1-3 feet long ascending, covered with a short spreading pubescence: leaves ovate to lanceolate 3-7 inches long, strictly sessile and amplexicaul or sometimes with a very short dilated clasping petiole, acute, rounded at base: usually pubescent with very short stiff hairs: panicle sessile or shortly peduncled, 2-9 inches long: pedicels solitary usually less than a line long: segments of the perianth less than a line long: filaments more or less broadly subulate, often broader than the segments: style nearly as long as the ovary: berries light red, finely dotted with purple, 2-3 lines in diameter, usually 1-seeded; seed whitish, 1½ lines broad. In the Coast ranges, Brit. Columbia to California.

V. racemosa Morong Mem. Torr. Bot. Club, v, 114. *Smilacina racemosa* Desf. Stems often stout, erect or ascending, somewhat angled, finely pubescent above or nearly glabrous, 1-3 feet high, from a thick fleshy rootstock: leaves oblong-lanceolate to oval, sessile, or the lower ones short-petioled, 3-6 inches long, 1-3 inches wide, acuminate, finely pubescent

beneath, the margins minutely ciliate: panicle densely many-flowered, 1-4 inches long, peduncled: pedicels about a line long: segments of the perianth oblong, about a line long: style about half as long as the ovary: berries red speckled with purple, 2-3 lines in diameter. In moist woods, Oregon to Brit. Columbia and across the continent.

* * Flowers larger, in a simple few-flowered raceme: stamens shorter than the segments.

V. sessilifolia Greene. *Smilacina sessilifolia* Nutt. Stems slender, usually flexuous above, 10-18 inches high, from slender creeping rootstocks: leaves lanceolate, 2-6 inches long, acute or acuminate, sessile and clasping, usually flat and spreading, more or less pubescent. racemes 3-9-flowered, sessile or shortly peduncled, the solitary pedicels 2-7 lines long: segments of the perianth lanceolate, 3-4 lines long, twice as long as the stamens: filaments subulate: style about a line long, as long as the ovary: berries usually black when mature, globose, 3-5 lines in diameter, 1-3-seeded: seeds brown sub-ovoid $1\frac{1}{2}$ lines in diameter. In damp forests, Brit. Columbia to California.

V. stellata Morong l. c. *Smilacina stellata* Desf. Stems rather stout, erect, glabrous, 8-20 inches high, from a stout fleshy rootstock: leaves lanceolate to oblong-lanceolate, sessile and somewhat clasping minutely pubescent beneath 2-5 inches long, 6-18 lines wide, obtuse to acute or acuminate: raceme sessile or short peduncled, 6-20-flowered: pedicels 1-4 lines long, usually shorter than the flowers: segments of the perianth oblong, obtuse, 4-5 lines long, $\frac{1}{3}$ longer than the stamens: style about 2 lines long, as long as the ovary: berries green with 6 black stripes or black, 3-5 lines in diameter. Along streams in the interior, Brit. Columbia to California and the Eastern States.

2 UNIFOLIUM Adans. Fam. Pl ii, 54. (1763)

MAIANTHUM Wiggs. *Prim. Fl. Hols. 14.* (1780.)

Low herbs with slender rootstocks, erect simple few-leaved stems, alternate petioled leaves and small white flowers in terminal minutely bracted racemes. Perianth of 4 distinct segments. Stamens 4, inserted at the base of the segments, with filiform filaments and short introrse anthers. Ovary sessile, 2-celled, rarely 3-celled, with a pair of ovules in each cell. Style 2-lobed or 2-cleft. Berries globose, 1-4-seeded.

U. dilatatum. *Maianthemum biflorum* var. *dilatatum* Wood. Glabrous: stem 2-12 inches high, erect: leaf of the sterile shoots round-cordate, 2-4 inches in diameter, acute or shortly acuminate, on a slender petiole 2-8 inches long; cauline leaves usually 2, cordate to sagittate, with large rounded auricles, 2-4 inches long, on slender petioles: often with a subulate bract on the peduncle: raceme 1-3 inches long, many-flowered: pedicels spreading, 1-2 lines long, often 2-4 together: segments of the perianth oblong, obtuse, about a line long, at length reflexed: stamens shorter than the segments: style stout, about a half line long: berries red, globose, about 3 lines in diameter, 1-4-seeded: seeds ovate, brown, $1\frac{1}{2}$ lines long. In wet places along mountain streams. California to Alaska.

3 STREPTOPUS Michx. Fl. i, 200. (1803.)

Branching herbs with stout or slender rootstocks. thin sessile alternate leaves and rather small flowers on slender solitary simple or forked extra-axillary peduncles. Perianth narrowly cam-

panulate, of 6 distinct deciduous segments. Stamens 6: filaments short, deltoid or subulate, inserted on the base of the segments: anthers sagittate, acute or acutely attenuate above, attached on the inner side near the base, with nearly lateral dehiscence. Ovary sessile, 3-celled, with numerous ovules in each cell. Style filiform, deciduous, with 3-lobed or 3-cleft stigma. Fruit a many-seeded berry. Seeds oblong, with close thin brownish testa.

S. amplexifolius DC. Fl. France iii, 174. Rootstock short, stout, horizontal, covered with fibrous roots: stem stout, 1-3 feet high, dichotomously branched: leaves lanceolate, 2-5 inches long, 1-2 inches wide, acuminate, cordate-clasping at base, glabrous, glaucous beneath: peduncles 1-2 inches long, 1-2 flowered bent or twisted at about the middle: segments of the perianth greenish-white, 4-6 lines long, narrowly lanceolate, acuminate, the tips spreading or recurved: anthers subulate-pointed: stigma simple, obtuse or truncate: berry oval, 5-9 lines long, yellow or red. Along mountain streams, California to Alaska and across the continent.

S. roseus Michx, Fl. i, 201, t. 18. Stems simple or sparingly branched, 6-30 inches high, from a short stout rootstock covered with fibrous roots: branches sparingly pubescent: leaves lanceolate-ovate to ovate, 2-4 inches long, rather abruptly acuminate, sessile by a broad rounded or slightly cordate clasping base, the margins finely ciliate: peduncles 6-12 lines long, one- or rarely two-flowered: segments of the perianth lanceolate, acuminate, 4-6 lines long, the tips spreading, purple to rose-color; anther-cells each apiculate: style 3-cleft, the spreading branches stigmatic along the inner side: berries globose or ovate, 5-6 lines in diameter. In damp woods, Oregon to Alaska and the Eastern States.

S. brevipes Baker Journ. Linn. Soc. xiv, 594. Stems mostly simple, smooth, 6-12 inches high, from very slender rootstocks: leaves lanceolate, 1-3 inches long, tapering from below the middle to an acuminate apex, sessile but not at all cordate at base, very minutely or not at all ciliate: peduncles 3-6 lines long: segments of the perianth linear-oblong, about 4 lines long, less than a line wide, more than twice as long as the stamens: berries globose. In damp places in the Cascade Mountains of Washington,

4 DISPORUM Salisb. Trans. Hort. Soc. i, 331. (1812.)

PROSARTES D. Don. (1840.)

Branching herbs, scaly-bracted below and leafy above, with running rootstocks, sessile alternate somewhat oblique leaves and rather small flowers in terminal few-flowered umbels. Perianth narrowly campanulate, of 6 distinct deciduous segments. Stamens 6, hypogynous: filaments filiform or somewhat flattened, longer than the oblong or linear extrorse anthers. Ovary sessile, 3-celled, mostly with 2 suspended ovules in each cell. Style slender, entire or with 3 short stigmas, deciduous. Fruit a 3-6-seeded berry. Seeds globose, with close testa and horny albumen.

* Perianth broad and gibbously truncate at base: stamens included, with elongated filaments: style 3-cleft: berries acute.

D. Menziesii B. & H. Gen. iii, 832. *Prosartes Menziesii* D. Don. More or less woolly-pubescent: stems 1-3 feet high, diffusely much branched: leaves ovate to lanceolate, acuminate, rounded or sometimes slightly cordate at base, 2-6 inches long: flowers in fascicles of 2-5, on slender pedicels 6-10

lines long: segments of the perianth nearly erect, acute 6-11 lines long: stamens a third shorter: style usually more or less woolly above and slightly 3-cleft at the apex: ovary nearly smooth: berry oblong-ovate, attenuate above into a short beak, triangular, 3-6-seeded, about 6 lines long, bright salmon-color. In the Coast Ranges, California to Brit. Columbia.

* * Leaves acute or shortly acuminate, mostly cordate and clasping: perianth narrow and less gibbous at base: style entire.

+ Filaments elongated, longer than the anthers.

D. Hookeri B. & H. l. c. *Prosartes Hookeri* Torr. More or less rough-pubescent with short spreading hairs: stems slender, 1-2 feet high, diffusely branched: leaves ovate, mostly deeply cordate, rough on the margins and nerves beneath, 1-3 inches long, the uppermost very oblique: flowers 1-6 in the fascicles; segments spreading above, 4-6 lines long, narrowed at base: stamens equalling or a little exceeding the perianth: ovary narrow, more or less pubescent: style entire, exerted, glabrous; berries usually somewhat pubescent, obovate, obtuse, 4 lines long, 6-seeded. In the Coast Ranges, southern Oregon to California.

D. trachyandrum B. & H. l. c. *Prosartes trachyandra* Torr. More or less pubescent with minute stiff hairs: stem slender, 12-18 inches high: leaves ovate to oblong, acute or somewhat acuminate, but slightly or not at all cordate, 1-2 inches long: flowers 1-3 in the fascicles: segments of the perianth lanceolate, acute, 4-5 lines long, $\frac{1}{2}$ longer than the stamens, narrowed at base: anthers minutely hispid: ovary glabrous: berries smooth, with a short stout beak. In the mountains of southern Oregon and northern California.

D. Oregonum B. & H. l. c. *Prosartes Oregona* Watson. Stem 1-3 feet high, diffusely much branched, woolly-pubescent above: leaves ovate or orbicular to oblong, more or less acuminate, distinctly cordate at base, 2-4 inches long: flowers usually 1-2 in the fascicles, funnelliform: segments of the perianth about 6 lines long, lanceolate, narrowed toward the base to a broad claw: filaments filiform with a dilated base, about 8 lines long: anthers a line long: style filiform, exceeding the stamens: berries ovate, acutish, pubescent, 5-6 lines long, 3-6-seeded. Common in forests, Oregon to Brit. Columbia.

D. trachycarpum B. & H. l. c. *Prosartes trachycarpa* Watson. Pubescent, at least when young: stem 1-2 feet high, rather sparingly branched: leaves ovate or oval to oblong-lanceolate, 2-4 inches long, acute or short acuminate, rounded or subcordate at base: flowers 1-3 in the fascicles, narrow campanulate: segments of the perianth narrowly oblong or oblanceolate, 6-7 lines long: stamens about equalling the perianth: style slender, exceeding the stamens: berries roughened, depressed-globose or somewhat ovoid, 4-5 lines in diameter, 3-18-seeded. In the mountains of eastern Oregon and Washington to Nebraska and Manitoba.

+ + Anthers much longer than the very short filaments.

D. parvifolium B. & H. l. c. *Prosartes parvifolia* Watson. More or less pubescent with spreading hairs: stem 6-12 inches high, densely much branched: leaves ovate to ovate-lanceolate, more or less abruptly acuminate, very acute, slightly cordate at base, 6-18 lines long: flowers 1-6 in the fascicles, narrow campanulate: segments of the perianth lanceolate, acute or somewhat acuminate, 4-6 lines long, white, twice as long as the stamens: filaments about a line long, shorter than the lanceolate acute anthers: ovary small, slightly pubescent: style slender, slightly exerted: berries not seen. In the Coast and Siskiyou Mountains of southern Oregon and northern California.

5 CLINTONIA Raf. Journ. Phys. 102, 1819.

Scapose herbs with slender rootstocks, few broad apparently radical many-nerved leaves and white or red flowers umbellate upon a scape-like peduncle. Perianth campanulate, of 6 distinct several-nerved equal deciduous segments. stamens 6, inserted on the base of the segments, with filiform filaments and oblong to linear versatile anthers, attached on the inner side and laterally dehiscent. Ovary sessile, 2-3-celled, with 2 to several ovules in each cell. Style slender, deciduous, slightly 2-3-lobed at the summit. Fruit a smooth few- to many-seeded berry. seeds somewhat compressed or angled, with smooth crustaceous brownish testa.

C. uniflora Kunth Enum. v. 159. More or less villous-pubescent throughout: stems 1-2 inches long, mostly under ground: leaves lanceolate or oblanceolate to oblong-obovate, acute or shortly apiculate, attenuate below to a sheathing petiole, 4-8 inches long by 1-2 wide: peduncle shorter than the leaves, 1- rarely 2-flowered: segments of the perianth white, oblanceolate, obtuse, 8-12 lines long $\frac{1}{3}$ longer than the stamens: style about equalling the stamens: berries blue, oblong, 4-6 lines long, the cells 6-10-seeded. Common in damp forests in the mountains, California to Alaska.

C. Andrewsiana Torr. Pac. R. Rep. iv, 150. Nearly glabrous, the inflorescence more or less pubescent: stem stout, 2-6 inches long, mostly under ground: leaves usually 4-6, broadly oblong to oblanceolate, shortly apiculate narrowed below to short petioles or sessile, 6-12 inches long, 2-4 inches wide; peduncle 1-2 feet high, usually with a foliaceous bract: flowers deep rose-color, numerous in a terminal umbel and one or more lateral umbellate fascicles: pedicels slender, unequal, 4-12 lines long: perianth gibbous at base, 4-7 lines long: stamens a half shorter, about equalling the style: filaments pubescent: berries 4-5 lines long, the cells 8-10-seeded. In Sequoia forests near the coast, southern Oregon to California.

6 SCOLIOPIS Torr. Pac. R. Rep. iv, 145.

Nearly acaulescent glabrous herbs with short fibrous-rooted rhizomes, a pair of thin apparently radical leaves subtended by scarious sheaths and few flowers on long pedicels in a nearly sessile umbel. Perianth of 6 distinct deciduous segments, the 3 outer lanceolate, several-nerved, the 3 inner narrower and 3-nerved. Stamens 3, inserted at the base of the 3 outer segments, with filiform-subulate filaments, and oblong 2-celled extrorse anthers. Ovary sessile, strongly triquetrous, 1-celled, the thickened angles placentiferous, with about 10 ascending ovules in 2 rows upon each placenta. style very short, persistent: stigmas linear, deeply channeled down the inner side. Fruit a thin-walled several-seeded capsule bursting irregularly. Seeds oblong, slightly curved, longitudinally sulcate-striate, with thin close light-colored testa.

S. Hallii Watson Proc. Am. Acad. xiv, 272. Rhizome short, with numerous long fleshy-fibrous roots: stem not rising above the ground: leaves broadly lanceolate, acute, 3-6 inches long, 1-2 inches wide, narrowed below to sheathing petioles: pedicels 1-8, very slender, 2-3 inches long; outer segments of the perianth lanceolate or oblanceolate, 3-4 lines long, $1\frac{1}{2}$ lines wide, narrowed to a claw below, yellowish green speckled with red outside, striped with purple inside, bent outward near the middle, the

upper half spreading or deflexed: inner segments linear-spatulate, shorter than the outer ones, incurved and connivent over the stigmas: filaments 1-2 lines long, about half as long as the ovary. On moist mossy banks along mountain streams, western Oregon.

7 TRILLIUM L. Sp. 339.

Glabrous erect herbs with short tuber-like rhizomes, short simple stems bearing scarious sheaths at base and 3 flat leaves in a whorl around a single large flower at the summit. Perianth of 6 distinct persistent segments: the 3 outer narrow, green and sepal-like; the 3 inner broader and usually white or red. Stamens 6, hypogynous; with short filaments and linear, mostly extrorse, anthers. Ovary sessile, 3-6-angled or lobed, 3-celled, with several to many ovules in each cell. Styles 3, stigmatic along the inner side. Fruit a 3-celled or imperfectly 1-celled many-seeded berry-like capsule. Seeds ovate, with close thin testa.

T. petiolatum Pursh Fl. 544. Stem 3-4 inches high, often scarcely exerted above the basal sheaths: leaves with ovate-elliptic to reniform blade 3-6 inches wide, on stout petioles as long or longer: flower sessile; sepals oblong-lanceolate, acute, about an inch long: petals dark purple, narrowly oblanceolate, scarcely longer than the sepals, 2-3 lines wide: anthers 6-8 lines long, dark purple: styles 5-6 lines long, recurved; ovary shortly beaked. On rich hillsides and in copses, eastern Oregon and Washington to Idaho.

T. chloropetalum. *T. sessile* var. *chloropetalum* Torr. in part. *T. sessile* var. *Californicum* Watson. Rhizome oblong to obovate, usually erect, about an inch long: stem 6-18 inches high: leaves broadly rhombic-ovate thickish, usually marked with whitish blotches, 2-6 inches long, often broader than long, obtuse, closely sessile: flower sessile: sepals elongated-oblong, obtuse, 10-12 lines long, 3 lines wide: petals white, oblanceolate, obtuse, 1-1½ inches long 3-4 lines wide, erect: anthers nearly sessile, white, about 6 lines long, longer than the stigmas. In wet copses, western Oregon to California.

T. ovatum Pursh Fl. 245. Rhizome oblong 1-2 inches long, horizontal: stem stout, 1-2 feet high: leaves rhombic-ovate, 3-8 inches long, usually acuminate, cuneately narrowed at base, sessile, 1½-3 inches long: sepals lanceolate, acute 1-2 inches long, 3-4 lines wide: petals broadly lanceolate, acute, 1½-2½ inches long, 4-12 lines wide, white, soon changing to rose-color and dark red: stamens 3-8 lines long; anthers yellow: styles slender, recurved or revolute at the apex. Common in wooded districts, California to Brit. Columbia.

T. rivale Watson Proc. Am. Acad. xx, 378. Rhizome oblong, 6-10 lines long, horizontal: stem slender, 2-10 inches long, erect or ascending, leaves ovate, obtuse and apiculate to acute or acuminate, 1½-3 inches long: rounded or subcordate at base, on petioles 4-10 lines long: flower on a slender usually declined peduncle 1-3 inches long: sepals broadly lanceolate, acute to acuminate 6-10 lines long: petals broadly lanceolate to ovate, acute to acuminate, narrowed below to a claw, but little longer than the sepals, white, speckled with purple near the centre: stamens about equaling the short recurved stigmas: capsule slightly if at all lobed. On rocky banks in the Coast Mountains, southern Oregon and adjacent California.

ORDER XCVIII MLANTHACEÆ R. Br. Prodr. i, 272.

Leafy-stemmed herbs with rootstocks or bulbs, broad or

grass-like leaves and perfect, polygamous or dioecious flowers in terminal racemes, panicles or umbels. Perianth of 6 distinct or nearly distinct mostly persistent segments. Stamens 6, borne on the base of the perianth-segments. Anthers small, 2-celled or confluent 1-celled, cordate or reniform, mostly extrorsely dehiscent. Ovary 3-celled, superior or partly inferior, with few to numerous anatropous or amphitropous ovules in each cell. Styles 3, distinct or more or less united. Fruit a mostly septicial few- to many-seeded capsule. Seeds commonly appendaged. Embryo small, in copious albumen.

* Leaves not rigid nor equitant: flowers usually polygamous: anthers 1-celled, peltate after opening.

- 1 **Veratrum** Stems tall and stout, from a thick rootstock: leaves broad, strongly nerved and plicate.
- 2 **Stenanthella** Stem erect, from a coated bulb: leaves linear, keeled: flowers in paniced racemes: perianth nodding, its segments acuminate, without glands.
- 3 **Zygodenus** Stem erect, from a coated bulb: leaves linear: inflorescence racemose or subpaniculate: perianth erect, the segments not acuminate, glandular at base.

** Flowers perfect, on bracteolate pedicels in a simple raceme on an equitant-leafy stem from a creeping rootstock: anthers 2-celled, introrse: seeds numerous.

- 4 **Tofieldia** Flowers involucrate with 3 scarious united bractlets: filaments naked; style short: capsule ovate, 3-beaked: seeds horizontal, not caudate.
- 5 **Abama** Bractlets linear: filaments woolly: style none: capsule oblong, attenuate upward: seeds ascending, caudate at each end.

*** Stems stout, very leafy, from a thick rhizome: leaves very narrow, rigid and rough-margined: flowers perfect, on naked pedicels in a simple dense raceme.

- 6 **Xerophyllum** Flowers white, on long pedicels: segments 5-7-nerved: seeds few, not appendaged.

1 VERATRUM L. Sp. 1044.

Tall perennial herbs with thick rootstocks, broad strongly veined plicate leaves and rather large flowers in a terminal pubescent panicle, the lower flowers mostly staminate only. Perianth of 6 distinct similar segments. Stamens free, with subulate filaments and cordate confluent 1-celled anthers that are peltate after opening. Ovary sessile, 3-celled. Styles distinct, stigmatic at the apex. Capsule membranaceous, 3-beaked by the persistent diverging styles, septicial to the base. Seeds several in each cell, ascending, compressed and margined or winged, with close thin whitish testa.

V. virida Ait. Hort. Kew. iii, 422. Stems stout, 2-7 feet high, very leafy: leaves broadly elliptical and acute, or the upper ones lanceolate and acuminate, 3-9 inches long: branches of the simple panicle slender, more or less drooping: bracts foliaceous, lanceolate, usually nearly equalling the

STENANTHELLA

flowers: segments of the perianth oblanceolate, ciliate-serrulate, 4-6 lines long, greenish-yellow, adnate to the attenuate base of the ovary: stamens 2-3 lines long: ovary glabrous: capsule oblong-ovate, acute, 10-12 lines long, many-seeded: seeds 4-5 lines long. In damp woods in the high mountains, Oregon to Alaska and the Eastern States and Canada.

V. Californicum Durand Journ. Philad. Acad. iii, 103. ? Stems very stout, 3-10 feet high, very leafy: lower leaves broadly oval, 6-12 inches long, 4-8 inches wide, obtuse to acute; the uppermost ones lanceolate, much reduced and bract-like: branches of the panicle slender, ascending: bracts ovate-lanceolate to subulate, shorter or several times longer than the pedicels: segments of the perianth greenish-white, lanceolate, obtuse, attenuate at base, 8-10 lines long, entire, or denticulate above, slightly adnate to the ovary: stamens 3-5 lines long: ovary glabrous: capsule an inch or more long. In swamps, Washington to California and Colorado.

V. caudatum Heller Bull. Torr. Bot. Club xxvi, 588. by the description does not differ from the above except in glabrous leaves: it grows in wet meadows, Chehalis County, Washington.

2 **STENANTHELLA** Rydberg Bull. Torr. Bot. Club xxvii, 530.

Erect glabrous herbs with coated bulbs, few narrow leaves and perfect flowers in bracted racemes or panicles. Perianth of 6 distinct lanceolate acuminate subequal marcescent segments without glands or distinct claw. Stamens 6, shorter than the perianth-segments and inserted on their bases, free. Anthers reniform, confluent 1-celled and peltate after opening. Ovary ovoid, superior. Styles 3. Capsule 3-beaked, septicial to the base. Seeds oblong, winged.

S. occidentalis Rydb. l. c. 531. *Stenanthium occidentale* Gray. Bulb oblong-ovoid, 4-6 lines in diameter: stem slender, 10-20 inches high: leaves linear-lanceolate, acuminate, 6-12 inches long, 3-12 lines wide: raceme simple, or branched at base: bracts somewhat scarious, broadly lanceolate, acuminate, 3-12 lines long: pedicels slender, spreading or recurved, longer than the bracts: flowers campanulate, nodding: segments of the perianth brownish-purple, 6-8 lines long, oblong to lanceolate, acuminate, the tips spreading or recurved: capsule at length strictly erect, 6-8 lines long, attenuate into the elongated slender styles: seeds linear, flat, winged, 3-4 lines long. On rocky banks and bluffs, Oregon to Brit. Columbia and Idaho.

3 **ZYGADENUS** Michx. Fl. i, 213. (1803.)

Erect herbs with coated bulbs, leafy stems, linear leaves and rather small white or yellowish flowers in terminal glabrous panicles or racemes. perianth of 6 distinct similar marcescent segments bearing 1 or 2 glands just above the narrowed base. Stamens free from the perianth-segments and about equalling them in length: anthers cordate or reniform, confluent 1-celled. Capsule 3-lobed and 3-celled, the cells not diverging, dehiscent to the base. seeds several or numerous in each cell, oblong or linear, angled.

* Flowers rather large, mostly perfect.

Z. elegans Pursh Fl. 241. Stem 6 inches to 3 feet high: leaves glaucous, 2-6 lines broad: raceme simple, or sparingly branched below, often few-flowered: bracts ovate lanceolate, usually purplish: perianth adnate to the base of the ovary, its segments broad, oval or obovate, obtuse, 4-5 lines

the inner abruptly contracted to a broad claw; gland obcordate: styles about 2 lines long: seeds oblong, angular, not margined, 2 lines long. In moist places, eastern Oregon to Alaska and Illinois.

Z. Douglasii Torr. Pac. R. Rep. vii, *Z. Fremonti* Watson. Stem rather stout, $1\frac{1}{2}$ - $2\frac{1}{2}$ feet high: leaves 6-12 lines wide, nearly as long as the stem: bracts mostly green, ovate, acuminate, 6-15 lines long; pedicels stoutish, 1-2 inches long, exceeding the bracts: perianth-segments white or yellowish, free from the ovary, 5-7 lines long, the outer not clawed, the inner contracted to a broad claw: glands irregular, toothed on the upper margin: stamens about half as long as the segments: styles about a line long: capsule 6-12 lines long: seeds less than 2 lines long. Along the coast, southern Oregon to California.

* * Flowers smaller, polygamous.

Z. paniculatus Watson Bot. King 343. Stem usually stout, 1-2 feet high; leaves 6-8 inches long, usually all sheathing, roughish on both sides, mostly falcate: raceme usually paniced, many-flowered: bracts mostly scarious, shorter than the pedicels: segments of the perianth 1-2 lines long, oblong, acute, rather abruptly contracted to a claw: gland not very definitely margined, often reaching nearly to the middle of the blade: stamens equalling or longer than the segments: capsule oblong-ovate, 6-12 lines long. On dry foothills, eastern Oregon and Washington to Montana and Nevada.

Z. venenosus Watson Proc. Am. Acad. xiv. 279. Stem rather slender, 8-30 inches high: leaves 4-15 inches long, 2-3 lines wide, scabrous, the cauline not sheathing: racemes usually simple, with narrow scarious bracts: perianth free from the ovary, its segments triangular-ovate to elliptical, obtuse or rarely acutish, 2-3 lines long, all abruptly contracted to a short glandular claw, the blade rounded or subcordate at base: gland extending slightly above the claw, with a well defined irregular margin: stamens longer than the segments; capsule 4-6 lines long: seeds $1\frac{1}{2}$ - $2\frac{1}{2}$ lines long. Common in meadows, California to Brit. Columbia and Utah.

Z. intermedius Rydb. Bull. Torr. Bot. Club, xxvii, 535. Stem rather stout, 1-2 feet high: leaves scabrous on the margins and midrib, 6 inches or more long, 3-5 lines wide, keeled and sometimes conduplicate, all with conspicuous scarious sheaths at base: raceme rather long: segments of the perianth 3-4 lines long, obtuse, the outer ones broadly ovate and acute or rounded at base, short-clawed, the inner oblong, subcordate at base, with a claw half a line long: gland almost semi-orbicular, the upper margin toothed but thin and not well defined. Idaho to Montana and Utah.

Z. gramineus Rydb. l. c. Stem slender. 8-14 inches high: leaves narrowly linear, scabrous on the margins and midrib, 4-8 inches long, 1-3 lines wide, conduplicate and somewhat falcate, all with distinct scarious sheaths surrounding the stem: racemes rather short: bracts scarious, lanceolate, long-acuminate: outer segments of the perianth broadly ovate, obtuse, acute at base and very short-clawed, inner ones ovate obtuse, subcordate at base, with a claw about a line long: gland almost semi-orbicular, the upper edge toothed but thin and not well-defined: capsule elongated-ovoid, 4-5 lines long. Idaho to Alberta and Nebraska.

4 TOFIELDIA Huds. Fl. Angl. ed. 2, 157. (1778.)

Perennial herbs with short running rootstocks, fibrous roots, erect stems, linear somewhat 2-ranked and equitant leaves clustered at the base and small perfect white or greenish flowers in a terminal bracted raceme, the flowers usually involucrate by 3

scarious more or less united bractlets on the pedicel. Perianth of 6 distinct 3-nerved persistent segments. Stamens 6, equalling the segments and inserted at their bases: filaments narrowly subulate: anthers round-cordate, attached by the base, 2-celled, laterally dehiscent. Ovary sessile, 3-lobed and 3-celled, with several ovules attached to the inner angle in each cell. Styles short, distinct, with small terminal stigmas. Capsule membranaceous or rigid, beaked by the 3 persistent styles, septicidally dehiscent. Seeds several to many, with thin membranous testa, often tailed.

T. glutinosa Pers. Syn. i, 399. Stem viscid-pubescent with black glands, 6-20 inches high, bearing 2-4 leaves near the base: radical leaves tufted, 3-7 inches long, 1-8 lines wide: raceme oblong, the upper flowers first appearing: pedicels commonly clustered in 3's, ascending viscid-pubescent, becoming 2-6 lines long in fruit: involucre bracts minute, united nearly or quite to their apices, borne just below the flower: segments of the perianth oblong, mostly obtuse, about 2 lines long, membranous: capsule oblong, about 3 lines high, 3-valved: seeds tailed at both ends. In mountain marshes, Oregon to Alaska and across the Continent.

T. intermedia Rydb. Bull. Torr. Bot. Club, xxvii, 528, Stem slender, about a foot high, viscid-pubescent with black glands above, leafy below: leaves 3-10 inches long, $\frac{3}{4}$ -3 lines wide: raceme dense, 6-12 lines long: bracts broad ovate: pedicels usually 3 together, a line or less long: involucre bracts 3, broadly triangular, united for $\frac{2}{3}$ their length: segments of the perianth oblong, about a line long, acute, bright white, drying yellowish: capsule ovoid, about 3 lines long: seeds appendaged. In mountain marshes, Oregon to Alaska.

T. occidentalis Watson Proc. Am. Acad. xiv, 283. Stem stout, 1-3 feet high, glandular above, sparingly leafy below: leaves 2-12 inches long, numerous: raceme 1-2 inches long, dense: pedicels 2-3 together, 2-3 lines long, viscid below the involucre bracts which are united to the middle: segments of the perianth oblong, about 3 lines long: capsule obovate, 3-4 lines long, long-beaked: seeds angular-ovate, with loose white spongy testa and a slender tail at the outer end nearly as long as the body. In marshes, northern California to the Cascade Mountains in Washington.

5 ABAMA Adans. Fam. Pl. ii, 47. (1763.)

NARTHECIUM Juss. Gen. 47. (1789.)

Perennial herbs with creeping or horizontal rootstocks, fibrous roots, erect simple stems, linear grass-like leaves and small perfect flowers in terminal bracted racemes, the pedicels bracteolate near the middle. Perianth of 6 distinct persistent segments. Stamens 6, hypogynous, distinct: filaments subulate, pubescent: anthers linear, attached by the base, introrse. Ovary sessile, linear-oblong, 3-celled, many-ovuled, attenuate upward to the small slightly lobed stigma. Capsule thin-chartaceous, loculicidally 3-valved. Seeds numerous ascending from near the base, small and linear, with thin transparent testa, and a long bristle-like tail at each end.

A. California Heller. *Narthecium Californicum* Baker. Rootstocks slender, with scarious scales at the nodes: stems slender, densely tufted, 10-20 inches high: radical leaves 5-6 inches long, 1-2 lines wide, cauline

2 or 3, short: raceme loose, becoming 3-15 inches long, 30-40-flowered: pedicels 3-6 lines long, twice longer than the linear-lanceolate bracts and bractlets: segments of the perianth 3-4 lines long, a third longer than the stamens, bright yellow: filaments woolly except near the top: capsule exerted, the cells 10-15-seeded. In marshes in the Coast Mountains, southern Oregon and northern California.

6 XEROPHYLLUM Michx. Fl. i, 210. (1803.)

Tall perennial herbs with thick short woody rootstocks, coarse fibrous roots, simple erect leafy stems, narrow linear serrulate persistent leaves and many small white flowers in a terminal raceme. Perianth of 6 distinct several-nerved persistent segments. Stamens 6, inserted at the base of the segments, with filiform-subulate filaments and rounded extrorse laterally dehiscent anthers. Ovary sessile, ovate, 3-lobed, with 1-2 pairs of ovules in each cell. Capsule chartaceous, loculicidally dehiscent to the base, and sometimes also septicial. Seeds 2-4 in each cell, ascending, oblong, somewhat triangular-flattened, with thin longitudinally wrinkled, rather light-colored testa.

X. tenax Nutt. Gen. i, 235. Rootstock often an inch thick or more: stems stout, 2-6 feet high, leafy below: radical leaves numerous, 1-3 feet long, about 2 lines wide. flat above, rather rigid; cauline leaves shorter, scattered, gradually reduced upward: racemes at first dense, elongating and becoming 1-2 feet long: lower bracts foliaceous and serrulate, the upper scarious and often upon the lower part of the pedicel: pedicels an inch or two long, erect in fruit: segments of the perianth 4-5 lines long, scarcely equalling the stamens: styles 2 lines long: capsule broadly ovate, acute, nearly 3 lines long, 3-valved: seeds narrowly oblong. Common in the high mountains, California to Brit. Columbia and Idaho.

X. Douglasii Watson Proc. Am. Acad. xiv, 284. "Pedicels shorter, (6-15 lines long): flowers smaller, the segments ($2\frac{1}{2}$ lines long) exceeding the stamens: styles a line long: capsule cordate-ovate, 2 lines long, 6-valved, the abruptly acute cells separating and then dehiscing: seeds shorter and broader. Oregon to Montana."

ORDER XCIX PONTEDERIACEÆ Dumort. Fam. 59. (1829)

Perennial aquatic or bog plants with grass-like or petioled thick leaves and perfect more or less irregular solitary or spiked flowers subtended by leaf-like spathes, Perianth free from the ovary, corolla-like, 6-parted. Stamens 3 or 6, inserted on the tube or the base of the perianth: filaments filiform, dilated at base or thickened at the middle: anthers 2-celled, linear-oblong or rarely ovate. Ovary 3-celled with the placenta in the axis, or 1-celled with 3 parietal placenta. Style filiform or columnar, with terminal entire or minutely toothed stigma. ovules anatropous, numerous, sometimes only one of them perfect. Fruit a many-seeded capsule or 1-seeded utricle. Embryo central, cylindrical, in copious albumen.

1 HETERANTHERA R. & P, Prodr. Fl. Per. 9. (1794.)

Herbs with creeping, ascending or floating stems, grass-like or petioled leaves and small yellow, white or blue flowers subtended

by a spathe. Lobes of the perianth nearly or quite equal, linear. Stamens 3, inserted on the throat of the perianth. Ovary fusiform, completely or incompletely 3-celled by the intrusion of the placenta: ovules numerous: stigma 3-lobed. Fruit an ovoid many-seeded capsule enclosed in the marcescent tube of the perianth. Seeds ovoid, striate.

H. dubia Mac M. Met. Miun. 138. *Schollera graminifolia* Willd. Aquatic perennial: stem slender, forked, often rooting at the nodes, 1-4 feet long; leaves linear, flat, acute, their sheaths thin, furnished at the top with small acute stipule-like appendages: spathes 1- or 2-flowered: flowers light yellow: perianth-segments narrow, 3-4 lines long, the tube 1-3 inches long; capsule 1-celled, torulose, 3-4 lines long. In ponds, Oregon to California and the Atlantic States.

ORDER C ARACEÆ Neck. Act. Acad. Theod. Palat. ii, 462.

Glabrous perennial herbs with all radical or alternate leaves and perfect, monœcious or diœcious flowers sessile and crowded upon a spadix which is surrounded by a simple spathe. Perianth none, or of 4 scale-like segments. Stamens 4 in our species: filaments very short: anthers 2-celled, opening by pores or slits. Ovary one- to several-celled, with one to several ovules in each cell. Style short or wanting: with terminal mostly minute and sessile stigma. Seeds various, mostly minute and albuminous.

1 LYSICHITON Schott Prodr. Aroid. 421.

Acaulescent swamp herbs with large flat leaves from a thick horizontal rootstock and numerous small flowers on a spadix surrounded by a spathe with a sheathing base that at first envelopes it but at length becoming long exerted upon a stout peduncle. Flowers perfect, crowded and covering the spadix, with 4-lobed perianth and 4 stamens opposite to the lobes. Filaments short and flat: anthers 2-celled, opening upward. Ovary conical, 2-celled, with 2 horizontal orthotropous ovuls. Stigma depressed. Fruit fleshy, somewhat immersed in the rachis and coalescent.

L. Kamtschateensis Schott l. c. Leaves 1-4 feet long, 3-18 inches wide, oblong to oblong-lanceolate, acute, narrowed below to a short margined petiole or sessile: spathe yellow, with a broad acute blade 2-6 inches long, narrowed below to a sheathing petiole 3-10 inches long: peduncle very stout, 8-12 inches long; spadix broader, 2-4 inches long, densely flowered. Common in swamps, California to Alaska and Kamtschatka.

ORDER CI TYPHACEÆ J. St. Hil. Expos. Fam. i, 60.

Aquatic perennial herbs with creeping rootstocks, cylindrical solid stems, alternate linear entire sessile leaves and monœcious flowers in heads or on a spadix without perianth, the upper staminate, the lower pistillate. Stamens and ovaries intermixed with bristles or scales. Anthers linear, longitudinally dehiscent. Ovaries one- or two-celled, one-ovuled, with slender style and one-sided stigmas. Fruit nut-like. Seeds pendulous, ana-

tropous, with straight axile embryo and copious albumen.

1 *Sparganium* Flowers in globular heads with foliaceous bracts.

2 *Typha* Flowers in a cylindrical compact terminal spike.

1 SPARGANIUM L. Sp. 971.

Aquatic herbs with erect or floating stems, linear alternate leaves and small flowers densely crowded in globose heads on the upper part of the stem and branches, the staminate heads uppermost. Spathes linear, immediately beneath or at a distance below the head. Perianth represented by a few chaffy scales. Stamens usually 5, with distinct filaments and oblong or cuneate anthers. Ovary sessile, mostly 1-celled. Fruit nut-like.

S. eurycarpum Engelm. in Gray's Man. ed. 2, 430. Stems stout, 2-8 feet high, branching: leaves linear, flat, slightly keeled, the lowest 2-6 feet long, the upper shorter: staminate heads numerous; pistillate heads 2-4 on the stem or branch, sessile or peduncled, compact, 10-16 lines in diameter when mature: style 1; stigmas 1 or 2: nutlets sessile, 3-5 lines long, obtusely 4-5-angled, narrowed at base, the top rounded, flattened or depressed, abruptly tipped with the style: scales as long or nearly as long as the fruit, and as many as its angles, often with 2 or 3 outer ones, somewhat spatulate, the apex rounded and denticulate or erose. In marshes and along streams, California to Brit. Columbia and the Eastern States.

S. androcladum Morong Bull. Torr. Bot. Club. xv, 78. Stems slender, more or less branching 10-20 inches high; pistillate heads 3-7, sessile or the lowest peduncled: style 1; stigmas 1, rarely 2: heads 6-12 lines in diameter when mature: scales oblong, as long as the nutlets or shorter: nutlets fusiform, 2-3 lines long, often strongly contracted at the middle, tapering into the style, pedicelled. In ponds, Oregon to Brit. Columbia and the Eastern States.

S. simplex Huds. Fl. Angl. ed. 2, 401. Stems slender, 2-20 inches high, simple: leaves more or less triquetrous, 2-4 lines wide: staminate heads 4-7, pistillate 2-6, sessil, or the lowest peduncled, 5-8 lines in diameter when mature: scales about half as long as the nutlets, denticulate: nutlets fusiform or narrowly oblong, obtusely angled at the apex, more or less contracted in the middle, pedicelled: stigma linear, as long as the style. Borders of ponds and streams, California to Alaska and across the Continent.

Var. angustifolium Engelm. in Gray Man. ed. 5, 481. Floating in deep water: leaves very long, 1-2 lines wide, their sheaths often inflated at base: pistillate heads 1-4, 3-7 lines in diameter. In mountain lakes and slow streams, California to Oregon Newfoundland and New York.

S. minimum Fries Sum Veg. ii, 560. Floating: stems very slender, 4 inches to 3 feet long: leaves very thin and lax, 1-3 lines wide: staminate heads 1 or 2, pistillate 1-3, sessile 2-5 lines in diameter when mature; scales about half as long as the fruit, denticulate: stigmas oval, often oblique: nutlets ovoid, slightly triangular, tapering abruptly into the style, 1-2 lines long sessile or nearly so. In ponds and streams, Oregon to Utah, Michigan, New Jersey and New Brunswic.

TYPHA L. Sp. 971.

Marsh or aquatic plants with creeping rootstocks, simple erect terete stems, linear flat ensiform leaves with sheathing base, and very numerous small flowers in dense terminal spikes subtended by spathaceous usually fugaceous bracts, the staminate spikes

uppermost. Ovaries long-stipitate, 1-celled, surrounded by numerous bristles and clavate rudimentary ovaries. Styles filiform. Fruit nut-like, small, usually splitting on one side. Seeds linear striate.

T. latifolia L. Sp. 971. Stems stout, 4-8 feet high; leaves nearly equalling or exceeding the stem, 3-12 lines wide: pistillate spike dark brown or black, at length an inch in diameter; the staminate portion usually contiguous, each 3-12 inches long: pollen grains in 4's: pistillate flowers without bracts: stigmas rhomboid or spatulate. In marshes throughout North America, Europe and Asia, except the extreme north.

T. angustifolia L. Sp. 971. Stems slender, 2-10 feet high; leaves 2-6 lines wide, somewhat convex on the back: spikes light brown, the staminate and pistillate portions usually distant, the two together sometimes 15 inches long, the pistillate portion when mature 2-8 lines in diameter and provided with bractlets: pollen grains simple: stigmas linear or linear-oblong. In marshes, California and Oregon to the Eastern States and Europe.

ORDER CII LEMNACEÆ Dumort. Fl. Belg. 147. (1827.)

Very small floating stemless herbaceous plants consisting of flattened disk-like fronds with one or more rootlets from the middle below, and monoecious flowers without perianth imbedded in the frond. Flowers consisting of 1-2 stamens or a flask-shaped 1-celled several-ovuled pistil. Style simple, with funnel-form stigma. Fruit a 1-6-seeded utricle. Seeds comparatively large, with straight axile embryo, albuminous.

1 **Lemna** Frond 1-5-nerved, with a single rootlet.

2 **Spirodela** Frond 7-11-nerved, with several rootlets.

1 LEMNA L. Sp. 970.

Fronds 1-5-nerved, containing numerous acicular raphides, destitute of vascular tissue proliferous from a lateral slit, usually on each side near the base, with a single rootlet. Flowers marginal, bracteate, diandrous. Filaments slender: anthers didymous, each cell bilocular by a transverse partition, dehiscing transversely. Seeds 1-6, mostly ribbed.

L. trisulca L. Sp. 970. Fronds thin, oblong or oblanceolate, 6-9 lines long, attenuate at base into a slender stalk, very obscurely 3-nerved, often without rootlets, usually several series of offshoots remaining connected: bracts sac-like: seeds ovate, amphitropous, with small round operculum. In ponds, throughout most of North America: also in Europe and Asia.

L. minor L. Sp. 970. Fronds round to elliptic-ovate, 1-3 lines in diameter, rather thick, very obscurely 3-nerved: seeds oblong-obovate, amphitropous, with prominent rounded operculum. Common in ponds in all parts of the world.

2 SPIRODELA Schleiden Linn. xiii. 391. (1839.)

Fronds 7-12-nerved. Rootlets several, with axile vascular tissue. Anther-cells bilocellate by a vertical partition and longitudinally dehiscent. Ovary 2-ovuled.

S. polyrhiza Schleiden l. c. Fronds round-obovate, 2-5 lines long, thick, flat and dark green above, slightly convex and purple beneath, pal-

mately 5-10-nerved, each with a central cluster of 2-11 elongated rootlets. Common in still water throughout most parts of the world.

ORDER CIII VALLISNERIACEÆ Dumort. Anal. Fam. 54.

Submerged or floating aquatic herbs with various leaves and regular mostly dioecious flowers. Perianth 3-6-parted: the segments all petaloid, or the outer ones smaller and herbaceous, the tube adherent to the ovary at its base. Stamens 3-12, distinct or monadelphous. Anthers 2-celled. Ovary 1-celled with 3 parietal placenta or 6-9-celled. Styles 3-9, with entire or 2-cleft stigmas. Fruit an indehiscent few-many-seeded utricle, ripening under water.

1 PHILOTRIA Raf. Am. Month. Mag. ii, 175.

Aquatic perennial herbs with leafy branched stems, numerous opposite or whorled sessile 1-nerved leaves and small flowers in membranaceous spathes. Flowers polygamo-dioecious, solitary and sessile in an axillary spathe. Perianth small in the staminate flowers with 3 scarcely united greenish sepals and as many narrow petals: the pistillate with greatly elongated filiform tube and 6-parted spreading limb. Stamens 3-9, with short filaments united at base. Ovary 1-celled, with 3 parietal placenta, few-ovuled. Style coherent with the perianth-tube: stigmas 3, bifid or emarginate. Fruit a few-seeded utricle.

P. Canadensis Britton Science (II) ii, 5. *Anacharis Canadensis* Pl. Stems 4 inches to 3 feet long, according to the depth of the water, much branched: leaves linear or elliptic, acute or obtuse, serrulate or entire, 2-7 lines long, 1-2 lines wide: flowers axillary, the staminate minute, sessile, breaking off at the time of flowering and rising to the surface where they shed their pollen: pistillate flowers expanding on the surface of the water which they reach by the elongation of the slender tube which varies in length from 2-12 inches: stigmas spreading, papillose or pubescent. Common in ponds, nearly throughout North America.

ORDER CIV NAIADACEÆ Lindl. Nat. Syst. ed. 2, 366.

Aquatic herbs with slender often branching leafy stems, flat or filiform leaves and perfect, monoecious or dioecious flowers in axillary spikes or solitary or spadaceous. Perianth of 4 segments or a hyaline envelope or wanting. Stamens 1-4, rarely more, distinct and hypogynous in the perfect flowers, solitary or connate in the sterile. Anthers extrorse, 1-2-celled. Ovaries 1-6, distinct, or rarely connate, 1-celled, mostly 1-ovuled. Fruit follicular or capsular or an indehiscent berry or utricle. Embryo large, often curved. Albumen none.

* Perianth membranaceous, and cup-shaped or none.

+ Flowers monoecious or dioecious: ovary solitary, sessile: stamen 1.

1 **Najas** Stems slender, with opposite or ternate leaves: flowers dioecious: solitary or clustered, axillary: perianth none in pistillate flowers, cup-shaped and membranaceous in staminate: style with 2-4 subulate stigmas

- 2 **Zostera** Stems slender, from creeping rootstocks: perianth wanting: ovaries and stamens alternate in 2 vertical rows on the inner side of a margined leaf-like enclosed spadix: ovaries pendulous: stigmas 2.
- 3 **Phyllospadix** Stems floating, from creeping rootstocks: flowers diœcious, without perianth: anthers sessile, in 2 rows on a spadix: ovaries in 2 rows on the inner side of a margined enclosed spadix, ascending: stigmas 2, linear, sessile.
- 4 **Lilæa** Annual stemless plants: flowers monœcious; staminate in close spikes on scapes under a single bract; pistillate flowers at the base of the leaves with very long styles, or in dense heads on scapes; stigmas capitate
- + + Ovaries about 4, nearly sessile, becoming more or less stipitate.
- 5 **Zannichellia** Leaves opposite: flowers monœcious, axillary or nearly so: anther solitary, on a slender naked filament: pistillate flowers solitary, with a cup-shaped membranaceous spathe or perianth: stigma peltate.
- 6 **Ruppia** Leaves alternate: flowers perfect, 2 or more on an enclosed spadix, at length long-exserted, without perianth: anthers 2, sessile: stigma depressed.
- * * Flowers perfect, with herbaceous 4-parted perianth, in a peduncled spike.
- 7 **Potamogeton** Ovaries and anthers 4, sessile: stigma sessile.

1 NAIAS L. Sp. 1015.

Slender branching aquatic wholly submerged plants with opposite, alternate or verticillate leaves with sheathing bases, and inconspicuous monœcious or diœcious flowers in axillary clusters or solitary. Staminate flowers of a single stamen and a membranous tubular 4-lobed perianth within a small cup-shaped membranous spathe. Anther 4-celled, nearly sessile: pollen granular. Pistillate flowers without perianth or spathe, the oblong ovary terminated by a short style and 3-4 narrowly subulate stigmas. Fruit a membranous utricle, filled by the single erect anatropous seed.

N. flexilis Rost. & Schmidt Fl. Sed. 384. Stem slender, dichotomously much branched 6-18 inches long: leaves linear, acuminate or abruptly acute, 6-12 lines long, $\frac{1}{2}$ -1 line wide, numerous and crowded upon the upper part of the branches, with 25-30 minute teeth on each side; sheaths obliquely rounded, with 5-10 teeth on each margin: fruit ellipsoid, with very thin pericarp, 1-2 lines long: style long, persistent; stigmas short: seed smooth, shining, straw-color, sculptured with 30-40 rows of nearly square or hexagonal reticulations. In ponds and streams, throughout nearly all parts of North America: also in Europe.

N. Gaudalupensis Morong Mem. Torr. Bot. Club, iii, 60. Stem nearly capillary 1-2 feet long, widely branched from the base: leaves numerous, 6-9 lines long, $\frac{1}{4}$ - $\frac{1}{2}$ line wide, acute, opposite or in fascicles of 2-5, frequently recurved, with 40-50 teeth on each margin: fruit about a line long; pericarp dark and strongly marked by 15-20 rows of hexagonal or rectangular reticulations which are transversely oblong: seed straw-color, not shining. In ponds and streams, Oregon to Nebraska and Texas: also in tropical America.

2 ZOSTERA L. Sp. 968.

Marine plants with creeping rootstocks, branching compressed

stems, long grass-like entire few-nerved leaves and inconspicuous flowers on an enclosed spadix. Flowers monoecious, without perianth, the single stamens and ovaries arranged alternately in 2 rows upon the face of a linear-oblong leaf-like sessile spadix enclosed in the dilated membranous base of a leaf. Anther 1-celled, sessile; pollen thread-like. Ovary attached near its apex, beaked by a short style with 2 linear deciduous stigmas, with a single pendulous orthotropous ovule. Fruit utricular, oblong. Seed with suberustaceous testa. Embryo split longitudinally and enclosing the long linear curved plumule.

Z. marina L. Sp. 968. Stems rather fleshy, 1-7 feet long: leaves ribbon-like, obtuse at the apex, 1-8 feet long, 2-4 lines wide, with 3-7 principal nerves; spadix 1-3 inches long: flowers crowded, usually from 10-20 of each kind on the spadix: at anthesis the stigmas are thrust through the opening of the spathe and drop off before the anthers of the same spadix open: the anthers at maturity work their way out and shed their glutinous stringy pollen into the water: seeds cylindrical, strongly about 20 ribbed, about $1\frac{1}{2}$ lines long, truncate at both ends. In bays and streams along the coast, Alaska to California and on the Atlantic coast and Europe.

Z. latifolia Morong, Mem. Torr. Bot. Club, iii, 63. Rootstocks very thick: stems stout 2-10 feet long: leaves 2-4 feet long, 3-6 lines wide, the broadest 10-13-nerved: spadix 2-3 inches long: fruit $1\frac{1}{2}$ -2 lines long, cylindrical, with a straight beak as long as itself and attached to the spadix by a short stipe, distinctly 20-25-costate. In bays, Puget Sound to Calif.

3 PHYLLOSPADIX Hook. Fl. ii, 171.

Perennial marine herbs with thick rootstocks, slender stems, elongated linear leaves and inconspicuous dioecious flowers on a spadix. Staminate flowers of numerous sessile anthers in 2 rows crowded upon a spadix. Anthers 1-celled dehiscing by a vertical slit, dorsally attached near the middle: pollen thread-like. Pistillate flowers of sessile ovaries attached above the base, attenuate into a short style. Stigmas 2, capillary. Fruit a coriaceous utricle.

P. Scouleri Hook. l. c. Stems very stout, an inch or two high, bearing solitary spathes: leaves 2-6 feet long, 1-2 lines wide, 3-nerved, with many fine striae between the nerves: spadix appendages on both kinds of flowers elliptical, about 6 lines long; fruit broadly flattened, the lobes half as broad as the body. On rocks that are exposed at low tide along the coast, Oregon to Alaska.

4 LILÆA Humb. & Bonpl. Pl. Ag. i, 221. (1808.)

Annual acaulescent paludose plants with terete leaves and dimorphous flowers sessile among the leaves and in heads on simple scapes. Staminate and pistillate flowers in the same or separate heads, without perianth. Stamens solitary. Anthers nearly sessile, rounded, 2-celled, subtended by a hyaline bract. Ovaries naked, sessile and erect in the axils of the leaves with very long styles and in heads on exserted scapes with short styles. 1-celled and 1-ovuled. Stigma capitate. Fruit coriaceous, ovoid, indehiscent, compressed and ribbed, the upper narrowly winged, the

lower wingless and laterally toothed at the summit, Seed with membranous testa and straight narrow embryo.

L. subulata Humb. & Bonpl. l. c. Leaves 6 inches to 2 feet long or more, 1-2 lines thick: heads crowded, 6-12 lines long, on scapes shorter than the leaves: staminate bracts narrowly oblong, obtuse, $\frac{1}{2}$ line long, twice longer than the anthers: radical fruits 3 lines long, the filiform styles often nearly as long as the scapes: upper fruits elliptical, acute, somewhat smaller. In shallow water or mud, Vancouver Island to South America.

5 ZANNICHELLIA L. Sp. 969.

Very slender immersed branching aquatic herbs with filiform flattened mostly opposite leaves, with small free membranous stipules, and inconspicuous monœcious flowers in axillary clusters. Staminate flowers of a single naked stamen with elongated filament and 2-celled anther. Pistillate flowers usually in the same axils, of 2-5 sessile or shortly stipitate ovaries in a membranous cup-shaped perianth or spathe: style short, with peltate stigma. Ovule solitary, suspended. Fruit an obliquely oblong coriaceous nutlet, somewhat compressed, beaked by the short style. Seeds with membranous testa. Embryo slender, the attenuate cotyledonary end bent into a coil.

Z. palustris L. Sp. 969. Stems 2 inches to 2 feet long, branching and leafy: leaves about 3 inches long, $\frac{1}{4}$ line or less wide, thin, 1-nerved: fruit sometimes incurved, often more or less toothed on the back, 1-1 $\frac{1}{2}$ lines long, about twice longer than the style, usually becoming shortly stipitate and often also pedunculate. In fresh-water ponds and slow streams, throughout most parts of the World.

6 RUPPIA L. Sp. 127.

Slender branching submersed herbs growing in brackish or salt water, with filiform or capillary alternate leaves, with broadly sheathing bases, and small perfect flowers enclosed in the base of the leaves. Flowers on a capillary spadix-like peduncle, without perianth, consisting of 2 sessile anthers, each with 2 separate cells, attached by the back to the peduncle, having between them several pistillate flowers in 2 sets on opposite sides of the rachis, the whole at first enclosed in the base of a leaf, the peduncle at length long exerted and bearing the ovaries in 2 clusters at the end. Ovaries at first sessile, with nearly sessile depressed stigmas and solitary suspended camplytropic ovules. Fruit obliquely ovoid, very shortly beaked, on elongated slender stipes, hard and drupe-like. Seed with membranous testa. Embryo ovoid, with short cotyledon and short lateral plumule.

R. maritima L. Sp. 157. Stems elongated, filiform, 6-20 inches or more high, leafy: leaves 2-4 inches long, $\frac{1}{4}$ line wide, with usually broadly dilated bases: flowers 2-8, in a short close spike: fruiting peduncle 3-6 inches long, contorted: fruit 1 $\frac{1}{2}$ lines long, the stipe 1-12 lines long. In brackish or salt pools along the coast, Alaska to California, and in most parts of the world.

7 POTAMOGETON L. Sp. 126.

Submersed aquatic herbs with slender jointed branching stems, mostly alternate leaves with scarious stipules and perfect flowers in peduncled axillary spikes. Perianth herbaceous, of 4 narrow valvate segments. Stamens 4, opposite to the segments, with nearly sessile 2-celled anthers. Ovaries usually 4 and sessile, with oblique depressed nearly sessile stigmas and solitary ascending campylotropous ovules. Fruit somewhat compressed, ovate, drupe-like, with a crustaceous nutlet within. Seed with membranous testa and strongly curved or spiral embryo.

* Floating leaves more or less coriaceous, with a dilated petioled blade, different in form from the thinner submerged ones: stipules free: spikes cylindrical, mostly dense, not interrupted.

P. natans L. Sp. 126. Stems 1-4 feet long, simple or sparingly branched: floating leaves thick, ovate-elliptic to lanceolate, acutish, slightly cordate at base, usually 2-3 inches long, mostly shorter than the petiole, 21-29-nerved: stipules long and conspicuous, acute or acuminate; upper submersed leaves often with a small lanceolate blade, the lower reduced to petioles: peducles stout, bearing an emersed spike 1-2 inches long: fruit turgid, obliquely obovate, acute, 2 lines long: nutlets with a small deep pit on each side: embryo nearly circular. In ponds and ditches, Alaska to California and across the Continent: also in Europe and Asia.

P. amplifolius Tuckerm. Am. Journ. Sci. (II) vi, 225. Stems often stout, simple: floating leaves elliptic to oblong-lanceolate, acute, mostly rounded or slightly cordate at base, 2-4 inches long, 30-50-nerved, on petioles about as long as the blade; stipules large and conspicuous: submerged leaves often very large, mostly falcate and somewhat undulate, acute, attenuate to a usually short petiole: spikes thick and often dense, 1-3 inches long, on very short peduncles: fruit over 2 lines long, 3-keeled, with a broad stout beak: sides of the nutlet not pitted: embryo slender, the cotyledon incurved. In ponds and streams, Brit. Columbia to California and the Eastern States.

P. pulcher Tuckerm. Am. Journ. Sci. xlv, 38. Stems simple, terete, black-spotted, 1-2 feet long: floating leaves usually massed at the top on short lateral branches, ovate or round-ovate, subcordate, 2-5 inches long, many-nerved: petioles about as thick as the stem, 2-4 inches long, spotted: submerged leaves of two kinds, the uppermost lanceolate, long-acuminate, undulate, 3-8 inches long, 6-8 lines wide, tapering into a short petiole, the lowest much thicker, spatulate, oblong or ovate, on petioles $\frac{1}{4}$ -4 inches long: stipules 2-carinate: spikes dense, long-peduncled: fruit about 2 lines long, turgid, tapering into a stout apical style, the back sharply 3-keeled: embryo coiled. In ponds, Idaho to Main and Georgia.

P. Nuttallii Cham. & Sch. Linn. ii, 226. *P. Claytonii* Tuckerm. Stems compressed, mostly simple, 2-6 feet long: floating leaves narrowly oblong to elliptic, 1-3 inches long, 11-17-nerved, obtuse or acutish, attenuate below into a flattened petiole usually shorter than the blade: stipules sheathing, soon deciduous, an inch or less long: submerged leaves very thin linear, 2-5 inches long, 5-nerved, with a close cellular reticulation between the middle nerves: spikes 6-12 lines long, on short stout peduncles: fruit obovate, 3-keeled, slightly apiculate, 1-1½ lines long: nutlets slightly depressed on the sides: embryo coiled nearly 1½ times. In ponds and streams, California to Alaska and the Eastern States.

P. alpinus Balbis Misc. Bot. 13. (1804). *P. rufescens* Schrad. (1815.)

Stems simple or branched, 1-2 feet high, somewhat compressed: floating leaves often wanting, rather thin, 11-17-nerved, narrowly oblong-elliptic or oblanceolate, 2-4 inches long, acutish, attenuate into a very broad short petiole; submerged leaves as large as the floating ones, sessile or nearly so, mostly attenuate, narrowly oblong-lanceolate, 3-12 inches long, 3-6 lines wide: stipules broad, usually acuminate, 6-12 lines long or more: spikes 1-2 inches long, rather slender, on stout often elongated peduncles: fruit round-obovate, $1\frac{1}{2}$ lines long, compressed acutely margined, beaked by the rather long style: nutlets pitted on both sides: embryo nearly circular. In alpine ponds, Brit. Columbia to California and the Eastern States, also in Europe.

P. lonchites Tuckerman Am. Journ. Sci. (II) vi, 226. Stems rather slender, branching, terete, 3-6 feet long: floating leaves thickish, 11-23-nerved, long-elliptical to oblong-lanceolate, usually 2-4 inches long, 9-15 lines wide, acute or acutish, rather abruptly narrowed into a petiole, usually longer than the blade; submerged leaves thinner, mostly linear-lanceolate, 3-12 inches long, 2-12 lines wide, attenuate at base, the lower sessile: stipules 1-4 inches long: spikes dense, 1-2 inches long, on stout peduncles: fruit obliquely obovate, 1-2 lines long, carinate, acute: nutlets somewhat 3-keeled, the sides scarcely impressed: cotyledons incurved above the base of the slightly incurved embryo. In ponds and slow streams, Washington to California and the Eastern States.

P. heterophyllus Schreb. Special Fl. Lip. xxi, 1771. Stems very slender, branching: floating leaves rather thin, 9-15-nerved, oblong-elliptic, acutish, 1-2 inches long, rounded or cuneate at base, on slender petioles mostly as long or longer than the blade: stipules broad, obtuse, about an inch long: submerged leaves linear-lanceolate, 1-2 inches long, 1-3 lines wide, acute or acuminate, narrowed at base: spikes about an inch long, rather loose, on stout often elongated peduncles: fruit round-obovate, a line long, acute, scarcely keeled: embryo stout, incurved. In different forms throughout most parts of North America: also in Europe.

* * Leaves all submerged and uniform, thin and dilated, numerous, mostly sessile: spikes dense, on stout peduncles.

P. prælongus Wulf. in Rœm. Arch. iii, 331. Stems stout, elongated, branching and flexuous above, usually growing in deep water, sometimes 8 feet long: leaves often lanceolate, 2-10 inches long, 6-12 lines wide, obtuse and somewhat cucullate at the apex, rounded and clasping at base, undulate-serrate: stipules white and conspicuous, 6-12 lines long: peduncles often much elongated; fruit semicircular, 2 lines long, acutely keeled, prominently beaked: embryo slender, the cotyledons pointing to the base of the radicle. In deep water, Brit. Columbia to California and the Eastern States.

P. perfoliatus L. Sp. 126. Stems slender, not flexuous, 2-4 feet high, branching: leaves broadly cordate to cordate-lanceolate, 6-18 inches long, obtuse to acute, clasping at base: stipules small and not persistent: spikes 8-12 lines long, often flowering and fruiting under water: fruit obliquely obovoid, nearly $1\frac{1}{2}$ lines long, obtusely keeled, beaked by the short slender style: embryo slightly incurved or with the apex pointing directly toward the base. In streams and ponds, California to Brit. Columbia and across the continent.

Var. Richardsonii A. Bennett Britten's Journ. Bot. xxvii, 25. Leaves 1-5 inches long, 4-8 lines wide at the broadened amplexicaul base, often curved inward at the apex, 13-23-nerved: fruit about 2 lines long, $1\frac{1}{4}$ lines thick. In streams and ponds, Oregon to California and Delaware.

P. zosteræfolius Schum. Enum. Pl. Saell. 50. Stems much flattened,

sometimes winged, widely branching: leaves linear: mucronate or short-pointed at the apex, 2-12 inches long, 1-2 lines wide, with 3 principal nerves and many fine ones: stipules scarious, finely nerved, soon perishing: peduncles $1\frac{1}{2}$ -4 inches long: spike cylindric, about $\frac{1}{2}$ inch long, 12-15-flowered: fruit obovoid with a broad base, about 2 lines long, 3-keeled on the back, the lateral keels rather obscure, beaked with a short recurved style: embryo slightly incurved. In still or running water, Oregon to New Jersey and New Brunswick: also in Europe.

P. foliosus Raf. Med. Rep. (11) v, 354. Stems flattened, much branched, 1-3 feet long: leaves 1-2 inches long, $\frac{1}{2}$ -1 line wide, acute, 3-nerved, mostly glandular at base: stipules white, hyaline, obtuse to acute, 6-10 lines long: peduncles more or less clavate, erect, about 6 lines long: spikes about 4-flowered, fruit lenticular or nearly orbicular, about 1 line in diameter, 3-keeled on the back, the middle keel winged and sinuate-dentate, the face strongly angled or arched, sharp, often with a projecting tooth at base: style apical. In ponds and streams, California to Brit. Columbia, and New Brunswick.

Var. Californicus Morong Bot. Gaz. x, 254. Stems stout and bushy, strongly flattened and sometimes winged, thickly clustered: leaves smaller, with dilated midrib and frequently 5-nerved at base: peduncles 4-6 lines long, erect, clavate, flattened: spikes often ripening 12 strongly marked fruits. Eastern Oregon to southern California.

P. pusillus L. Sp. 127. Stems filiform, branching, 6-24 inches long: leaves narrowly linear, 1-3 inches long, rarely a line wide, often nearly setaceous, 1-3-nerved, obtuse and mucronate or acute, biglandular and sessile: stipules obtuse, becoming setose: spike capitate or somewhat elongated and open or interrupted, on slender flattened peduncles $\frac{1}{2}$ to nearly 2 inches long: fruit obliquely ellipsoidal, about a line long, 2-grooved on the back or sometimes with 3 distinct keels: apex of the embryo slightly incurved and pointing obliquely downward. In ponds, Brit. Columbia to California and across the continent: also in Europe.

+ + Stipules united with the sheathing base of the leaf: spikes interrupted.

P. pectinatus L. Sp. 127. Stems slender, repeatedly branched, 1-3 feet long: leaves setaceous, attenuate to the apex, 1-nerved, 1-6 inches long, often capillary and nerveless: stipules half free, 6-12 lines long, thin: sheaths scarious on the margins: peduncles filiform, 2-12 inches long, the flowers in verticils: fruit obliquely obovoid, with a broad thick shell, 1-2 lines long, plump on the sides: apex of the embryo pointing almost directly toward the basal end. In ponds and brackish or salt water, Brit. Columbia to California and the Eastern States.

P. Robbinsii Oakes Hovey's Mag. vii, 180. Stems stout, widely branching, 2-4 feet long: leaves linear, 3-5 inches long, acute, finely many-nerved, crowded in 2 ranks, minutely serrulate, auriculate at the point of attachment with the obtuse at length setose stipules: spikes usually several, on stout peduncles about an inch long, loose and more or less interrupted, about 6 lines long: fruit oblong-obovate, nearly 2 lines long, keeled with a broadish wing, acutely beaked: embryo stout, the apex pointing a little inside of the basal end. In ponds and lakes, Oregon to California and the Atlantic States.

ORDER CV SCHEUCHZERIAEÆ Agardh
Theor. Syst. Pl. 44.

Marsh herbs with terete or semiterete leaves and small flowers in terminal spikes or racemes. Perianth 4-6-parted, its

segments in 2 series. Stamens 3-6, with short or elongated filaments and mostly 2-celled extrorse anthers. Carpels 3-6, 1- or 2-ovuled, more or less united until maturity. Seeds anatropous, without albumen. Embryo straight.

1 **Triglochin** Leaves all radical: flowers bractless, in a spike-like raceme terminating a jointless scape: ovaries 3-6, united until maturity.

2 **Scheuchzeria** Flowers bracteate in a loose raceme upon a leafy stem: ovaries 3, nearly distinct, at length divergent.

1 TRIGLOCHIN L. Sp. 338.

Perennial herbs with all radical terete or semiterete ligulate leaves with membranous sheaths, and perfect flowers in a naked raceme upon a scape-like peduncle. Perianth herbaceous, deciduous, of 3 small concave sepals and as many similar petals. Stamens 3 or 6, with oval nearly sessile anthers. Ovaries 3-6-celled with sessile stigmas and solitary ovules, separating at maturity from the central axis into as many distinct carpels. Seeds anatropous, erect, with membranous testa. Embryo straight, with minute included plumule.

T. maritima L. Sp. 339. Rootstock without stolons, often subligneous, the caudex thick, mostly covered with the sheaths of former leaves: scapes stout, nearly terete, $\frac{1}{2}$ -2 feet high: leaves semiterete, usually about 1 line wide, shorter than the scape: raceme elongated, often 16 inches or more long: pedicels decurrent, 1-1 $\frac{1}{2}$ lines long: segments of the perianth 6, each with a large sessile anther at its base: pistil of 6 united carpels: fruit oblong or ovoid, 2 $\frac{1}{2}$ -3 lines long, obtuse at base, with 6 recurved points at the summit: carpels 3-angled. In saltmarshes and saline places, California to Alaska and across the continent: also in Europe.

T. palustris L. Sp. 338. Rootstock short, oblique, with slender fugaceous stolons: leaves linear, shorter than the scapes, 5-12 inches long, tapering to a sharp point: scapes striate, 8-20 inches high: racemes 5-12 inches long: pedicels capillary, in fruit erect-appressed, 2 $\frac{1}{2}$ -3 lines long: perianth segments 6, greenish-yellow: anthers 6, sessile: pistil of 3 united carpels: stigmas sessile: fruit linear or clavate: ripe carpels separating from the axis and becoming suspended from its apex, the axis 3-winged. In bogs, Idaho to Alaska and the northern Atlantic States: also in Europe.

2 SCHEUCHZERIA L. Sp. 338.

Bog perennials with creeping rootstocks, erect leafy stems flatish leaves and small flowers in a loose terminal raceme. Perianth of 3 oblong sepals and 3 narrower petals. Stamens 6, with linear-oblong anthers and slender exerted filaments. Ovary of 3 nearly distinct ovoid 1-2-ovuled carpels, becoming divergent coriaceous subglobose follicles, dehiscing ventrally. Stigmas flat, sessile. Seed ascending, anatropous, with coriaceous testa. Embryo straight, thick.

S. palustris L. Sp. 338. Stems solitary or several together, usually clothed at the base with the remains of old leaves, 4-10 inches high: leaves 5-15 inches long, exceeding the stem, the uppermost reduced to bracts: pedicels 3-10 lines long, spreading in fruit: flowers white, few, in a loose terminal raceme: segments of the perianth membranaceous, 1-nerved, 1 $\frac{1}{2}$ lines long: filaments 2-4 lines long: seeds oval, brown, 2 $\frac{1}{2}$ -3 lines long,

with a very hard coat. In cold bogs, California to Alaska and across the continent: also in Europe and Asia.

ORDER CVI ALISMACEÆ DC. Fl. France iii, 181.

Marsh herbs with scape-like stems, broad leaves with sheathing base and conspicuous perfect or unisexual flowers in panicles or racemes. Perianth of 3 herbaceous persistent sepals and as many often conspicuous white deciduous sepals. Stamens 6 or more, included. Ovaries numerous, distinct, 1-celled and mostly 1-ovuled, becoming achenes in fruit. Seed erect, campylotropous, with membranous testa and no albumen. Embryo strongly recurved or uncinat.

- 1 **Alisma** Flowers perfect: stamens usually 6: carpels numerous, verticillate, distinct, obovate-oblong.
- 2 **Sagittaria** Flowers monœcious or diœcious: carpels numerous, flattened and membranously winged.

1 ALISMA L. Sp. 342.

Perennial herbs growing in shallow water or mud with broad leaves and small flowers in a verticillately branched panicle. Flowers perfect, small, numerous, on unequal 3-bracteolate pedicels. Stamens 5, rarely more, with short filaments, Ovaries distinct, numerous, borne in several whorls on a small flat receptacle, 1-ovuled. Styles very short, ventral. Achenes in a crowded whorl, ovate-oblong, flattened.

A. Plantago-aquatica L. Sp. 342. Scapes $\frac{1}{2}$ -3 feet high, usually solitary: leaves ovate, acute at the apex, cordate, rounded or narrowed at base, or when floating sometimes lanceolate or even linear, on petioles 1-10 inches long: inflorescence a large loose panicle 5-15 inches long: pedicels verticillate in 3's-10's, subtended by 3 striate acuminate bracts: petals $\frac{1}{2}$ -1 line long: styles deciduous, the base remaining as a small point or short beak on the inner curve of the achenes: stigmas small, terminal: achenes nearly 1 line long, arranged in a circle forming an obtusely triangular truncate head. In shallow water or mud, throughout North America: also in Europe and Asia.

2 SAGITTARIA L. Sp. 993.

Perennial aquatic or bog herbs with broadly sheathing leaves, often without blades, and mostly simple stems bearing one to few whorls of flowers mostly in threes. Flowers monoœcious or sometimes diœcious, the staminate ones above. Petals usually conspicuous. Stamens usually numerous, inserted on the convex receptacle: anthers 2-celled, dehiscent by lateral slits. Pistillate flowers with numerous distinct ovaries. Stigmas small. Achenes numerous, densely aggregated in subglobose heads.

S. arifolia Nutt. J. G. Smith Ann. Rep. Mo. Bot. Garden vii, 32.

pl. 1. Glabrous or nearly so, terrestrial or partly submerged: scapes weak, ascending, 8-20 inches high: leaves sagittate, long-petioled, the blade 3-10 inches long, acute, the lobes divergent, acute or acuminate: bracts lanceolate, acute, 4-10 lines long, scarious-margined and obscurely veined, often reflexed: 1-3 lower verticils pistillate: fruiting heads 4-8 lines in diameter: achenes a line long, tumid, winged on both margins. Along streams and borders of lakes, Brit. Columbia to California and Minnesota.

Var. stricta J. G. Smith Ann. Rep. Mo. Bot. Gard. vi, 8. Slender, erect, 12-16 inches high: blade of leaf 1-3 inches long: scape simple: bracts ovate, acute, 3-4 lines long: fruiting heads 6 lines in diameter: achenes smooth or laterally unicostate. Boggy meadows and slow streams, Falcon Valley, Washington.

S. cuneata Sheldon Bull. Torr. Bot. Club xx, 289, pl. 159. Submerged aquatic, rooting in the mud: leaves sagittate, long-petioled, the blade floating, 3-4 inches long, with linear lobes: scapes simple, slender, terete, 2-3 feet long, bearing verticils of flowers at the surface of the water: bracts ovate-lanceolate, acute, 2-3 lines long: stamens few: fruiting heads small, about 6 lines in diameter: achenes $\frac{1}{2}$ line long. In ponds or on margins of lakes, Brit. Columbia to Washington and Minnesota.

S. esculenta. *S. variabilis* Engelm. in part. (WAPATOO). Glabrous or nearly so: scapes simple or branched, 1-3 feet high: leaves large, the blade 4-12 inches long, obtuse or abruptly acute, the lobes from lanceolate to broadly ovate, acuminate, divaricate: bracts scarious, 3-5 lines long, ovate, obtuse: achenes about 3 lines long, with rather tumid dorsal wing and long horizontal beak. In shallow lakes, Brit. Columbia to California: this species was very abundant along the lower Columbia river, but is now almost exterminated by the Carp.

ORDER CVII JUNCACEÆ Vent. Tabl. ii, 150. (1799.)

Mostly perennial herbs, cespitose or with creeping rhizomes, terete hollow or spongy usually simple stems, alternate sheathing flat, channelled or terete leaves and small usually sessile scarious bracteolate flowers in panicles, cymes, subumbellate clusters or spicate heads. Flowers perfect, with a regular persistent perianth of 6 similar glumaceous segments in two rows, 3-6 nearly hypogynous included stamens with persistent filiform filaments and 2-celled anthers, and a superior 3-celled ovary, or sometimes one-celled with 3 parietal placenta, with three or many anatropous ovules. Styles very short, with three filiform stigmas. Capsule loculicidally 3-valved. Seeds with membranous or cellular often caudate or appendaged testa. Embryo minute, enclosed within the base of fleshy albumen.

1 **Juncoides** Stems leafy, hollow: leaves flat and soft, often villous: capsule 1-celled, with 3 parietal 1-seeded placenta.

2 **Juncus** Stems usually with spongy pith: leaves terete or flat, not villous.

1 JUNCOIDES Adans. Fam. Pl. ii, 47. (1763.)

LUZULA DC. Fl. Fr. iii, 47. (1805.)

Perennial herbs with simple hollow leafy stems, grass-like flat leaves and numerous small flowers in loose involucrate umbels or panicles, or more or less densely clustered or spicate. Floral

bracts small and scarious. Stamens always 6. Capsule 1-celled, with 3 parietal placentæ and 1-3 erect seeds.

J. pilosum Kuntze Rev. Gen. ii, 725. Tufted, often somewhat stoloniferous: stems erect, 2-4-leaved, 6-12 inches high; radical leaves 2-6 inches long, 2-4 lines wide, slightly pubescent, acuminate into a blunt almost gland-like point: cauline leaves similar but successively shorter: inflorescence an umbel-like cluster, the filiform pedicels usually nearly equal, 1-2-flowered: perianth 1-1½ lines long, its segments triangular-ovate, acuminate, brown with hyaline margins, almost twice as long as the toothed bractlets: capsule about ¼ longer than the perianth, its valves ovate-lanceolate: seeds about 1 line long, with a conspicuous hooked caruncle at the summit. Oregon to Alaska and in the Alleghany Mountains: also in Europe and Asia.

J. spadicum Kuntze l. c. 724. Glabrous or slightly villous: stems 6-18 inches high: leaves 4-6 inches long, 3-5 lines wide, acute or shortly acuminate: inflorescence lax, and drooping, much exceeding the usually small involucreal bracts: perianth straw-color or tinged with brown, the segments lanceolate, acuminate, about 1 line long, slightly shorter than the acute apiculate capsule: seeds oblong, brownish, not appendaged. In the mountains, California to the Arctic regions and the northern Atlantic States: also in Europe.

J. parviflorum Coville Cont. Nat. Herb. iv, 209. Stems slender, tufted, 1-2 feet high: leaves narrowly lanceolate, 3-6 inches long: 3-6 lines wide: inflorescence a loose decompound panicle, commonly 3-4 inches high, its lowest bract foliaceous, seldom more than ¼ the length of the panicle: flowers borne singly or 2-3 together on the branches of the panicle, on slender pedicels: bractlets ovate: perianth ¾-1¼ line long, its segments ovate, acuminate, slightly exceeded by the green to brown ovoid capsule: seeds narrowly oblong, attached to the placentæ by a slender fibre. In soredists, Alaska to California and the northern Atlantic States.

Var. melanocarpum Sheldon Bull. Geol. Surv. Minn. ix, 63. Stems stouter and shorter: leaves more numerous, and somewhat broader: inflorescence more dense: bracts all scarious: pedicels 3-6 lines long: perianth and capsule dark brown. On the highest parts of the Cascade Mountains.

Var. subcongestum Sheldon l. c. Often tufted: leaves narrower: inflorescence more narrowly paniculate: pedicels only a line or two long, the flowers thus appearing in small heads. In the high mountains, Alaska to California.

J. spicatum Kuntze l. c. 725. Closely tufted, without rootstocks: stems erect, 4-16 inches high, distantly 1-3 leaved tapering to a filiform summit: leaves 2-3 lines wide, often involute, tapering to a sharp apex: inflorescence a nodding spike-like often interrupted panicle, commonly 9-15 lines long, usually exceeded by the lowest leaf-like bract, ovate-lanceolate, acuminate, equalling the perianth: segments of the perianth brown with hyaline margins, 1-1½ lines long, lanceolate, aristate-acuminate: capsule broadly ovoid, about ⅔ as long as the perianth: seeds narrow and obliquely obovoid. Alaska to California and across the continent.

J. comosum Sheldon l. c. 64. Stems slender, 6-15 inches high, leafy, leaves 3-4 inches long, 1-3 lines wide, the foliaceous bract usually exceeding the narrow panicle: peduncles 2-12, unequal, the longer 1-3 inches long spikes simple, usually oblong, loosely-flowered: perianth pale or somewhat tinged with brown, about 1½ lines long, its segments narrowly acuminate equalling the obtuse capsule: anthers small, as long as the filaments: seed, dark brown with a white caruncle, appendage sometimes half as long as the seed. Alaska to California and the Rocky Mountains.

Var. congestum Sheldon l. c. Spikes several, sessile and close, forming a somewhat pyramidal head: bracts white and conspicuous: perianth brown, $1\frac{1}{2}$ lines long. Near the coast, Oregon to California.

Var. macranthum Parish. Perianth 2-3 lines long, much exceeding the broad obtuse capsule: anthers equalling or twice longer than the filaments: seeds longer, the appendage always short. Alaska to California.

Var. subsessile Watson Bot. Cal. ii, 203, under *Luzula*. Spikes solitary or few, nearly sessile, loose: perianth-segments lax and scarious. Oregon to California.

J. campestre Kuntze l. c. 724. More or less villous with long white hairs: stems densely tufted, erect, 4-10 inches high, 2-4-leaved: leaves 2-5 inches long, 1-4 lines wide, tapering at the apex to a blunt almost gland-like point: branches of the panicle unequal, straight, each bearing an oblong or short-cylindric dense spike: the lowest bract leaf-like, often exceeding the panicle: floral bracts white, ovate, acuminate, about equaling the flowers: segments of the perianth lanceolate-ovate, acuminate, brown with white margins, $1-1\frac{1}{2}$ lines long: capsule obovoid; seeds oblong, with a thick white appendage at base. In the mountains, Alaska to California and the Eastern States.

J. divaricatum Coville l. c. Stems 4-7 inches high: cyme broadly diffuse, with divaricately spreading branches and pedicels: perianth tinged with brown: seed light-colored, with a small appendage at base. In the Cascade and Sierra Nevada Mountains, southern Oregon to California.

2 JUNCUS L. Sp. 325.

Glabrous perennial or annual plants, growing in wet or moist places, with simple terete leafy or leafless stems, terete channelled or flat, sometimes equitant, often knotted leaves and small flowers in clusters, cymes, panicles or heads or solitary. Stamens 6, or sometimes 3 by suppression of the inner ones. Capsule globose to pyramidal, many-seeded, 3-valved, 3-celled with central placentæ, or 1-celled with parietal placentæ. Seeds usually distinctly reticulated or ribbed, often tailed.

* Stems leafless and scape-like, from matted rootstocks, sheathed at base: the inner sheaths sometimes bearing terete leaves: flowers in sessile apparently lateral panicles.

+ Scapes slender: sheaths mostly leafless: spathes usually very much exceeding the panicle: stamens usually 6.

** Flowers in compound panicles, two lines long or more: capsule oblong-ovate.

J. Lescurii Bolander Proc. Calif. Acad. ii, 179?. Stems stout, 1-3 feet high, from a stout creeping rhizome: sheaths short, black, obtuse: spathe 6-15 inches long very acutely pointed: flowers in a dense somewhat secund many-flowered panicle: bracts ovate, acuminate: perianth-segments $2\frac{1}{2}$ -3 lines long, lanceolate, acuminate: greenish-white with intermarginal brown stripes: anthers much longer than the filaments: capsule brown, triquetrous, sharply angled, acute, shorter than the perianth: seeds ovate, obtuse, scarcely apiculate. In shifting sands along the coast of Oregon: perhaps distinct from *J. Lescurii* as that species is said to grow in "Salt-marshes and saline localities".

J. Balticus Willd. Berlin Mag. iii, 298. Stems erect, 8-36 inches high, arising at intervals from stout creeping rootstocks: sheaths green or tinged with dark brown: spathe slender, 4-6 inches long: panicle commonly

loosely branching 1-3 inches long: perianth $1\frac{1}{2}$ - $2\frac{1}{2}$ lines long its segments lanceolate, acute, or the inner sometimes obtuse, brown with green midrib and hyaline margins: stamens 6, about $\frac{2}{3}$ the length of the perianth: anthers much longer than the filaments: capsule about as long as the perianth, pale to dark brown, narrowly ovoid, conspicuously mucronate: seeds usually with a loose coat. On shores of lakes and streams, Alaska to California and across the continent: also Europe and Asia.

++ ++ Flowers in compound panicles, smaller: capsule obovate or subglobose.

J. effusus L. Sp. 326. Pale green or yellowish: stems densely tufted, 3-4 feet high, from stout branching proliferous rootstocks: sheaths short or mere rudiments: spathe short, often not exceeding the erect, loosely flowered panicle: perianth 1- $1\frac{1}{4}$ lines long, its segments green, lanceolate, acuminate: stamens 3, the anthers shorter than the filaments: capsule obovoid, 3-cleft, obtuse or retuse: seeds apiculate, finely ribbed, about $\frac{1}{4}$ line long. Common in swamps and wet places in most parts of the world.

Var. Brunneus Engelm. Panicle usually very short and compact: perianth and capsule dark brown. Near the coast, Oregon to California.

J. patens Meyer Rel. Hænk. i, 141. Densely tufted, pale green: stems slender, 1-3 feet high: sheaths few, 1-4 inches long, acute: spathe slender, 4-6 inches long: panicle small, often compact and somewhat secund: perianth pale to light brown, its segments lanceolate, acuminate, about $1\frac{3}{4}$ lines long: stamens 6, the anthers shorter than the filaments: capsule subglobose, slightly angled, equalling or a little shorter than the perianth, with thin septa, the valves breaking away from the central placenta. In wet places, Oregon and Washington to California.

J. filiformis L. Sp. 326. Stems slender, 4 inches to 2 feet high many of them sterile and appearing like leaves, from stout matted rootstocks: sheaths purplish, obtuse, with a short bristle-like appendage: spathe usually longer than the stem: panicle rather few-flowered, 6-12 lines high: segments of the perianth $1\frac{1}{4}$ - $1\frac{3}{4}$ line long, green with hyaline margins, narrowly lanceolate, acuminate: stamens 6, about half the length of the perianth: anthers shorter than the filaments: capsule obovoid, green, barely pointed, about $\frac{3}{4}$ as long as the perianth, 3-celled: seeds oblong, about $\frac{1}{4}$ line long, pointed, at each end. In marshes, Washington to Alaska and across the continent.

+ Low alpine perennials: flowers 1-3: stamens 6.

J. Drummondii E. Meyer Ledeb. Fl. Ross. iv, 235. Cespitose: stems very slender, 10-16 inches high: sheaths green, obtuse, the inner ones bristle-tipped: spathe filiform, 6-12 lines long, equalling or exceeding the usually 3-flowered panicle: perianth-segments about 3 lines long, green with brown margins, lanceolate, acute, or acuminate: anthers a little longer than the filaments: capsule brown, oblong, retuse, nearly equalling the perianth: seeds a line long, ovate, caudate, very finely striate. On the highest mountains, California to Unalaska and the Rocky Mountains.

J. Parryi Engelm. Trans. St. Louis Acad. ii, 446. Cespitose: stems filiform, 3-10 inches high: inner sheaths leaf-bearing, the leaves sulcate at base, terete above, much shorter than the stems: spathe longer than the inflorescence, 6-18 lines long: panicle loosely 1-3-flowered: perianth-segments 3 lines long or more, more or less tinged with brown, lanceolate, acuminate, or the inner obtuse: anthers much longer than the filaments: capsule oblong, acute, about equalling the perianth: seeds ovate, caudate, a line long, finely striate. On grassy slopes on the highest mountains, Brit. Columbia to California and the Rocky Mountains.

J. castaneus Smith Fl. Brit. i, 383. Stems erect, 4-20 inches high,

leafy, from slender rootstocks: leaves terete, deeply channelled at base: spathe longer than the inflorescence: heads 1-3, 3-12 flowered: perianth-segments brown or black, 2-4 lines long, lanceolate, acute: anthers pointed, half as long as the filaments: capsule brown, longer than the perianth, narrowly oblong, tapering to an acute summit, imperfectly 3-celled: seeds with long slender tails, the body about $\frac{3}{8}$ line long. Oregon to Alaska and across the Continent.

* * Stems leafy at base: leaves flat or semiterete, not knotted: panicle or head evidently terminal: the spathe usually short.

+ Dwarf or low slender annuals with fibrous roots: stems leafy, branched.

J. bufonius L. Sp. 328. Stems usually branching from the base, 1-12 inches high: leaves very narrow, usually revolute and bristle-like: flowers greenish, mostly remote and secund upon the spreading branches: perianth-segments lanceolate, acuminate, with scarious margins, 2-3 lines long, the inner slightly shorter: stamens 6; anthers about as long as the filaments: capsule oblong, obtuse, shorter than the perianth: seeds ovate, obtuse, very finely striate and cross-lined. A common species everywhere, growing in places that are wet in spring.

J. triformis Engelm. l. c. 492. Stem very short or almost none, bearing several erect filiform scape-like peduncles 1-3 inches long: leaves an inch long or less, filiform, channelled, flat above: flowers usually 3-7, in a small head: perianth brownish, its segments narrowly lanceolate, acuminate, 1-1 $\frac{1}{2}$ lines long, a little longer than the 3 stamens and the obtuse apiculate capsule: style exserted, with elongated stigmas: seeds ovate, obtuse, finely ribbed and cross-lined. In barren places that are wet in spring, western Oregon to California.

Var. brachystylus Engelm. l. c. Smaller, the peduncles 1-3-flowered: stamens half the length of the perianth; the oblong anthers shorter than the filaments: style and stigmas short, included. With the type.

Var. uniflorus Engelm. l. c. Very small, only half to an inch high, the solitary flowers mostly dimerous. Oregon to California.

+ + Taller perennials: stems simple: stamens 6.

+ + Stems naked: flowers solitary in a diffuse or compact panicle,

J. tenuis Willd. Sp. Pl. 214. Stems slender, erect, 1-2 feet high, leafy at base: leaves very narrow, flat or more or less channelled or involute, shorter than the stem: spathe exceeding the inflorescence: panicle usually loose and spreading: perianth-segments pale, narrowly lanceolate, acuminate, 1 $\frac{1}{2}$ -2 lines long, spreading in fruit and equalling or exceeding the ovate retuse greenish capsule: seeds white-appendaged at each end, very finely ribbed and cross-lined. In dry or moist soil, throughout most parts of North America.

J. occidentalis Weigand Bull. Torr. Bot. Club xxvii, 521. *J. tenuis* var. *congestus* Engelm. Stems stiff and erect, 1-2 feet high, pale green, nearly terete; leaves $\frac{1}{3}$ - $\frac{1}{2}$ the length of the stem, flat and flexuous: spathe 2-3 inches long, exceeding the inflorescence: panicle glomerate, or more commonly somewhat open, fuscous: perianth-segments broadly subulate, fuscous with green midrib and rather broad scarious margins: stamens about half as long as the perianth, the oblong anthers much shorter than the filaments: capsule oblong-ovoid, obtuse or retuse, $\frac{3}{4}$ as long as the perianth, fuscous, the placenta extending only about half-way to the axis: seeds oblong, irregularly apiculate at each end areolate-reticulated, not striate. Along ditches and in wet places, Oregon to California.

J. confusus Coville Proc. Biol. Soc. of Wash. x, 127. Densely tuft-

ed, 7-30 inches high, erect: sheaths of the leaves with well developed ligules, the blades about $\frac{1}{2}$ the length of the stem, flat, usually involute: spathe much longer than the inflorescence, usually involute: panicle congested into a turbinate cluster, an inch long: perianth-segments ovate-lanceolate, acute, brown with green midrib: stamens 6, the anthers shorter than the filaments: capsule oblong, equalling the perianth, retuse, completely 3-celled: seeds light brown. In meadows, eastern Washington to Montana and Colorado.

++ ++ Stems more or less leafy; the leaves flat and grass-like, not equitant: flowers clustered.

J. falcatus E. Meyer Reliq. Hænk. 144. Bright green: stems slender, 6-18 inches high, from slender stoloniferous rootstocks: leaves usually equalling or exceeding the stem, 1-2 lines wide, the open somewhat oblique sheaths without ligules: spathe short: heads usually 1-5, 1-10-flowered: perianth-segments brown with bright green midrib, 2-3 lines long, ovate, the outer shortly acuminate, the inner obtuse: anthers much shorter than the filaments: capsule ovate, obtuse, apiculate, as long or longer than the perianth, almost black, 3-celled: seeds oblong-ovate, obtuse, $\frac{1}{2}$ line long, with loose pale testa, longitudinally reticulated. In springy places along mountain streams, California to Alaska.

J. longistylis Torr. Bot. Mex. Bound. Surv. 223. Stems rather stout, 1-2 feet high, from stout stoloniferous rootstocks: leaves 6-12 inches long, the sheaths with distinct ligules: spathe narrow, 2-4 inches long: heads 5-20, in a sparingly branched panicle, few to several-flowered: perianth-segments pale brown with green midrib and hyaline margins, about 3 lines long, lanceolate, acute or the outer ones acuminate: anthers much longer than the filaments: style about a line long: capsule brown, oblong, about half as long as the perianth, angled above, obtuse or depressed at the summit, 3-celled: seeds light brown, $\frac{1}{4}$ line long. In wet places. Washington to California.

*** Leafy-stemmed perennials: leaves terete or laterally flattened, more or less distinctly knotted by internal partitions: flowers capitate.

+ Leaves terete or only slightly compressed.

J. Richardsonianus Schult. in R. & S. Syst. vi, 201. Stems erect, 6-20 inches high, in loose tufts from creeping rootstocks, 1-2-leaved below the middle: panicle 3-8 inches high, its branches strict or slightly spreading: heads 3-12-flowered: perianth-segments unequal, the outer ones pale, obtuse, mucronate or acute; the inner ones shorter, obtuse, stamens 6; the anthers much shorter than the filaments: capsule ovoid-oblong, slightly exceeding the perianth, acute or obtuse, with a short tip: seeds about $\frac{1}{4}$ line long, narrowly obovoid to oblong, apiculate, acute or acuminate at base. Idaho to Brit. Columbia and across the Continent.

J. dubiosus Engelm. l. c. 459. Stems rather stout, 2-4 feet high, from stout horizontal rootstocks, several-leaved: leaves narrow, often equalling or exceeding the stem, the sheaths with scarious margins: panicle compound, diffuse, 3-12 inches long: heads numerous, 6-20-flowered: perianth-segments brown or brownish, about 2 lines long, lanceolate, acuminate: stamens 6, the anthers elongated, longer than the filaments: capsule narrow, acuminate, shorter than the perianth: seeds ovate, rather abruptly acuminate at each end, brownish. In marshes, Oregon to California.

J. nodosus L. Sp. 466. Stems slender, 6 inches to 2 feet high, arising singly from tuber-like thickenings of a slender rootstock: leaves narrow, the upper one often exceeding the inflorescence: panicle 1-3 inches long, bearing 1-30 spherical 8-20-flowered heads: perianth-segments usually reddish-brown above, lanceolate, acuminate, $1\frac{1}{2}$ - $1\frac{3}{4}$ line long, the inner

longest: stamens 6, with anthers about as long as the filaments: capsule lanceolate-subulate, 3-angled, 1-celled, exceeding the perianth: seeds oblong, acute below, apiculate above. Alaska to Oregon and the Eastern States,

J. Torreyi Coville Bull. Torr. Bot. Club xxii, 303. Stems stout, 8-40 inches high, arising singly from tuber-like thickenings of a slender rootstock: leaves terete, thick, abruptly divergent from the stem: inflorescence congested, consisting of 1-20 dense heads 5-8 lines in diameter: perianth-segments 2-2½ lines long, subulate, the outer longest: stamens 6: capsule subulate, 3-angled, 1-celled, with a beak ½-¾ line long, exceeding the perianth and holding the valves together during dehiscence: seeds oblong, acute at each end. Oregon to California, Texas and New York.

J. Oreganus Watson Proc. Am. Acad. xxiii, 267. Stems numerous, very slender, 6-10 inches high, exceeding the very narrow leaves, from very slender matted rootstocks: heads simply paniced, few-flowered, often proliferous: perianth-segments nearly equal, lanceolate, acute: stamens 6, with anthers as long as the filaments: capsule dark brown, acutish, mucronate, at length nearly twice as long as the perianth: seeds rather turgid. In bogs, Ilwaco, Washington.

J. Bolanderi Engelm. l. c. 470. Stems slender, about 2 feet high: leaves subterete, nearly equalling the stem; the ligule conspicuous, sometimes elongated and leaf-like: heads subglobose, usually 2 or 3, very many-flowered: perianth-segments greenish brown, narrowly lanceolate and setaceously acuminate, 1½ lines long: stamens 3, with anthers much shorter than the filaments: capsule clavate-oblong, shorter than the perianth, obtuse, apiculate, 1-celled: seeds very small. In wet places southwestern Oregon to California,

J. Nevadensis Watson l. c. xiv, 303. Stems very slender, 6 inches to 2 feet high, somewhat compressed, from slender creeping rootstocks: leaves very narrow, somewhat compressed nearly equalling the stem, with large sheaths and conspicuous ligules: heads small, few to rather many, in a short open panicle, or often solitary: perianth-segments brownish, lanceolate, acuminate, 2 lines long: stamens 6; anthers linear, longer than the filaments: capsule oblong, abruptly acute and beaked, nearly equalling the perianth: seeds minute, apiculate at both ends. Common in wet mountain meadows, eastern Washington to California and Nevada.

J. Suksdorfii Rydberg Bull. Torr. Bot. Club xxvi, 541. Stems about a foot high, strict, light green: leaves terete or slightly flattened, the lowest ones short: cauline except the upper one often a foot long, all with conspicuous scarious sheaths: heads in a contracted panicle, brown and shining, 2-8-flowered: perianth-segments subequal, about 2 lines long, narrowly lanceolate, acute or acuminate, stamens 6; anthers longer than the filaments: capsule dark brown and shining, oblong, acuminate, 3-angled. In wet meadows about the base of Mount Adams, Washington.

J. brachyphyllus Weigand Bull. Torr. Bot. Club xxvii, 519. Stems stiff, erect and very stout, 20-30 inches high, slightly compressed, very conspicuously grooved: leaves short, ¼-½ the length of the stem, the blade, usually broad and flat but rather thick, stiff and spreading, about a line wide; sheaths loose and mostly free, with membranous margins; ligule conspicuous: inflorescence short and crowded: perianth-segments 2½ lines long, slightly unequal, subulate, very acute: anthers oblong, about as long as the filaments: capsule rather narrowly oblong, triangular above, obtuse or retuse, equalling the perianth, 3-celled: seeds oblong, strongly apiculate at each end. Idaho to Arkansas.

J. latifolius Buch. Stems 15-36 inches high, from creeping rootstocks: leaves flat, about a line wide, pale green, shorter than the sheaths, with

ligules: heads paniced few-flowered: perianth-segments straw-color, lanceolate, acuminate, scarious-margined, rough, 3 lines long: stamens 6: capsule triangular, oblong, acute, short-beaked. Common along streams, eastern Washington.

+ + Stems compressed and usually acutely edged: leaves flattened latterly and equitant.

J. ensifolius Wiks. Stems 8-20 inches high, leafy, from thick rootstocks: leaves equitant: heads several to numerous, paniced, globose, usually dark brown: perianth-segments lanceolate, acuminate $1\frac{1}{2}$ lines long: stamens 3: capsule 3-angled, acute, hardly exceeding the perianth. Common in wet places Brit. Columbia to California.

J. xiphioides Meyer l. c. Stems rather stout, 1-4 feet high, from stout creeping rootstocks: leaves 2-3 lines wide, the sheaths without ligules: heads few to numerous, dense, 3-20-flowered, in a compound panicle: perianth-segments brownish to almost black, $1\frac{1}{2}$ lines long, lanceolate, acuminate: stamens 6; anthers very small oblong-linear, equalling or much shorter than the filaments: capsule oblong, acute, about equalling the perianth: seeds very small, ovate-oblancoate. A variable species: in wet places, California to Alaska.

J. oxymenis Engelm. l. c. 483. Stems stout, 2-4 feet high: leaves 2-3 lines wide: panicle decomposed, 4-8 inches long: heads small, very numerous, 3-12-flowered: perianth-segments linear-lanceolate, acuminate-awned, about 2 lines long: stamens 6; anthers twice as long as the filaments: capsule lanceolate, rostrate, longer than the perianth, 1-celled: seeds ovate-oblancoate, $\frac{1}{4}$ line long. In marshes, southern Oregon to California.

J. Mertensianus Bong. Veg. Sitch. 167. Stems weak, 6-18 inches high, from matted rootstocks: leaves usually about a line wide; ligule conspicuous: inflorescence usually a single many-flowered head, 4-6 lines in diameter: perianth-segments very dark brown, ovate-lanceolate, the outer ones aristate-acuminate: stamens 6; anthers usually mucronate, as long or shorter than the filaments: capsule obovate, obtuse, about equal, equalling the perianth: seeds oblancoate, apiculate at each end. In wet meadows on the highest mountains, California to Alaska and the Rocky Mountains.

ORDER CVIII CYPERACEÆ J. St. Hil. Expos. Fam. i, 62.

Perennial or annual herbs with rhizomatous rootstocks, triangular or terete mostly solid stems, alternate mostly radical leaves and small perfect, monœcious or diœcious flowers in the axils of imbricated glumaceous bracts or scales. Perianth none or represented by bristles or scales. Stamens usually 2 or 3, hypogynous, with basifixed anthers. Ovary 1-celled, with an erect anatropous ovule and a 2-3-cleft style, in fruit a lenticular or more or less triangular membranaceous, crustaceous or bony achene. Embryo minute, lenticular or turgid, at the base of copious albumen.

* Flowers of the spikelets all or at least one of them perfect: spikelets all alike, few- to many-flowered, capitate or umbellate, one or two of the lower scales usually sterile.

+ Spikelets more or less flattened, the scales being in two ranks: inflorescence involucrate.

1 **Cyperus** Inflorescence spicate or clustered: perianth none: style persistent.

- 2 **Dulichium** Inflorescence axillary: perianth of 6-9 bristles: style persistent.
+ + Spikelets many-flowered, not flattened, the scales imbricated all around.
++ Styles not enlarged at base.
- 3 **Scirpus** Spikelets solitary or clustered, or in a compound umbel, involucrate: perianth of few barbed persistent bristles or wanting.
- 4 **Eriophorum** Spikelets solitary or few, involucrate: perianth of numerous long silky naked bristles: stamens 1-3.
- 5 **Hemicarpha** Low annuals: spikelets solitary or few, in a sessile apparently lateral cluster: perianth a minute hyaline bractlet between each flower and the rachis: stamen only one.
++ Style enlarged at base.
- 6 **Eleocharis** Spikelet solitary and terminal upon a leafless terete stem: perianth of 3-9 retrorsely barbed bristles, or wanting: stamens 3: base of the style persistent.
- 7 **Stenophyllus** Low annuals, the stem leafy at base; spikelets in an involucrate umbel: perianth none: stamens 1-3.
* * Spikelets polygamous, few-flowered, ovoid, the scales imbricated all around, only the terminal one fertile.
- 8 **Rhynchospora** Stems leafy: spikelets variously clustered: perianth of 9-12 retrorsely barbed bristles: achenes lenticular, beaked by the persistent base of the style.
* * * Flowers monœcious, in the same or distinct spikelets, or diœcious: pistillate flowers enclosed in an inflated sac-like persistent perigynium.
- 9 **Carex** Spikelets solitary, spicate or paniced: perianth wholly wanting, or of a single short bristle at the base of the ovary.

1 CYPERUS L. Sp. 44.

Perennial or annual herbs with mostly triangular nearly naked simple stems, alternate nearly radical leaves and perfect flowers in few- to many-flowered mostly flattened spikelets, the concave more or less carinate scales in 2 ranks. Perianth wholly wanting. Stamens 1-3. Style not thickened at base, 2-3-cleft, deciduous. Achenes lenticular or 3-angled, not beaked, smooth or nearly so.

C. inflexus Muhl. Gram. 16. *C. aristatus* Bockl. in part. Annual: stems slender or almost filiform, diffusely branched from the base, 1-6 inches high: leaves a line wide or less, about equalling the stem: those of the involucre 2-3, exceeding the inflorescence: umbel sessile, 1-3-rayed: spikelets linear-oblong, 6-10-flowered, 2-3 lines long: scales bright brown, lanceolate, rather firm, strongly several-nerved, tapering into a long recurved awn, falling from the rachis at maturity: stamens 1: style 3-cleft: rachis narrowly winged, the wings persistent: achenes 3-angled, dull brown, narrowly obovoid or oblong. obtuse, mucronulate. In wet sandy soil, California to British Columbia and the Eastern States.

C. acuminatus Torr. & Hook. Ann. Lyc. N. Y. iii, 435. Annual: stems very slender, tufted, 2-15 inches high: leaves light green, usually less than a line wide, often equalling the stem, those of the involucre much elongated: umbel 1-4-rayed, simple, rays short: spikelets flat, ovate oblong,

obtuse, 2-4 lines long, many-flowered, densely capitate: scales oblong, pale green, 3-nerved, coarsely cellular, conduplicate, with a short sharp more or less recurved tip: stamens 1: style 3-cleft: achenes sharply 3-angled, gray, oblong, narrowed at each end, almost half as long as the scale. In moist sandy soil, California to Oregon and Illinois.

C. esculentus L. Sp. 45. *C. phymatoides* Muhl. Perennial by scaly horizontal tuber-bearing rootstocks: stems usually stout, 6-30 inches high: leaves bright green, as long or longer than the stem, 2-4 lines wide, the midrib prominent; those of the involucre much longer than the inflorescence: umbel 4-10-rayed, often compound: spikelets numerous, in loose spikes, straw-color or yellowish brown, flat, spreading, 6-12 lines long, many-flowered: scales ovate-oblong, subacute, 3-nerved: rachis narrowly winged: stamens 3: style 3-cleft: achenes obovoid, obtuse, 3-angled. In moist sandy fields, Alaska to California and the Atlantic States.

C. erythrorhizos Muhl. Gram. 20. Stems tufted, stout or slender, 3 inches to 2 feet high: leaves 1-4 lines wide, rough-margined, those of the involucre 2-7, some of them often 4 times as long as the inflorescence: umbel mostly compound, several-rayed: spikelets linear-subulate, 3-10 lines long, less than a line wide, compressed, many-flowered, clustered in oblong nearly or quite sessile spikes: scales chestnut-brown, oblong-lanceolate, mucronulate, appressed, separating from the rachis at maturity: the membranous wings of the rachis separating as a pair of hyaline interior scales: stamens three: style three-cleft: achenes sharply 3-angled, oblong, pointed at both ends, pale, $\frac{1}{2}$ as long as the scale. In wet soil, Oregon to California and the Eastern States.

C. Houghtoni Torr. Ann. Lyc. N. Y. iii, 277. Perennial by tuber-like corms: stems slender, erect, 1-2 feet high: leaves shorter than the stem a line or less wide, smooth; those of the involucre 3-5, the longer much exceeding the inflorescence: umbel simple, 1-5-rayed, the rays mostly short: their sheaths 2-toothed: spikelets loosely capitate, linear, compressed, acute: 4-8 lines long, about a line wide, 11-15-flowered, falling away from the axis when mature: chestnut brown, firm, somewhat spreading, shining, oblong, obtuse, truncate or apiculate: rachis very narrowly winged: stamens 3: style 3-cleft: achene broadly oblong, 3-angled, brown, apiculate, nearly as long as the scale. In sandy soil, along the Columbia river to the Eastern States.

2 DULICHIMUM L. C. Richard Pers. Syn. i, 65. (1805.)

Tall perennial herbs with terete hollow jointed stems, leafy to the top, the lower leaves reduced to sheaths, flat grass-like leaves and perfect flowers in axillary simple or compound spikes. Spikelets flat, linear, many-flowered. Scales 2-ranked, carinate, conduplicate, decurrent on the joint below. Perianth of 6-9 retrorsely barbed bristles. Stamens 3. Style 2-cleft at the apex, persistent as a beak on the summit of the linear-oblong achene.

D. spathaceum Pers. Syn. i, 65. Stems stout, 1-3 feet high, erect: leaves numerous, flat, 1-3 inches long, 2-4 lines wide: spikelets shorter than or the uppermost exceeding the leaves: pedicels 2-12 lines long: spikelets narrowly linear, spreading, 6-12 lines long, about a line wide, 6-12-flowered: scales lanceolate, acuminate, appressed, brownish: bristles of the perianth stiff, longer than the achene: style long-exserted. In marshes Oregon to Minnesota and Nova Scotia.

3 SCIRPUS L. Sp. 47.

Tufted annual or perennial herbs with creeping rootstocks, leafy stems, or the leaves reduced to sheaths in some species, and perfect flowers in a terminal or apparently lateral involucrate cluster or compound umbel-like panicle. Spikelets usually many-flowered, with the scales closely imbricated around the rachis, the lower one or two often empty. Perianth of 3-6 bristles or none. Stamens 1-3. Style 2-3-cleft, scarcely or not at all thickened at base, deciduous or only the base persistent. Achenes lenticular or more or less 3-angled or obovoid.

§ 1 *ISOLEPIS* Benth. Stems low and slender. Spikelets solitary, small, with a single erect involucre. Perianth none.

S. riparius Spreng. Stems tufted, from fibrous roots, very slender, often setaceous, 2-10 inches high, sheathed at base, the upper sheath usually bearing a short slender leaf: involucre 1-10 lines long or nearly wanting: spikelets ovate to ovate-oblong, $1\frac{1}{2}$ -3 lines long: scales pale or often deep brown, with a pale prominent midrib, concave, obtuse or pointed: stamens usually 3: style 3-cleft: achene triangular-obovoid, with distinct angles, the sides convex, dark brown when mature. In marshy places near the coast Oregon to California and South America.

§ 2 *EUSCIRPUS* Benth. Bristles present, retrorsely barbed or ciliate, not elongated.

* Inflorescence terminal, without involucre.

S. nanus Spreng. Pug i, 4. Annual: stems filiform, flattened, grooved, tufted, erect or ascending, 1-2 inches high, bearing bladeless scarious sheaths near the base: spikelet solitary, ovoid-oblong, 3-8-flowered, 1-1 $\frac{1}{2}$ lines long: scales ovate or lanceolate, pale green, the lower obtuse, the upper acutish: bristles about 6, longer than the achene: stamens 3: style 3-cleft: achene oblong 3-angled, pale pointed at each end, smooth. Muddy places, Oregon to Alaska and the Atlantic States.

S. pauciflorus Lightf. Fl. Scot. 1078. Perennial by filiform rootstocks: stems very slender little tufted, 3-10 inches high, upper sheaths truncate: spikelets solitary, oblong, 4-10-flowered, 2-3 lines long; scales brown with lighter margins and midrib, lanceolate, acuminate: bristles 2-6, hispid, as long as the achene or longer: stamens 3: style 3-cleft: achene obovoid-oblong, gray, rather abruptly beaked, its surface finely reticulated. In wet soil along the Columbia river, Oregon to Brit. Columbia, Ontario and New York.

* * Inflorescence apparently lateral, with a single involucre leaf.

← Stems terete or nearly so.

S. subterminalis Torr. Fl. U. S. i, 47. Stems slender, terete, nodulose, 1-3 feet high: leaves slender, channelled, 6 inches to 2 feet long, $\frac{1}{4}$ - $\frac{1}{2}$ line wide: spikelet solitary, terminal, oblong-cylindric, narrowed at each end, 3-5 lines long: involucre 6-12 lines long: scales ovate-lanceolate, acute, membranaceous, light brown with green midrib: bristles about 6, as long as the achene or shorter: stamens 3: style 3-cleft to about the middle: achenes obovoid, 2-angled, dark brown, smooth, about a line long, obtuse, abruptly beaked by the slender base of the style. In ponds and streams, eastern Washington to Pennsylvania and New Brunswick.

S. Nevadensis Watson Bot. King, 360. Stems clustered, from run-

ning rootstocks, 6 inches to 2 feet high, somewhat flattened above, leafy: leaves nearly equalling the stem, deeply channelled or revolute, very rough on the margins, sharply acute: spikelets 1-8, in a sessile cluster, ovate-oblong, acute, 4-10 lines long: scales brown and shining, ovate, sharply carinate, acutish; bristles 1-3, not half the length of the achene: style 2-cleft: achene broadly ovate, plano-convex, acute, a line long. In alkaline soil on borders of lakes, eastern Oregon to Nevada and California.

S. lacustris L. Sp. 48. Perennial by stout rootstocks: stems stout, terete, 6-12 feet high, often nearly an inch in diameter, sheathed below, the upper sheath sometimes extended into a short leaf: involucre bract stout, shorter than the inflorescence: spikelets numerous, solitary or more or less clustered in an irregularly compound umbel, oblong-ovate, 3-6 lines long: scales broadly ovate, very obtuse to emarginate and mucronate, ciliate, often pubescent, usually pale with fine brown lines; bristles usually 6, slender, equalling or longer than the achene; stamens 3, style 2-cleft: achene broadly obovate, rounded at the summit, abruptly short beaked. In marshes, Alaska to California and the Atlantic States; also in Europe.

+ + Stems acutely triangular or triquetrous.

S. Olneyi Gray Bost. Journ. Nat. Hist. v, 238. Stem stout, 2-7 feet high, from a stout running rootstock; more or less deeply triquetrous or wing-angled, sheathed at base; leafless or with a few short leaves; involucre bract stout, triangular, an inch or less longer than the inflorescence: spikelets 2-12, in a crowded sessile cluster, oblong-ovate, brown: bristles 4-6, shorter than or equalling the achene: stamens 2 or 3: style 2-cleft: achene obovate, plano-convex, mucronate, brown. In salt marshes, eastern Oregon to California and the Eastern States.

S. Americanus Pers. Syn. i, 68. *S. pungens* Vahl. Stems usually slender, from long perennial rootstocks, 1-4 feet high, acutely triangular, somewhat leafy at base: leaves 1-4, shorter than the stem, keeled; involucre bract more or less channelled, 1-4 inches long: spikelets 1-6, closely crowded in a sessile cluster, ovate to ovate-oblong: scales brown, often very dark, broadly ovate, emarginate and usually tipped with a straight awn: bristles 2-6, shorter than or equalling the achene: stamens 3: style usually 2-cleft: achene obovate, smooth, dark brown mucronate. Common in salt marshes, throughout the United States.

* * * Stems triangular, leafy at base: leaves flat: involucre foliaceous.

Spikelets large, few, in a sessile cluster or sparingly umbellate, rufous.

S. robustus Pursh Fl. 56. Stems stout, 1-3 feet high, from running often tuberiferous rootstocks: leaves flat, equalling or exceeding the stem: involucre bracts unequal, one much longer and more erect: spikelets ovate to oblong-ovate, acute, 5-10 lines long: scales ovate, 2-3 lines long, dull brown, emarginate, tipped with a long slender soon reflexed awn: bristles 1-6, fragile, shorter than the achene: stamens 3: style 3-cleft: achene compressed very flat on the face, convex, or with a low ridge on the back, obovate-orbicular, dark brown, shining, $1\frac{1}{2}$ lines long. In salt marshes, Bri. Columbia to California and the Atlantic States.

+ + Spikelets small, numerous, greenish or light brown, in a compound or decomposed umbellate panicle.

S. microcarpus Presl. Reliq. Hænk. i, 195. *S. sylvaticus* var. *digynus* Bækl. Stems usually stout, 3-5 feet high, from perennial rootstocks: leaves ample, often exceeding the stem, rough-margined, those of the involucre usually exceeding the inflorescence: panicle ample, decomposed, rather loose: spikelets ovoid, oblong, acute, $1\frac{1}{2}$ -2 lines long, 3-25 together

in capitate clusters at the ends of the usually spreading raylets: scales brown with a green midrib, obtuse or subacute: bristles 4, somewhat longer than the achene: stamens 2: style 2-cleft: achenes oblong-obovate, nearly white, plano-convex or with a low ridge on the back, pointed. In swamps and wet woods, Alaska to California and the Atlantic States

S. atrovirens Muhl. Gram. 43. Stems rather slender, leafy, 2-4 feet high, from slender perennial rootstocks: leaves elongated, rough on the margins, dark green, 3-6 lines wide one or two of them usually exceeding the inflorescence: umbel simple or 1-2-compound: spikelets ovoid-oblong, acute, 6-20 in the dense capitate clusters at the ends of the rays or raylets: scales greenish-brown, oblong, acute, the midrib excurrent, bristles usually 6, about as long as the achene: stamens 3: style 3-cleft: achene obovoid-oblong, 3-angled, pale dull brown. In swamps, Oregon to Nova Scotia and Georgia.

S. lineatus Michx. Fl. i, 32. Perennial by stout rootstocks: stems rather slender, erect, 1-3 feet high, leafy: leaves light green, shorter than the stem, 2-4 lines wide, the upper ones and those of the involucre not exceeding the inflorescence, flat, rough on the margins: umbels terminal and commonly also axillary, decomposed, the rays very slender, becoming pendulous: spikelets mostly solitary at the ends of slender raylets, oblong, obtuse, 3-5 lines long: scales ovate or oblong, reddish-brown with green midrib: bristles 6, weak, smooth, much longer than the achene: stamens 3: style 3-cleft: achenes oblong, pale brown, narrowed at both ends, 3-angled, short-beaked. In wet places, Oregon to Texas, Georgia and Ontario.

§ 3 Stems leafy, bearing a sessile head of spikelets subtended by a few involucre bracts. Bristles elongated, the barbs directed upward.

S. criniger Gray Proc. Am. Acad. vii, 392. Stems slender, 3 inches to 3 feet high, from slender matted rootstocks, triangular and striate, rough above: leaves flat, rough on the margins, the radical one elongated but shorter than the stem, the cauline only an inch or two long, distant, the uppermost usually very near the top: involucre bracts broad and scale-like, acuminate, 2-4 lines long: spikelets 5-9, oblong, 3-4 lines long: scales thin and soft, brownish, oblong: bristles 6: filaments slender, much exserted: style 3-cleft: achenes oblong, 3-angled, acute and shortly beaked, a line long. In marshes, southern Oregon to California.

4 ERIOPHORUM L. Sp. 52.

Low herbs with creeping perennial rootstocks, triangular or nearly terete stems, grass-like leaves and small perfect flowers in terminal solitary or umbellately clustered spikelets subtended by a one- to several-leaved involucre or naked. Scales spirally imbricated, usually all fertile. Perianth of few to many filiform smooth soft exserted bristles. Stamens 1-3. Style 3-cleft. Achenes 3-angled, oblong, ellipsoid or obovoid.

* Involucre leaves none: spikelets solitary.

E. vaginatum L. Sp. 52. Stems stiff, tufted, obtusely triangular, smooth, slender, 8-16 inches high, leafless except at base, bearing 2 inflated sheaths, the upper one usually above the middle: leaves stiff, filiform, triangular, channelled, shorter than or sometimes exceeding the stem: spikelet ovoid, erect: scales ovate-lanceolate or the lowest lanceolate, acuminate, purple-brown, thin: bristles numerous, white, straight, glossy, 4-5 times as long as the scale: anthers linear: achene obovoid, obtuse

brown, minutely apiculate. In high mountain bogs, Washington to Alaska Newfoundland and Pennsylvania.

E. Schencheri Hoppe Taschenb. 1800, 104. Stems slender, smooth, nearly terete, 10-20 inches high, leafy below, often with a leafless sheath above: leaves filiform, channelled, usually much shorter than the stem: spikelet erect: scales ovate-lanceolate, long-acuminate, purple-brown, membranaceous: bristles numerous, white or slightly yellowish, weak, nearly straight, 4-5 times as long as the scale: achene narrowly oblong, brown, acute and somewhat beaked. In bogs, Oregon to Alaska and Newfoundland.

E. russeolum Fries Novet. Mant. ii, 67. Stems solitary or little tufted, triangular, smooth, 8-20 inches high, leafy at base, bearing an inflated mucronate sheath above: leaves filiform, triangular, channelled, mucronate, 1-4 inches long: spikelet erect: scales ovate-lanceolate, acuminate, thin, purplish-brown with narrow white margins: bristles numerous, bright reddish brown, an inch or more long: achene oblong, narrowed at each end, apiculate. In marshes, Oregon to Alaska and Newfoundland.

* * Spikelets several, subtended by a 1-4-leaved involucre.

E. polystachyon L, Sp. 52. Stems stiff, smooth, triangular above, nearly terete below, 1-3 feet high, leafy: leaves flat, shorter than the stem, 1-4 lines wide, tapering to a triangular rigid point: involucre of 2-4 leaves, commonly equalling or exceeding the inflorescence: spikelets 3-12, ovoid or oblong, nodding, in a terminal more or less compound umbel; rays filiform: scales ovate-lanceolate, acute, or acuminate, purple-green or brown: bristles numerous, bright white, about an inch long: achenes obovoid, obtuse, light brown. In bogs, Oregon to Alaska and the Atlantic States: also in Europe and Asia.

E. gracile Koch Roth. Catal. Bot. ii, 259. Stems slender, obtusely 3-angular, rough on the angles, 1-2 feet high, leafy: leaves narrowly linear, about a line wide, triangular-channelled, rough-margined, shorter than the stem: involucre commonly of a single stiff erect leaf: spikelets 3-8, capitate or subumbellate, the longer-peduncled ones drooping: scales ovate or oblong, obtuse or subacute, greenish-brown, the midrib rather strong: bristles numerous, bright white, 8-12 lines long: achenes linear-oblong, acute, pointed. In bogs, California to Alaska and across the Continent: also in Europe and Asia.

5 HEMICARPHA Nees & Arn. Edinb. New Phil. Journ. xvii, 263.

Low or dwarf setaceous annuals with flattened stems, somewhat leafy at base, linear leaves and 1-3 small spikelets sessile in an involucre cluster. Scales spirally imbricated all around, deciduous. Flowers perfect. Perianth of a single hyaline scale between the rachis and the flower. Stamens 1-3. Style 2-cleft, deciduous, not enlarged at base. Achenes oblong, turgid or lenticular.

H. subsquarrosa Nees in Mart. Fl. Bras. ii, Pt. 1, 61. Stems tufted, numerous, 1-6 inches high, with brown sheaths at base: leaves 1 or 2, very short, filiform: principal involucre bract continuous with the stem, 6-12 lines long, the others much smaller or wanting: spikes 1-3, brownish, ovate, 1-1½ lines long: scales numerous, cuneate-obovate, shortly acuminate and slightly spreading at the tip or erect, ¼ line long, little exceeding the obtuse nutlet. In moist sandy soil, Washington to Brazil and the Atlantic States.

H. occidentalis Gray Proc. Am. Acad. vii, 391. Stems filiform, 1-2

inches high, tufted, with reddish-brown basal sheaths: leaves filiform, shorter than the stem: principal involucre bract continuous with the stem, 5-8 lines long, the others shorter: spikelets greenish, broadly ovate: scales with broadly ovate base and long acuminate spreading tips, twice as long as the nutlet: hyaline scale truncate or erosely toothed, not adherent to the nutlet. In wet grounds, base of Mount Adams Washington to California.

H. intermedia Piper Fl. Palouse Reg. 36. Stems numerous, tufted, 2-4 inches high: leaves narrow, involute, the recurved blades 6-18 lines long: spikelets ovoid, obtuse, 1-2 lines long: involucre bracts usually 3, the uppermost 6-18 lines long, the others much shorter: scales $\frac{1}{2}$ -1 line long, broadly obovate, the abruptly acuminate somewhat spreading or recurved apex as long as the body: hyaline scale triangular-ovate, not adherent to the nutlet, which is oblong-ovate or obovate, about $\frac{1}{2}$ line long, with a short beak. Margins of ponds along the Columbia and Snake rivers, Oregon and Washington.

6 ELEOCHARIS R. Br. Prodr. Fl. Nov. Hol. i, 224. (1810.)

Annual or perennial herbs with simple triangular, quadrangular, terete, flattened or grooved stems, the leaves reduced to sheaths, or the lowest rarely leaf-bearing, and small flowers in dense solitary terminal spikes without an involucre. Scales concave, spirally imbricated all around. Perianth of 1-12 bristles, usually retrorsely barbed, wanting in some species. Stamens 2 or 3. Style 2-cleft, the base persistent and forming a tubercle on the summit of the more or less 3-angled achene.

E. ovata R. & S. Syst. ii, 152. Glabrous annual with fibrous roots: stems tufted, slender or filiform, rather deep green, nearly terete, mostly erect, 2-16 inches high: spike ovoid or oblong, obtuse, many-flowered, 2-5 lines long, 1-1 $\frac{1}{2}$ lines in diameter: scales thin, oblong-orbicular, very obtuse, brown with green midrib and scarious margins: bristles 6-8, deciduous, usually longer than the achene: stamens 2 or 3: style 2- or 3-cleft: achene pale brown, shining lenticular, obovate-oblong, smooth, $\frac{1}{2}$ line long or more: tubercle deltoid, acute, compressed, scarcely constricted at base, about $\frac{1}{4}$ as long as the achene and narrower. In wet soil, Oregon to Brit. Columbia, New Brunswick and Florida: also Europe.

E. palustris R. & S. l. c. 151. Perennial by horizontal often densely matted rootstocks: stems stout, terete or somewhat compressed, striate, 1-5 feet high: basal sheaths brown, rarely bearing a short blade, the upper obliquely truncate: spike ovoid-cylindric, 4-12 lines long, 1 $\frac{1}{2}$ -2 lines in diameter, many-flowered, thicker than the stem: scales ovate-oblong or ovate-lanceolate, purplish brown with scarious margins and green midrib, or pale green all over: bristles usually 4, slender, longer than the achene and tubercle, sometimes wanting: stamens 2 or 3: style 2- or 3-cleft: achene lenticular, smooth, yellow, $\frac{2}{3}$ line long: tubercle conic-triangular, constricted at the base, flattened, $\frac{1}{4}$ - $\frac{1}{3}$ as long as the achene. In ponds and moist meadows, Alaska to California and across the continent: also in Europe and Asia.

Var. glaucescens Gray Man. ed. 5, 558. stems slender or nearly filiform, 8-18 inches high: spikes oblong, 2-5 lines long: achenes smaller: tubercle narrower. In wet meadows and marshes, range nearly of the type in North America.

E. acicularis R. & S. l. c. 154. Perennial by filiform stolons or rootstocks: stems tufted, filiform or setaceous, obscurely 4-angled and grooved, weak, erect or reclining, 1-8 inches long: sheaths truncate: spikes com

pressed, narrowly ovate or linear-oblong, acute, broader than the stem, 2-10-flowered, 1-4 lines long, $\frac{1}{2}$ line wide: scales oblong, obtuse, or the upper subacute, thin, pale green, usually with a narrow brown stripe on each side of the midrib, deciduous, many of them commonly sterile: bristles 2-4, fragile, fugacious, shorter than the achene: stamens 3: style 3-cleft: achenes obovoid-oblong: tubercle conic, acute, $\frac{1}{4}$ as long as the achene. In wet soil, throughout North America: also Europe and Asia.

E. rostellata Torr. Fl. N. Y. ii, 347. Perennial by a short caudex: stems slender, the fertile erect, the sterile reclining and rooting at the apex, 1-5 feet long: upper sheaths truncate: spikes oblong, narrowed at both ends, thicker than the stem, 10-20-flowered, 4-6 lines long, about a line in diameter: scales ovate, obtuse or the upper acute, green with a somewhat darker midrib and slightly scarious margins: bristles 4-8, longer than the achene and tubercle: stamens 3: style 3-cleft: achene oblong-obovoid, obscurely 3-angled: tubercle conic-subulate, about half as long as the achene. Brit. Columbia to California and the Atlantic States.

7 STENOPHYLLUS Raf. Neog. 4. (1825.)

Annual herbs with slender erect stems, narrowly linear or filiform leaves with ciliate or pubescent sheaths and perfect flowers in umbellate, capitate or solitary spikelets subtended by a one- to several-leaved involucre. Scales spirally imbricated all around, mostly deciduous. Perianth wholly wanting. Stamens 2 or 3. Style 2- or 3-cleft, glabrous, at base much swollen and persistent on the achene as a tubercle. Achene 3-angled, turgid or lenticular.

S. capillaris Britton Bull. Torr. Bot. Club xxi, 30. *Fimbristylis capillaris* Gray. Stems filiform, densely tufted, erect, grooved, smooth, 2-10 inches high: leaves filiform, roughish, much shorter than the stem, their sheaths more or less pubescent with long hairs: involucre leaves 1-3, setaceous, shorter than or one of them exceeding the inflorescence: spikelets narrowly oblong, somewhat 4-sided, 2-4 lines long, less than a line thick, several in a simple or compound umbel, or sometimes solitary: scales oblong, obtuse or emarginate, pubescent, dark brown with green keel: stamens 2: style 3-cleft: achenes yellowish brown, narrowed at base, very obtuse or truncate at the summit $\frac{1}{4}$ line long, 3-angled, transversely wrinkled: tubercle minute, depressed. In dry or moist soil throughout North America.

8 RYNCHOSPORA Vahl. Enum. ii, 229. (1806.)

Leafy-stemmed herbs with erect 3-angled or terete stems, narrow flat or involute leaves and small flowers in variously clustered spikelets. Scales thin, 1-nerved, imbricated all around, usually mucronate by the excurrent midrib, the lower empty. Upper flowers imperfect, the lower perfect. Perianth of 1-20 barbed or scabrous bristles or none. Stamens commonly 3. Style 2-cleft, 2-toothed or entire. Achenes lenticular or swollen, capped by the persistent base of the style, or sometimes by the whole style.

R. alba Vahl Enum. ii, 236. Pale green: rootstock short: stems slender or almost filiform, glabrous, 6-20 inches high: leaves setaceous. $\frac{1}{4}$ - $\frac{3}{4}$ line wide, shorter than the stem: spikelets several or numerous, in 1-4 dense corymbose terminal and axillary clusters, narrowly oblong, acute, at both ends, 1-3 lines long: scales ovate or ovate-lanceolate, white, acute: bristles 9-15, downwardly barbed, slender, about as long as the achene and tubercle: achene obovate-oblong, smooth, pale brown, lenticu-

lar: tubercle triangular-subulate, flat, $\frac{1}{3}$ as long as the achene. In bogs, Oregon to Alaska, Newfoundland and Florida.

9 CAREX L. Sp. 972.

Perennial herbs with triangular stems, linear 2-ranked leaves and monœcious, diœcious or androgynous flowers borne in terminal solitary or racemed spikes, each usually subtended by a leaf-like bract. Perianth none or rarely represented by a single bristle. Staminate flowers of 3 stamens with filiform filaments, usually all in the terminal spike. Pistillate flowers of a single pistil with a style and 2 or 3 stigmas, borne on a very short axis in the axil of a sac-like bractlet or second bractlet called the perigynium which completely encloses the 3-angled, lenticular or plano-convex achene.

SUBGENUS I EUCAREX Cosson Fl. Paris, 744. Staminate flowers in one or more terminal spikes, sometimes with pistillate flowers at the base or apex. Pistillate flowers in distinct and simple mostly peduncled spikes. Cross-section of the perigynium circular, obtusely angled or prominently trigonous in outline. Style mostly 3-parted and the achene triangular or triquetrous. see p. 701

TRIBE I PHYSOCARPÆ Drejer Symb. Car. 10. Spikes few to many, distinct, densely flowered. Perigynium mostly straw-color at maturity, papery in texture, more or less inflated, smooth, nerved, tapering into a beak as long or longer than the body. Stigmas mostly 3.

§ 1 PAUCIFLORÆ Tuckerman Enum, Meth. 7. Spike androgynous, the pistillate flowers at the base, few. Perigynium greenish, linear-lanceolate, several times longer than the scale.

C. pauciflora Lightf. Fl. Scot. 545, t. 6. Glabrous: stems erect or assurgent, very slender, 4 inches to 2 feet high: leaves very narrow, shorter than the stem, the lowest reduced to toothed sheaths: scales inconspicuous, lanceolate to ovate, deciduous: perigynium scarcely inflated, 3-4 lines long, about $\frac{1}{2}$ line in diameter, tapering from below the middle into a slender or almost subulate beak, strongly reflexed: stigmas 3. In bogs, Washington to Alaska, Newfoundland and Pennsylvania.

§ 2 VESICARÆ Tuckerman l. c. 13. Staminate spikes commonly 2 or more. Pistillate spikes usually long-cylindrical and dense. Perigynium smooth and shining, much inflated, at maturity straw-color or sometimes purple, beaked and conspicuously 2-toothed, usually prominently few-nerved. Stigmas 3.

C. utriculata Boott Hook. Fl. ii, 221. Glabrous: stems stout, erect, 2-4 feet high: leaves elongated, the upper mostly exceeding the stem, 2-6 lines wide, the midrib prominent: bracts leaf-like: staminate spikes 2-4, linear, peduncled, the lower sometimes pistillate at the top: pistillate spikes 2-4, densely many-flowered, or sometimes looser near the base, 2-6 inches long, the lower short-peduncled, the upper sessile or nearly so, sometimes staminate at the summit: scales lanceolate, the lower awned and slightly longer than the perigynium, the upper acute: perigynium ovoid, light green, 2-3 lines long, narrowed above to a sharp 2-toothed

beak. In marshes, California to Alaska and across the continent.

C. monile Tuckerman Enum. Meth. 20. Stems slender, erect or reclining, 1-3 feet high: leaves elongated, rather light green, 1-4 lines wide, sometimes exceeding the stem: bracts similar, often longer than the inflorescence: staminate spikes 1-4, slender-peduncled: pistillate spikes 1-3, cylindrical, 1-3 inches long, about 4 lines in diameter, rather loose at maturity, the upper sessile, the lower one when 3, slender-peduncled and usually remote: perigynium yellowish-green, ovoid, inflated, about $2\frac{1}{2}$ lines long, tapering into a sharp 2-toothed beak, longer than the lanceolate acuminate scale. In marshes and wet meadows, California to Alaska and across the continent.

C. exsiccata Bailey Mem. Torr. Bot. Club, i, 6. Stems stout, erect, 1-3 feet high: leaves pale green, 4-6 lines wide, the upper ones surpassing the stem: staminate spikes 1 or 2, slender: pistillate spikes 1-3, cylindrical, 1-3 inches long, nearly sessile or the lowest one slender-peduncled: scales very narrow, mucicose: perigynia lance-ovate, scarcely inflated, strongly nerved, 3-4 times longer than the scale. In swales, Oregon and Washington.

Var. globosa Bailey l. c. More slender, with narrower leaves: spikes small, an inch or less long, more or less scattered, closely sessile, rusty in color: scales hyaline and very small: perigynia narrower, conspicuously spreading. In ponds on the high mountains, Oregon to Brit. Columbia.

C. retrorsa Schwein. Ann. Lyc. N. Y. i, 71. Glabrous: stems stout, erect, 1-3 feet high: leaves elongated thin, rough-margined, 2-4 lines wide, the upper usually exceeding the stem; the bracts similar: staminate spikes 1-3, short-peduncled: pistillate spikes 3-6, all close together at the top and sessile or nearly so, or the lowest distant and peduncled, densely-flowered, 1-2 inches long, 6 lines in diameter: perigynia ovoid, membranous, yellowish-green, about three lines long, tapering into a subulate 2-toothed beak, $\frac{1}{3}$ longer than the smooth lanceolate acute scale, reflexed at maturity. In bogs and wet meadows, Oregon and the Atlantic States.

C. comosa Boott Trans. Linn. Soc. xx, 117. Stems stout, 2-3 feet high: leaves ample, rough on the margins, 5-6 lines wide: staminate spikes erect, short-peduncled, sometimes pistillate at the top: pistillate spikes 5-6, all on slender peduncles, or the uppermost nearly sessile all nodding or spreading, about 2 inches long, 5-7 lines in diameter: scales narrow, very rough, oblong or lanceolate, short acuminate, about 2 lines long: perigynia with oblong little inflated base and long slender 2-toothed beak, twice as long as the scale; the long slender teeth spreading. In bogs, Washington to California and the Atlantic States.

TRIBE II TRACHYCHLENÆ Drejer Symb. Car. 9. Staminate spikes one or more. Pistillate spikes compactly flowered, mostly large, erect or nearly so. Stamens 3. Perigynia mostly thick, and hard in texture, commonly scabrous or hirsute, straight-beaked.

§ 1 ANOMALÆ Carey Gray's Man. 557. Terminal spikes all staminate: pistillate spikes long and cylindrical, mostly densely flowered. Perigynia broad and short, short-beaked, the apex very slightly toothed or entire, mostly granulate.

C. amplifolia Boott, Hook. Fl. ii, 228, t. 226. Stems stout, 2-3 feet high, very sharply angled, rough above: leaves many, 5-8 lines wide, rough on the margins, usually exceeding the stem: bracts leaf-like, without sheaths: pistillate spikes 4-6, erect, the upper one sessile, the lower

short-peduncled, 1-4 inches long slenderly cylindrical: perigynia elliptic conspicuously few-nerved, abruptly narrowed into a whitish beak, spreading, about as long as the whitish purple-margined awn-pointed scale. In wet places in wooded districts, California to Oregon and Idaho.

§ 2 *HIRTÆ* Tuckerman Enum. Meth. 14. Terminal spike all staminate: pistillate spikes densely many-flowered. Perigynia more or less hairy, the beak more deeply toothed.

C. Oregonensis Olney Proc. Am. Acad. viii, 407. Stems smooth or nearly so, very leafy, about a foot high: pistillate spikes about 3, an inch long, often staminate at the top, erect, approximate, shortly peduncled: perigynia ovate, tapering at both ends, prominently many-nerved, thickly covered with short stiff hairs, gradually produced into a white and smooth distinctly 2-toothed beak, longer than the ovate acute membranous scale. In the higher parts of the Cascade Mountains.

C. lanuginosa Michx. Fl. ii, 175. Stems rather slender, acutely angled and rough above, 1-2 feet high: leaves and lower bract elongated, flat, not involute, 1-2 lines wide, sometimes longer than the stem: staminate spikes 1-3, long-peduncled sometimes pistillate at base: pistillate spikes 1-3, usually distant, sessile or the lowest peduncled, 9-18 lines long; scales ovate, membranous, often purplish, acuminate or short-awned: perigynia green, densely pubescent, tapering into a short 2-toothed beak, as long or longer than the scale. In moist meadows, California to Brit. Columbia and across the continent.

§ 3 *PALUDOSÆ* Fries Corp. 190. Staminate spikes 2 or more, long-peduncled: pistillate spikes 2 to several, usually all peduncled, long and heavy, loosely flowered. Perigynia large, thick in texture, strongly nerved, mostly smooth, usually produced into a long beak which terminates in conspicuous subulate erect or spreading teeth.

C. aristata R. Br. Franklin Journ. 721. Stems stout, erect, smooth or roughish above, acutely angled, 2-5 feet high: leaves elongated, 3-5 lines wide, more or less scabrous often pubescent beneath and on the sheaths: bracts similar, the lower often exceeding the stem: staminate spikes 3-5, remote, cylindrical, sessile or the lowest short-peduncled, loosely-flowered: at the base, dense above, 1-4 inches long, sometimes 8 lines in diameter scales oblong-lanceolate, rough-awned, thin-margined, perigynia ascending, conic, glabrous, 4-6 lines long, gradually tapering into the conspicuously 2-toothed beak nearly twice as long as the scale. In bogs, Oregon, the Northwest Territory, Michigan and New York.

C. riparia Curtis Fl. Lond. iv t. 60. Pale green and glabrous: stems stout or rather slender, smooth or somewhat rough above, erect, 2-3 feet high: leaves elongated, somewhat glaucous, 3-6 lines wide, about equaling the stem: staminate spikes 1-5; pistillate spikes 2-5, cylindrical, 2-4 inches long, about 4 lines in diameter the upper erect, sessile or nearly so, the lower more or less peduncled: scales lanceolate or oblanceolate long-aristate or acute: perigynia narrowly ovoid, firm, scarcely inflated, tapering gradually into a short 2-toothed beak, as long or longer than the scales. In swamps, Idaho to Manitoba and Florida.

TRIBE III MICROHYNCHÆ Drejer Symb. Car 9. Paludose and alpine species of various habit, mostly with colored spikes, often growing in dense tufts. Perigynia small nearly beakless, not prominently toothed at the apex, rather thin in texture.

§ 1 ATRATÆ Kuntz Enum. Pl. ii, 431. Mostly alpine or boreal species. Terminal spikes club-shaped and androgynous with the staminate flowers below: pistillate spikes mostly short and dark colored.

C. alpina Swartz Lilj. Sv. Fl, ed. 2, 26. Stems slender, erect, rough above, leafy only below the middle, 6 inches to 2 feet high, leaves roughish, shorter than or equaling the stem: spikes 2-4, clustered at the summit, the terminal 1 or 2 staminate below, oblong or globose, 2-5 lines long, sessile or the lower peduncled: perigynia oval, orbicular or ovoid, light green, about a line long, tipped with a very short minutely 2-toothed beak, equaling or shorter than the ovate black or purple-brown, obtuse or acutish scale: stigmas 5. In rocky places, Oregon to Colorado, James Bay and Lake Superior; also in Europe.

C. Mertensii Prescott Bong, Veg. Sit. 168. Stems erect, rather slender, 2-3 feet high, rough on the very sharp angles, leafy: leaves broad and flat, shorter than the stem: bracts leaf-like the lower exceeding the stem: spikes 5-8, an inch or two long, very densely flowered, all more or less staminate at base, the upper one conspicuously so, all drooping, on filiform scabrous peduncles: perigynia very flat, broadly ovate, winged, very thin in texture, green or whitish, much longer and wider than the purple white-ribbed scale: Along streams, mostly high mountain streams, Oregon, to Alaska and Montana.

C. Umelini Hook, Bot. Beech. 118. t. 27. Stems slender, erect, 1-3 feet high, leaves erect, 1-2 lines wide: spikes 2-4, short and thick, peduncled, awn of the scales hispid: perigynia ferruginous, smooth, Oregon to Alaska and Siberia.

C. fusca All. Fl. Ped. 11, 269. Slender, stiff, erect, sharp-angled rough above 2-3 feet high: leaves rough, erect 1-2 lines wide, shorter than or sometimes exceeding the stem: spikes 2-4, oblong or cylindric, erect, all sessile, and close together or the lowest sometimes distant and very short peduncled, 4-8 lines long, about 4 lines in diameter when mature, the terminal one staminate at base or sometimes throughout: scales ovate awn-tipped black or dark brown with green midvein, perigynia elliptic or or somewhat obovate flat, ascending, a line long, very light green, beakless the apex minutely 2-toothed, shorter than the scales, stigmas 3. In bogs, California to Alaska and the Eastern states, also in Europe.

§ 2 RIGIDÆ Fries Summa. 72. Mostly stiff and rigid with short and erect very closely flowered spikes, the terminal one entirely staminate and purple or black. Bracts with auriculate base.

C. heteroneura W. Boott Bot. Cal. ii, 239. Stems slender erect 1-2 feet high, sharply angled: leaves narrow, flat, shorter than the stem, lower bract leaf-like, nearly as long as the stem, sheathless: pistillate spikes about a half inch long, 3 lines thick, sessile or the lower ones very short peduncled, more or less contiguous, whitish or yellowish: perigynia oval, smooth, straw color, thin in texture, narrowed abruptly into a very short slightly emarginate beak, longer and broader than the obtuse or mucose purple white-ribbed scale. In the mountains California to Idaho.

C. Reynoldsii Dewey Sill. Journ. xxxii, 39. Stems 6-18 inches high, sharply angled: leaves glaucous, 3-4 lines broad, flat, with revolute margins rather abruptly tapering to a triangular apex, shorter than the stem; spikes 3-6, oblong or obovoid, the staminate 4-9 lines long, sessile; pistillate 6-8 lines long, 3-4 lines thick, sessile or short peduncled, contiguous

or the lowest distant, on a peduncle 1-1½ inches long: scales purple, or pale in the middle and on the margins, oblong or oval acute or acuminate, divergent, pale yellow above, abruptly rostellate with a purple emarginate beak, longer and broader than the scale. In the mountains, California to eastern Washington and Montana.

C. stylosa C. A. Meyer Act. Acad. St. Petersb. i, 222, t. 12. Stems slender, erect, 12-18 inches high, rough and leafless above; leaves 1-2 lines wide, shorter than the stem: Staminate spikes solitary, nearly sessile, often partly pistillate, an inch or less long: pistillate spikes 2-3, 6 lines long or less, the lowest longest, slender-peduncled, the others sessile or nearly so: perigynia turgid-ovate, fuscous, minutely punctate, beakless, the entire orifice closed with the stiff and persistent style from which the stigmas are caducous, longer than the very obtuse black white-ribbed scale. In wet meadows, northern Washington to Alaska and Labrador.

C. spreta Bailey Mem. Torr. Bot. Club, 1, 6. Stems stout, 12 to 18 inches high: leaves 2-3 lines wide, usually equalling or exceeding the stem: spikes sessile 4-6 lines long, and nearly as thick, the upper 2-3 contiguous to the staminate spike: perigynia broadly elliptical, or broader than long, beakless, thin, green, longer, and much broader than the black and mucicose faintly white-nerved scale. Columbia river bottoms.

C. Tolmiei Boott Hook. Fl. 11, 224. Stem rigid, 12-18 inches high triquetrous, smooth or nearly so: leaves rough on the margins, mostly shorter than the stem: lower bracts leaf-like and about equalling the stem, sheathless: spikes 4-7, the uppermost an inch or less long, staminate and mostly contiguous, oval or oblong 8-12 lines long, dark-colored, often staminate at the apex, the 2 or 3 lowest slender-peduncled 1-2 inches long: perigynia compressed-trigonus, oval or oval-oblong, pale and more or less discolored with purple dots, produced into a very short and entire cylindrical beak, either longer or shorter than the obtuse or mucicous purple white-ribbed scale. Oregon to Behring Straits.

Var. nigella Bailey Men. Torr. Bot. Club i, 47. Perigynia minutely bidentate: scale narrower and more acute.

Var. subsessilis Bailey l. c. Spikes short and thick, very densely flowered the staminate sessile; the pistillate aggregated near the top, sessile or the lowest very shortly peduncled: perigynia broader and more abruptly contracted. Eastern Oregon to Colorado.

Var. angusta Bailey l. c. Taller, leaves very long and narrow, the basal sheaths becoming fibrillose: spikes sessile or lowest peduncled, cylindrical: bracts narrow or filiform. Kerbyville Oregon.

C. Kelloggii W. Boott. Bot. Cal. 11, 240. Stems very slender 12-16 inches high, sharply angled and scabrous above: leaves 1-2 lines wide, the cauline shorter, the sterile rather longer than the stem: bracts without sheaths, the lowest slightly exceeding the stem: spikes 4-5, narrowly cylindrical or clavate, short-peduncled and loosely flowered at base, the uppermost staminate, rarely with some pistillate flowers at top or base, 9 lines long; pistillate spikes 3-12 lines long, about a line thick: scales purple with pale midrib, obtuse perigynia pale, ovate, tapering to a short beak, the orifice entire, purple, smooth, longer than the scale. In the mountains, California to Brit. Columbia.

C. decidua Boott. Linn Trans. xx, 119. Stems 12-18 inches high: leaves 1-3 lines wide, shorter than the stem: bracts without sheaths, the lower exceeding the stem: spikes 4-6, dark purple, oblong or cylindrical, the uppermost staminate, at least at base, or at both ends, 12-14 lines long, 2-3 lines thick, the others pistillate and solitary or in clusters of 2-3, 6-18 lines long, 2-4 lines thick: scales dark purple with pale centre, oblong-oval

to lanceolate and mucronulate: perigynia ferruginous, oval, rostellate with an entire beak, stipitate, papillose, deciduous, longer or shorter than the scale. Oregon to California and Patagonia.

C. nudata W. Boott Bot. Cal. ii, 241. Stems slender, 12-16 inches high, sharply angled, scabrous, leaves 1-2 lines wide setaceously pointed, shorter than the stem: bracts without sheaths, the lowest rarely equalling the stem, the others shorter than the spike: spikes 4 or 5, cylindrical, the uppermost staminate, at least above, 6-12 lines long, 1-1½ lines thick, single or rarely with a smaller one at its base, the others pistillate, 6-18 lines long, 1-2 lines thick, the highest close to the staminate and sessile, the others contiguous on short peduncles or rarely the lowest radical on a peduncle a foot long: scales dark purple, oblong, obtuse, or the lower lanceolate and acute: perigynia purple above, almost lanceolate, attenuate to an entire cylindrical beak, very deciduous. Along streams in the coast mountains, Oregon to California.

Var. angustifolia Bailey Mem. Torr. Bot. Club 16. More slender and lax: leaves narrower: spikes 6-9 lines long, sessile or nearly so: perigynia shorter and relatively broader; much more abruptly contracted above. Along streams in the Coast Mountains, Oregon to the Mackenzie river.

Var. anomala Bailey l. c. Very slender, 18-30 inches high, the stem and leaves very rough: leaves very numerous, long and narrow: spikes 3-5, the lowest one or two on long and very slender peduncles, very narrow and thinly flowered at base, 1-2 inches long, greenish or brownish, the terminal one often pistillate at the top or throughout: perigynia firmer in texture, long and often very slender, green or greenish-yellow, longer than the narrow brown and obtuse scale. Cascade Mountains of Oregon.

C. Hallii Bailey Proc. Am. Acad. xxii, 82. Stems 1-2 feet high, sharp-angled and rough. strict: leaves narrow, rough on the margins, shorter than the stem; bracts all serrate on the margins, without sheaths the lowest more or less leaf-like and equalling the stem, the upper setaceous: spikes sessile, about 5, the terminal staminate and usually more or less peduncled, the others closely sessile and short: scales of the staminate spike very broad and obtuse, often emarginate purplish-black: perigynia flat, almost white, elliptic with contracted ends, smooth, the beak very short and entire, either much exceeding or about the length of the broad obtuse black scale. Oregon.

C. invisa Bailey l. c. Stems 5-24 inches high, sharply angled, erect, smooth: leaves nearly as long as the stem, 12 lines wide, roughish on the margins, short-pointed: spikes 4 or 5, all sessile or the two lowest on short peduncles and erect, oblong and somewhat narrowed at base, about an inch long, or short and nearly globular, the upper 1 or 2 staminate and short, the others all approximate or contiguous and pistillate: bracts short and sheathless: perigynia elliptic-ovate green and olive-colored with black-purple blotches, flat, very short beaked, the orifice entire or nearly so, broader and commonly longer than the purple-black, very conspicuously white-ribbed apiculate scale. In the mountains, California to Brit. Columbia.

C. laciniata Boott. Ill. 175 t. 594. Stems stout, 2-3 feet high, very sharply angled: leaves stiff and carinate, pale, 2-4 lines wide: bracts without sheaths, the lowest sometimes 2½ feet long: spikes 2-6, yellowish, ferruginous, cylindrical, the staminate 1 or 2, commonly peduncled, the uppermost 2 inches long, 2-3 lines thick, sometimes with a few pistillate above the middle or at the base: the rest pistillate, 1-3 inches or more long, 2-4 lines thick, remote, densely flowered, the upper sessile, the lower

nodding on long peduncles and loosely flowered at base: scales purple or ferruginous, pale in the middle, lanceolate or oblong, ciliate, acute or with a rough awn, rarely obtuse: perigynia oval, ovate, round or obovate abruptly or gradually beaked with the orifice varying from nearly entire to bidentate with serrate teeth, coriaceous, sparingly toothed on the upper margins, compressed lenticular, punctate, broader than the scale. In dry alluvial soil, southern Oregon to California.

C. Nebraskensis. Dewey Sill. Journ. xviii, 102. Stems rather stout, erect, sharply angled 1-2 feet high: leaves pale green, 2-3 lines wide, rough-margined, not exceeding the stem: lower bract foliaceous, sometimes equalling the stem, the upper much shorter and narrower: staminate spikes commonly 2, peduncled: pistillate spikes 2-4, dense, oblong-cylindric, erect, 9-15 lines long, about three lines thick, sessile or the lower on short peduncles: perigynia elliptic or somewhat obovate, short-beaked, the beak 2-toothed, longer than the ovate or lanceolate acute brown scale: stigmas 2. In wet places eastern Oregon and Washington to Nebraska and New Mexico.

C. aquatilis Wahl. Kongl. Vet. Acad. Handl. (11) xxiv, 165. Stems rather stout, erect, sharp angled above, smooth or nearly so, 2-4 feet high; leaves elongated, sometimes equalling the stem, 2-3 lines wide: bracts similar to the leaves, the lower exceeding the stem: staminate spikes 1-3, peduncled: pistillate spikes narrowly linear-cylindric, often staminate at the summit, erect or slightly spreading 1-2 inches long, 2-3 lines thick, sessile and dense or the lower narrowed and loosely-flowered at the base, and short peduncled: perigynia elliptic, green, minutely beaked, the orifice entire, longer than or equalling the oblong scale: stigmas 2. In swamps and along streams. California to Brit. Columbia and the Atlantic States: also in Europe.

C. stricta Lam. Encycl. iii, 387. Stems slender, stiff, erect, usually in dense tufts, sharply angled, rough above, $1\frac{1}{2}$ -4 feet high: leaves long, rarely exceeding the stem, very rough on the margins 1-2 lines wide: lower bracts similar, sometimes equalling the stem: staminate spikes solitary or sometimes 2, peduncled: pistillate spikes 2-5, linear-cylindric, often staminate at the top, very densely-flowered, or loose at base $\frac{1}{2}$ -2 inches long, about 2 lines thick, all sessile or the lower peduncled: perigynia ovate elliptic, ascending, acute, a line long or less, minutely beaked the orifice entire or nearly so, longer than the brown purple green-margined oblong or lanceolate scale: stigmas 2. In swamps, California to Washington and the Atlantic States.

C. interrupta Bœckl. Linnæa xl. 432. Stems slender, erect, 12-16 inches high, sharply angled above: leaves elongated, usually exceeding the stem about 2 lines wide; bracts all shorter than the inflorescence: staminate spike usually solitary, 8-10 lines long, pistillate spikes 3-5, 6-18 lines long, about 2 lines thick, often staminate at the top, densely flowered above, the lower ones loose and often interrupted at base: sessile or the lowest one short-peduncled: scales brown with pale midrib and margins, nearly as long as the perigynium, broadly lanceolate appressed: perigynia small, green, elliptical, shortly beaked. Along mountain streams, Western Oregon.

C. lenticularis Michx. Fl. ii, 172. Stems very slender, erect 1-2 feet high: leaves rarely over a line wide, shorter or rarely longer than the stem, slightly rough on the margins: lower bracts similar to the leaves, usually much longer than the spikes: staminate spikes solitary or rarely 2, sessile or short peduncled, often pistillate above: pistillate spikes 2-5, clustered at the summit or the lower distant, sessile or the lower short peduncled: 4-12 lines long, about 2 lines thick: perigynia ovate or elliptic, acute, tipped with a minute entire beak longer than the appressed

green scales. On shores, California to Washington and the eastern states.

C. acutina Bailey Mem. Torr. Bot. Club 1, 52. Stems erect, 16-20 inches high, smooth or rough above, leaves flat and thin, about as long as the stem; the lower 1 or 2 bracts flat and leaf-like, about equalling the stem, the margins mostly serrate: spikes 4 or 5, the upper 1 or 2 staminate, all approximate and sessile or the lower short-peduncled, 1-2 inches long: perigynia thin and soft, yellowish somewhat inflated, the small beak entire, shorter or longer and broader than the obtuse or mucicose scale. Along rivers, eastern Oregon.

Var. tenuior Bailey l. c. 53. Tall and more slender: leaves narrower; spikes an inch or less long and more scattered: perigynia smaller. Margins of mountain lakes, Oregon and Washington.

C. bovina. Densely matted and forming extensive meadows of many acres: stems slender 12-18 inches high, erect: leaves strongly carinate, shorter than or equalling the stem: spikes all peduncled or the upper one sessile, lower more or less cernuous 12-18 lines long, nearly 3 lines thick: perigynia elliptical, somewhat inflated, broader and shorter than the lanceolate acuminate scale. On lands that are overflowed by the Columbia river in June.

§ 4 CRYPTOCARPÆ Tuckerman Enum. Meth. 11. Large species with cernuous or drooping large spikes which bear long and conspicuous mostly dark scales: stigmas 2.

C. cryptocarpa C. A. Meyer Mem. Acad. St. Petersb. i. 226, t. 14. Stems stout, erect, sharply angled, rough above, 1½-3 feet high: leaves smooth, pale 2-3 lines wide, the basal shorter than or equalling the stem, the upper ones and the bracts shorter, all withering with the first frosts: staminate spikes 2-4, peduncled, 1-2 inches long: pistillate spikes 2-5, all on long filiform peduncles and drooping, densely-flowered, often staminate at the top, 1-3 inches long, 3-4 lines in diameter, scales purple-brown, ascending, lanceolate, acuminate: perigynia elliptical, light colored, 1½ lines long: tipped with a very short entire beak, much shorter than the scale. In salt marshes California to Alaska and Greenland.

C. Sitcheusis Prescott Bong. Veg. Sitche. 168. Stems stout, 1-4 feet high, sharply angled, rough, many-leaved at base, 3-4 lines wide, very dark green, persistent through the winter, very rigid, the radical longer than the stem: spikes dark purple, the staminate 1-4, sessile, erect, 1-3 inches long, 2-3 lines thick: pistillate spikes 3-5, sessile or more or less peduncled, 1-4 inches long, 3-5 lines thick, spreading or nodding, loosely flowered at base, dense above: scales purple, the staminate oblong, obtuse, the pistillate ovate or lanceolate, acuminate or awned: perigynia purple or orbicular-obovate, abruptly short-beaked, stipitate, shorter than the scale. In marshes, California to Alaska.

C. Barbara Dewey Bot. Mex. Bound. 231. Stems slender 2 feet or more high, glaucous leaves surpassing the stem: pistillate spikes 2-4, linear, 1-3 inches long, the upper 1 or 2 sessile or short peduncled, the lower very long on a peduncle 3-4 inches long: scales dark, obtuse or mucicose: perigynia small appressed, pale, more or less attenuate below, abruptly contracted into a short and entire beak, nearly nerveless, shorter or longer than the white backed and brown edged obtuse or mucicose scale. Banks of streams, California and Oregon.

C. Howellii Bailey Mem. Bot. Club i 45. Stems stout 3-6 feet high, sharply angled, rough above: leaves broad and lax, very long, the sheaths covering the base of the stem with a long and papery brown envelop: stam-

inate spikes 2-3, prominently peduncled; pistillate spikes about 4, 2-4 inches long, cernuous or somewhat bent, the upper 2 on peduncles 6-12 lines long, and usually staminate above, the lowest very long-peduncled: perigynia narrowly elliptic or elliptic-oblong, conspicuously granulate when mature, produced into a slender and entire beak, shorter than the linear-lanceolate muticose dull brown scale. In swamps along the coast, from the mouth of the Columbia river to Alaska.

§ 5 FERRUGINEÆ Tuckerman Enum. Meth. 12. Plants smaller: spikes small, an inch or less long, the upper ones often androgynous: perigynium tapering into a conspicuous point, often rough on the angles, dark-colored: bracts conspicuously sheathing: stigmas usually 3.

C. frigida All. Fl. Ped. ii, 270. Stems 8-20 inches high, leafy at base: leaves shorter than the stem: spikes 4-8, rusty-black, oblong, the terminal one staminate, the others pistillate, the upper contiguous and sessile, the lower remote and exserted on a long peduncle: bracts shorter than the stem: perigynia triangular, lanceolate, tapering to a beak, bifid at the orifice, hispid on the margins longer than the ovate acuminate mucronate scale. In wet prairies on the high mountains, Washington to California and Utah.

C. luzulæfolia W. Boott. Bot. Cal. ii, 250. Stems 2-3 feet high, obtusely angled, smooth 1 or 2 leaved at or below the middle, many-leaved at base: leaves 4-10 inches long, 2-4 lines wide, acuminate to a sharp rough irregular point, much shorter than the stem bracts tapering to a short sharp point, shorter than the peduncles: spikes 3-6, the upper 1-3 staminate, clavate or obovoid, 3-6 lines long, 1-3 lines thick, often crowded so closely as to appear as a single one, the others pistillate, clavate, 6-14 lines long, 2 lines thick, the upper often sessile at the base of the staminate, the others all remote on exserted scabrous peduncles 2-6 inches long: scales purple or pale in the middle, oblong to lanceolate, ciliate obtuse or acute or roughly cuspidate: perigynia tawny or purple, oval to lanceolate, acuminate to a long cylindrical bidentate beak, stipitate, smooth, longer and broader than the scale. In the high mountains, California to southern Oregon.

§ 6 PENDULINÆ Fries Corp. 190. Bracts sheathless: perigynium whitish, more or less granulated, nearly pointless.

C. limosa L. Sp. 977. Stems slender, rough above, erect, 10 inches to 2 feet high: leaves a line wide, or less, shorter than the stem: bracts linear-filiform the lower $\frac{1}{2}$ to 2 inches long: staminate spike solitary on a long peduncle: pistillate spikes 1 or 2 on filiform peduncles, drooping, oblong 5-10 lines long about 3 lines thick: perigynia pale oval, narrowed at both ends $1\frac{1}{2}$ lines long, tipped with a minute entire beak, about as long as the oval green or purplish-brown acute or cuspidate scale. In bogs, Idaho to New Jersey and the Atlantic regions: also in Europe.

TRIBE iv HYMENOCHLÆNÆ Drejer Symb. Car. 10. Staminate spikes several or many, mostly loosely flowered and on filiform nodding peduncles Perigynia mostly light green or whitish, thin-membranaceous, mostly somewhat inflated, commonly smooth and shining, tapering gradually into a minutely 2-toothed beak.

C. capillaris L. Sp. 977. Stems slender or filiform, smooth, or roughish above, erect, 2-14 inches high: leaves $\frac{1}{2}$ -1 line wide, much shorter than the stem, flat or somewhat involute in drying, roughish: bracts all with sheathing base: spikes all on filiform peduncles, the terminal one staminate;

pistillate spikes 1-3, narrowly oblong, 2-6 lines long, 1 line thick, nodding, 10-12-flowered: perigynia oblong, 3-angled light green, the slender beak about $\frac{1}{2}$ as long as the body, longer than the oval, scarious margined scale. Idaho to Alaska, Greenland and the Atlantic States; also Europe and Asia.

C. cinnamomea Olney Proc. Am. Acad. vii, 396. Stems slender, 1-2 feet high, erect: leaves narrow-margined, shorter than the stem: bracts sheathing, longer or shorter than the stem: spikes 3-5, erect, 12-18 inches long, cinnamon colored, the terminal one staminate, fusiform and long peduncled, the others pistillate, cylindrical, densely flowered, the upper approximate, the lower on long exserted peduncles, attenuate and loosely flowered at base, the lowest remote: scales cinnamon colored with green centre, membranous, ovate, obtuse, ciliate at the apex: perigynia elliptical, 3 angled, green, rostellate with bidentate orifice ciliate within, glabrous, longer and broader than the scale. In marshes, southern Oregon and California.

TRIBE v SPIROSTACHYÆ Drejer Symb. Car. 10. Staminate spikes usually solitary, pistillate spikes 2-5, short yellowish or fuscous, compactly flowered. Perigynia smooth or minutely granulate, rarely somewhat serrate on the margins, prominently nerved, squarrose, mostly beaked, the orifice entire. Stigmas 3.

C. viridula Mich. Fl. ii, 170. Glabrous and bright green: Stems slender, erect, 4-15 inches high: leaves a line or less wide, often longer than the stem: bracts similar, strictly erect and much exceeding the spikes, sessile, sometimes pistillate at the top: pistillate spikes 2-5, all approximate and sessile or the lowest distant and short-peduncled, oblong, 2-6 lines long, 2 lines or less thick: perigynia ovoid-oblong, a line or less long, narrowed at base, tapering into a 2-toothed beak about half as long as the body, longer than the ovate scale. In wet places, Washington to Alaska, New Foundland and Pennsylvania.

TRIBE vi DACTYLOSTACHYÆ Drejer Symb. Car. 10. Bracts sheathing, the sheaths often conspicuous and colored. Staminate spike mostly one: pistillate spikes short, commonly rather loosely flowered and slender, their scales mostly whitish, often small.

§ 1 LAXIFLORÆ Kunth Enum. Pl. ii, 452. Slender, more or less broad-leaved species with mostly leafy bracts, green sheaths and loosely flowered spikes. Perigynia mostly conspicuously 3-angled, with a more or less curved beak.

C. Hendersoni Bailey Proc. Am. Acad. xxii, 115. Slender and rather weak, 1-2½ feet high: leaves thick and flaccid, 4-8 lines wide, shorter than the stem: bracts with sheaths 1-3 inches long: spikes 4-5, pale, the pistillate approximate, on short peduncles, loosely flowered: perigynia 2-3 lines long, gradually contracted at each end, longer than the firm hyaline-margined ovate obtuse often mucronate scale. In forests and thickets, Washington to California.

§ 2 PANAICEÆ Tuckerman Enum. Meth. 15. Mostly stouter narrow-leaved species. Perigynia often strongly nerved, not conspicuously trigonous, often turgid

C. livida Willd. Sp. Pl. iv, 285. Pale green and very glaucous: Stems slender, strictly erect, smooth, 12-18 inches high: leaves 1-2 lines wide, shorter than or equalling the stem: bracts narrow, usually short: staminate spike solitary, short-peduncled: pistillate spikes 1-3, 5-12 lines

long, about 2 lines thick, erect and clustered at the summit of the stem, densely several-flowered or loose at the base, the third when present distant or sometimes nearly basal, peduncled; perigynia oblong, very pale, nearly 2 lines long, less than a line thick, beakless, narrowed to an entire orifice, longer than the ovate obtuse scale: stigmas 3. In bogs, Alaska to California and the Atlantic States.

§ BICOLORES Tuckerman l. c. 12. Small species with the terminal spike androgynous or all staminate: perigynia more or less round or pyriform, beakless, commonly glaucous.

C. aurea Nutt. Gen. ii, 205. Light green: stems very slender, erect or reclining, 2-15 inches long: leaves flat, 1-1½ lines wide, the basal equaling or exceeding the stem: bracts similar and exceeding the spikes: terminal spike short-peduncled; pistillate spikes 2-4 oblong or linear-oblong, erect and clustered near the top, or the lower one distant, on filiform peduncles, loosely or densely few-flowered, 2-10 lines long: perigynia obovoid or subglobose, yellow or brown and a line in diameter when mature, beakless, longer than or equalling the membranous acute cuspidate or short-awned scale. In wet meadows Oregon to Brit. Columbia and the Eastern States.

Var. celsa Bailey Mem. Torr. Bot. Club 1, 75. Taller and strict, 15-20 inches high: spikes large and compactly flowered, longer-peduncled. Oregon to California.

§ 4 DIGITATÆ Fries Corp. 187. Low species with ordinary leaves: sheaths membranous or hyaline and colored either not prolonged into a bract or the bract very short and not foliaceous: perigynia more or less 3-angled, often hairy, the beak straight or nearly so.

C. Richardsoni R. Br. Frankl. Journ, 751 Stems slender, rough, erect, 4-12 inches high: leaves flat, about a line wide, the basal shorter than or equalling the stem: staminate spike short-peduncled; pistillate spikes 1 or 2, erect, short-peduncled, 4-9 lines long, compactly several-flowered, close together: perigynia obovoid, pubescent, about a line long, minutely beaked, shorter than the ovate purple conspicuously white-margined scale: stigmas 3. In dry soil California to Brit. Columbia and the Eastern States.

TRIBE VII SPHERIODIPHORÆ Drejer Car. 9. Low species of dry ground with the leaves all radical. Staminate spikes solitary: pistillate spikes short, usually globular or short-oblong, more or less sessile and approximate or the longer ones radical. Perigynia usually short and rounded, the beak straight and usually bifid, firm or hard in texture, not inflated, hairy or scabrous.

C. filifolia Nutt. Gen. II, 204. Densely tufted, pale green and glabrous: stems very slender, smooth, erect; 3-14 inches high: leaves filiform, rather stiff, spike solitary, erect, bractless, staminate above, pistillate below, 3-15 lines long, the pistillate part about 2 lines in diameter perigynia obovoid-oval, triangular, rough or somewhat pubescent at the summit a line long abruptly tipped by a short cylindrical hyaline entire beak, narrower than and about as long as the broadly oval scarious-margined obtuse or cuspidate scale. In dry soil California to British Columbia and Nebraska.

C. vespertina. *C. Pennsylvanica* of authors as to the Pacific coast plant. Stoloniferous: stems very slender, erect, 8-20 inches high: leaves

1-1½ lines wide; shorter than the stem: lower bract leaf-like, 6-12 lines long: staminate spikes usually short-peduncled, about an inch long: pistillate spikes 1-3, short-oblong, few-flowered: perigynia white or light colored, obovate, tipped with a rather stout 2-toothed beak, hairy, shorter than the brown scarious-margined acute or mucronate scale. In pine forests, eastern Washington and Oregon.

C. deflexa Hornem. Plantel. ed. 3, i, 938. Very low and much tufted: stems 1-6 inches high, setaceous, more or less curved or spreading: leaves narrow, nearly equalling or longer than the stems: staminate spike minute and nearly always invisible in the head; pistillate spikes 2 or 3, 2-5 flowered, green or green and brown, all aggregated into a small head, the lowest one always more or less short-peduncled and subtended by a leafy bract 4-6 lines long: perigynium very small, much contracted below, tipped with a very small flat beak. Alpine prairies eastern Oregon to Alaska, Greenland and Vermont.

Var. media Bailey Mem. Torr. Bot. Club 1, 73. Rather stiff, 4-12 inches high, in dense tufts, most of the stems somewhat exceeding the leaves: staminate spike prominent and erect, 4-5 lines long: pistillate spikes 2-3, all scattered, the lowest peduncled and subtended by a bract which surpasses the stem. In the mountains of eastern Oregon to Montana.

C. umbellata Schk. Reidgr. Nachtr. 75. Closely tufted and matted, stoloniferous: stems filiform, 1-6 inches long, erect or reclining: leaves ½—1½ line wide, usually much exceeding the stems: staminate spike, solitary, terminal 4-6 lines long commonly conspicuous: pistillate spikes 1-3, all filiform-peduncled from the basal sheaths or 1 or 2 of them sessile or very nearly so at the base of the staminate, ovoid-oblong, several flowered, 2-4 lines long: perigynia oval, finely pubescent, pale, obtusely 3-angled, tipped with a subulate 2-toothed beak nearly as long as the body, about as long as the ovate-lanceolate acuminate or short-awned scales. Oregon to the eastern states.

C. globosa Boott Trans. Linn. Soc. xx, 125. Stoloniferous: stems 4-16 inches high, very slender, scabrous, clothed at base with reddish brown sheaths that break up into thread-like fibres: leaves firm, 1-2 lines wide, the lower longer than the stem: lower bracts longer than the spikes: staminate spike 6-12 lines long, a line thick; pistillate spikes oblong, loosely 2-9-flowered, 3-6 lines long, 2 lines thick, the upper sessile and close to the staminate, the others remote and pedunculate, scales oblong or lanceolate, acute or cuspidate, purple with green midrib and hyaline margins: perigynium more or less purple, globose, produced at base, abruptly beaked with a bidentate orifice, hirsute scabrous, broader than the scale. Washington to California.

C. inops Bailey Proc. Am. Acad. xxii, 126. Stems slender, rigid, sharply angled, a foot high, from long and erect rootstocks: leaves numerous, rigid, narrow, long-pointed, about half as long as the stem: spikes 3-4, all aggregated and sessile at the top of the stem, the lowest subtended by a sheathless bract of about its own length, the terminal spike staminate, about an inch long, the others half as long and staminate at the top: perigynia small, elliptic, brown below, very abruptly produced into a white straight and deeply cut beak, scabrous below, hairy on the shoulders and beak, about as long as the brown-centred broad acute scale. On sandy ground among timber on Mount Hood.

TRIBE VIII PHYLLOSTACHYS Carey Gray's Man. 1848, 538. Spikes solitary, staminate above; pistillate flowers few, often remote, usually on a more or less zigzag rachis: scales prolonged and leaf-like or scabrous.

C. Geyeri Boott Linn. Trans. xx. 118. Stems stiff, slender, 6 inches to 2 feet high, leafy at base: leaves rigid, $\frac{1}{2}$ -1 line wide, carinate, scabrous on the margins and keel: staminate flowers 1-6, alternate, appressed to the rachis: scales whitish, becoming ferruginous, green in the middle, ciliate, in the staminate flowers oblong and obtuse, the pistillate clasping and cuspidate, the lower foliaceous and equalling the stem: perigynia triangular-ellipsoidal, tapering to the base, with a very short entire beak and hyaline orifice, smooth, 1-nerved on the middle of 2 sides, shorter than the scale. On dry ridges, Oregon and Washington to Colorado and Montana.

C. multicaulis Bailey Bot. Gaz. ix, 117. Stems numerous, 1-3 feet high, stiff and wiry, terete or obtusely angled, smooth or minutely scabrous beneath the spike, dark green and remaining so a year after fruiting: leaves short and reduced to sheaths: staminate flowers 3-8, their scales oblong or lanceolate, green with hyaline margins, appressed; pistillate flowers 1-4, their scales green with ovate scarious-margined base and long acuminate tips, sometimes longer than the spike: perigynium large, green, triangular contracted below to a stipitate base, tipped with a short stout beak. On dry ridges among pine timber, southern Oregon to California.

TRIBE IX LAMPROCHLÆNÆ Drejer Symb. Car. 10. Small mostly boreal species. Spikes mostly solitary. Scales obtuse with hyaline margins. Perigynium smooth, firm in texture, or or even horny, glossy or shining, brown or black, lightly nerved or nerveless, tipped with a short beak. Stigmas mostly 3.

C. Pyrenaica Wahl. Acad. Handl. xxiv, 139. Cespitose, the filiform stems 4-7 inches high, very leafy at base: leaves $\frac{1}{2}$ -1 line broad, flat or often conduplicate: bracts scale-like: spikes dark-brown or purple, ellipsoidal, densely-flowered, 5-8 lines long, 2-4 lines thick, staminate above: scales membranaceous, deciduous, of the staminate flowers linear-oblong, acutish: of the pistillate darker, ovate-lanceolate or oblong-lanceolate, the lowest often cuspidate or subfoliaceous: perigynium membranaceous, lanceolate or spindle-shaped, gradually attenuate to an acute obliquely cut, hyaline-margined orifice, long-stipitate, reflexed at maturity, rather longer than the scale. On the high mountains, northern California to Alaska and the Rocky Mountains.

C. nigricans C. A. Meyer Cryp. Nov. t. 7. Stems rather stout, 4-8 inches high, very leafy at base: leaves 1-5 lines wide, not half as long as the stem, flat, attenuate to a very sharp point: spike very dark brown or black, oblong to obovate, 3-6 lines long, staminate at the top: scales oblong to ovate, acute or acuminate: perigynia broadly lanceolate or oblong, abruptly contracted below to a slender stipe, produced above into a slender sharply 2-toothed beak, usually longer than the scale. In wet meadows on the highest mountains, California to Alaska and the Rocky Mountains.

TRIBE X LEPTOCEPHALÆ Bailey Proc. Am. Acad. xxii, 131. Spike solitary, staminate above, thin and slender. Perigynia thin in texture, green, oblong, lanceolate or linear in outline, beakless or nearly so.

C. leptalea Wahl. Kongl. Vet. Acad. Handl. (11.) xxiv, 139. Light green and glabrous: stems filiform, erect or spreading, 6-18 inches long: leaves $\frac{1}{4}$ line wide, mostly shorter than the stems: spikes narrowly linear, 2-7 lines long, less than a line thick: perigynia few, linear-oblong, narrowed at base, obtuse and beaked at the summit, $1\frac{1}{3}$ lines long, longer than the attenuate scales. In wet places, California to Alaska and across the continent.

TRIBE XI PHYSOCEPHALÆ Bailey l. c. 132. Spikes solitary,

globular or short-oblong, staminate at top. Perigynia straw-color, papery, more or less inflated. Stamens 3.

C. Breweri Boott Il. 142, t. 455. Rootstock creeping, stoloniferous: stems 5-18 inches high, obtusely angled, smooth, leafy at base: leaves rigid, filiform, the cauline shorter than the stem: spikes dark fulvous or chestnut-color, oval or ovate, 6-12 lines long, 4-6 lines thick, naked: staminate flowers few: perigynia oval, much inflated and very thin, with a very short obliquely cut entire beak, longer and broader than the hyaline-margined scale. Alpine, California to Washington.

SUBGENUS II VIGNEÆ Koch Syl. Fl. Germ. 748.

Staminate flowers few and inconspicuous, borne at the base or apex of the spikes. Pistillate flowers in one to several short and sessile spikes which are commonly more or less aggregated into heads or even panicles. Cross-section of the perigynium plano-convex in outline. Styles 2. Achenes lenticular.

TRIBE XII ACROARRHENÆ Fries Summa. 73. Staminate flowers borne at the top of the spikes, or the spikes wholly staminate or the plants sometimes dioecious.

§ 1 FŒTIDÆ Tuckerm. Enum. Meth. 10. Spikes tawny or brown, not elongated, very densely aggregated into a continuous globose somewhat chaffy head. Perigynium ovate or ovate-lanceolate, nerveless or nearly so, mostly thin in texture.

C. vernacula Bail. Bull. Torr. Bot. Club xx, 417. Stems rather stout, triangular, 3-30 inches high, leafy at base: leaves flat, 1-2 lines wide, 1-4 inches long: bract leaf-like, sometimes much longer than the inflorescence: spikes congested into a head 6-20 lines long by 3-8 lines thick, of numerous small roundish ferruginous spikelets, the lower often distinct: scales ovate, acute, cuspidate: perigynia ovate, contracted below to a short stipe and above to a stout bidentate beak, longer than the scale. In the high mountains, Washington to California and the Rocky Mountains.

C. Hoodii Boott Hook. Fl. ii, 211, t. 211. Stems slender, erect, 1-2 feet high longer than the leaves: spikes several to many, very few-flowered, in a dense ovoid or oblong head 6-9 lines long: perigynia spreading, small and narrow, gradually contracted at both ends, green, nerveless or nearly so, conspicuously winged, rough on the angles, about the length of the brown or tawny scales. Oregon and Washington to Montana.

Var. nervosa Bailey Mem. Torr. Bot. Club i, 14. Very tall and slender, 2-3 feet high: head looser: perigynia more conspicuously winged on the outer face. In woods near the coast, Puget Sound to California.

§ 2 VULPINA Kunth Enum. Pl. ii, 383. Spikelets mostly yellow or tawny when mature, densely aggregated or sometimes somewhat scattered below or even paniced. Perigynia thick in texture, spongy at base, mostly stipitate, conspicuously nerved.

C. Jonesii Bailey Mem. Torr. Club i, 16. Stems slender, erect, somewhat stiff, 7-18 inches high, sharply angled and rough, somewhat exceeding the narrow leaves, spikes several to many, densely aggregated into a small oblong or ovoid naked head an inch or less long: perigynia small, lanceolate from a truncate base, stipitate, very strongly many-nerved, marginless, smooth or but slightly rough on the angles above, the long and brown beak nearly entire, exceeding the brown muticose or obtuse scale. In the mountains, Washington to California.

C. macrocephala Willd. in Herb. Spring. Syst iii, 808. Stems stout, 3-angled, 4-12 inches high, from long running rootstocks: leaves stiff, 1-4 lines wide, rough on the margins, as long or longer than the stem: spikes densely aggregated into an oblong or ovate head 1-3 inches long by 1-1½ inches thick, subtended by slender bracts: perigynia 6-8 lines long, 2 lines or more thick, ovate from a truncate base, produced above into a subulate deeply 2-toothed beak nearly as long as the body, the angles conspicuously margined with dentate wings, longer than the ovate acuminate scales. On sandy banks along the coast of Oregon and Washington.

C. stipata Muhl. Willd. Sp. Pl. 233. Stems smooth, erect, 1-3 feet high: leaves flat, 3-4 lines wide, shorter than the stem, the upper ones sometimes exceeding the spike: bracts, bristle-like or wanting: spikes numerous, yellowish, crowded into an oblong cluster 1-4 inches long, the lowest sometimes branched: staminate flowers few, always terminal: perigynia lanceolate, 2-2½ lines long, about a line thick at the base, gradually tapering into a rough flattened 2-toothed beak 1-2 times as long as the body, longer than the ovate or lanceolate acuminate hyaline scale. Common in wet places. Brit. Columbia to California and across the continent.

§ **MULTIFLORÆ** Kunth Enum. Pl. ii, 387. Heads various, mostly loosely flowered, sometimes paniced, yellow or tawny. Spikes short. Staminate flowers sometimes occupying whole spikes in the middle or at the apex of the head. Perigynia mostly small and short, nearly nerveless in some species, becoming nearly lanceolate and more or less prominently nerved, firm in texture.

C. Gayana Desv. Fl. Chile, 205. Stems 1-2 feet high, scabrous: leaves 1-2 lines wide, shorter than the stem: spikes aggregated into an oblong or ovoid head 6-10 lines long by 4-7 lines thick, diœcious or nearly so: scales membranous, chestnut color with hyaline margins, ovate, acuminate, carinate, cuspidate: perigynia chestnut color, broadly ovate, cordate, stipitate at base, tipped with a minute conical beak with an entire orifice, shorter than the scale. Idaho to Colorado.

C. marcida Boott Hook. Fl. ii, 212, t. 213. Stems slender, 1-2 feet high, scabrous: leaves a line wide, shorter than the stem: heads 8-15 lines long, 3-5 lines thick, sometimes nearly diœcious. dull brown, composed of many ovate crowded or contiguous closely imbricated spikes 2-3 lines long by a line thick, the lower compound, the upper simple: perigynia nearly black at maturity, orbicular with a short, or ovate with a longer, bidentate beak, stipitate, equalling the ovate acute or cuspidate hyaline-margined scale. In meadows, California to Brit. Columbia and Colorado.

Var. debilis Bailey Proc. Am. Acad. xxii, 136. Small and slender, a foot or less high, the stems mostly exceeding the very narrow leaves: perigynia smaller and more contracted at base. Along streams, eastern Oregon.

C. teretiuscula Goodn. Trans. Linn. Soc. ii, 163. Stems slender, erect or reclining, very rough, at least above, 1-2 feet long: leaves mostly less than a line wide, shorter than or sometimes equalling the stem: spikes several or numerous, staminate above, in a narrowly oblong compact or interrupted terminal cluster 1-2 inches long: perigynia ovate, smooth, dark brown, slightly more than half a line long, truncate or rounded at base, tapering into a flat conic beak about as long as the body, about equalling the ovate brownish acute or short-awned scales. In swamps and wet meadows, Idaho to Brit. Columbia and Hudson Bay.

Var. prairiea Britton. Clusters of spikes compound, branched, the

top commonly nodding. Oregon to Brit. Columbia and the Eastern States.

Var. amplia Bailey Mem. Torr. Bot. Club i, 53. Very large and stout, 2-3 feet high: heads 1-3 inches long, much branched: perigynia a line or more long, nerved on the back, produced into a long beak. In bogs, Oregon and Washington.

C. vicaria Bailey l. c. 49. Stems 10-30 inches high, slightly scabrous above: leaves 1-2½ lines wide, shorter than the stem: bracts setaceous, exceeding the spike, heads ferruginous, 6-20 lines long by 3-8 lines thick, ovate-oblong or cylindrical, of numerous small roundish crowded spikes or clusters of spikes, the lower often distant: scales ovate, acute, cuspidate: perigynia divergent, membranaceous, ovate, rostrate and bidentate, serrate above on the somewhat winged margins, longer and broader than the scale. In wet places, Oregon to California.

Var. costata Bailey l. c. 49. Perigynia very strongly many-nerved or ribbed on the outer face and usually bearing 3 or 4 nerves on the inner one. Southern Oregon.

§ 4 **ARENARIÆ** Kunth Enum. Pl. ii. 376. Spikes longer, linear or nearly so, aggregated into short almost globose heads. Perigynia lanceolate or ovate-lanceolate, mostly larger and more delicate in texture. Scales very acute or awn-pointed. Staminate flowers variously situated.

C. Douglasii Boott Hook. Fl. ii, 213, t. 213. Rootstocks creeping: stems about a foot high, obtusely angled, smooth: leaves 1-2 lines wide, tapering to an extremely slender triangular point: bracts scale-like, clasping, cuspidate, or the lowest prolonged beyond the stem: heads diœcious or nearly so, oblong, pale or chestnut color, 1-2 inches long, 6-9 lines thick, of many ellipsoidal or ovoid crowded spikes the upper simple, the lower compound and sometimes branching, often half inch long: perigynia ovate or lanceolate-ovate, acuminate to a slender obliquely cut beak, stipitate, shorter than the ample membranous oblong or lanceolate acute or cuspidate hyaline-margined scale: stigmas 2, very long. In alkaline soil, eastern Washington to California.

§ 5 **MUHLENBERGIANÆ** Tuckerm. Enum. Meth. 9. Spikes green or nearly so when mature, aggregated or scattered, never in compound heads. Staminate flowers always borne at the top of the spike. Perigynia mostly short-ovate, usually not conspicuously nerved.

C. tenella Schk. Reidgr. 23. Rootstocks very slender: stems almost filiform, rough, commonly reclining, 6 inches to 2 feet long: leaves soft, about ½ line wide, spreading, shorter than or sometimes equalling the stem: spikes very small, 1-2-flowered, distant, or the upper close together: perigynia ovoid-ellipsoid, nearly terete, hard, about 1 line long by ½ line thick, tipped with a minute entire beak longer than or equalling the ovate acute hyaline scale: stigmas 2. In bogs, Brit. Columbia to California and the Eastern States.

C. valicola Dewey Sill. Journ. 2nd ser. xxxii, 40. Stems 6-12 inches high, very slender: leaves ½ line wide, shorter than the stem: bracts roughly cuspidate from a broad hyaline-margined base, the lowest equalling or exceeding its spike: head 6-12 lines long, linear-oblong, of 4-7 narrowly oblong contiguous spikes: scales chestnut-color, membranous, with very broad hyaline margins, acute, or the scabrous keel prolonged into a short mucro: perigynia pale brown, obovate, abruptly attenuate to the base and to the obliquely cut entire beak, about equalling the scales.

Southern Idaho.

C. nardina Fries Mant. ii, 55. Stems filiform, erect, smooth, 2-6 inches high, very densely tufted: leaves filiform, erect, about as long as the stems: spikes solitary erect, terminal, ovoid-oblong, 3-5 lines long, less than 2 lines thick, bractless: perigynia oblong-elliptic, yellowish-brown, narrowed at both ends, nearly 2 lines long, somewhat hispid above. Beakless, the orifice 2-toothed, equalling or shorter than the brown ovate acute or cuspidate thin scales. Washington to Brit. Columbia and Hudson Bay.

TRIBE XIII HYPARRHENÆ Fries Summa. 72. Staminate flowers borne at the base of the spike or variously situated.

§ 1 ELONGATÆ Kunth Enum. Pl. ii, 402. Spikes silvery-green or sometimes tawny when mature, distinct, mostly small. Perigynia not wing-margined nor conspicuously broadened, mostly nearly flat on the inner face.

C. sterilis Willd. Sp. Pl. iv, 208. Stems slender, stiff, erect or spreading, 8-18 inches long, rough above: leaves $\frac{1}{2}$ -1 line wide, shorter than the stem: bracts very short or sometimes bristle-like: spikes 3-5, subglobose or short-oblong, contiguous or separated, about $2\frac{1}{2}$ lines thick: staminate flowers usually numerous at the base of the upper spike or sometimes whole spikes staminate, rarely quite dioecious: perigynia pale, lanceolate, compressed, spreading or reflexed when mature, $1\frac{1}{2}$ lines long, thickened at base, tapering into a sharp-edged 2-toothed rough beak more than half as long as the body, longer than the ovate hyaline scale: stigmas 2. Common in moist places, California to Alaska and across the continent.

≠ *C. canescens* L. Sp. 974. Pale green and somewhat glaucous: stems slender, erect, roughish above, 10-30 inches high: leaves flat, $\frac{2}{3}$ -1 line wide, shorter than the stem: bracts very short or none, or the lowest bristle-like and longer than its spike: spikes 4-9, short-oblong or subglobose, densely many-flowered, 2-5 lines long, about 2 lines thick, scattered or the upper close together: staminate flowers basal: perigynia oval, silvery-green to nearly white, rather less than a line long, about $\frac{1}{2}$ line wide, rough above, tipped with a minute entire beak, equalling or surpassing the ovate hyaline scale. In swamps and bogs, Oregon to Alaska and across the continent.

Var. *Oregana* Bailey Mem. Torr. Bot. Club i, 75. Head larger and more dense, becoming brown: spikes loosely flowered, the perigynia sometimes spreading in a stellate manner, narrow, often almost linear-lanceolate, brown-nerved, sharp-edged and rough above. In wet places. Oregon to Vancouver Island.

C. brunnescens Poir. in Lam. Encycl. Supp. iii, 286. Rather dark green, not glaucous: stems slender, stiff, erect, 8-18 inches high: leaves a line or less wide, shorter than the stem, spikes 4-8 subglobose or short-oblong, few-flowered, rarely over $2\frac{1}{2}$ lines long, scattered or the upper close together: staminate flowers basal: perigynia ascending or spreading, brown, less than a line long, tipped with a beak about $\frac{1}{4}$ as long as the body, about equalling the ovate membranous brownish scale. In wet places, Oregon to Brit. Columbia and the Eastern States.

C. arcta Boott Ill. 155, t. 497. Rather light green but not glaucous: stems slender, erect, 12-30 inches high, rough above: leaves flat, a line wide, shorter than or equalling the stem: spikes oblong, many-flowered, 3-4 lines long, about $2\frac{1}{4}$ lines thick, all aggregated into a terminal ovoid cluster: staminate flowers basal: perigynia pale, ovate, mostly spreading, tapering into a rough beak about half as long as the body, longer than the

membranous pale brown scale: stigmas 2. In swamps and wet woods, Oregon to Brit. Columbia and across the continent.

C. Deweyana Schwein. Ann. Lyc. N. Y. i, 65. Stems slender, spreading, nearly or quite smooth, 1-2 feet long: leaves 1-2 lines wide, flat, soft, shorter than the stem: spikes 3-6, oblong or subglobose, few-flowered, 2-3 lines thick, distinctly separated or the upper ones contiguous: staminate flowers basal: perigynia lanceolate or ovate-lanceolate, thin, tapering above to a rough strongly 2-toothed beak half as long as the body, equaling the hyaline-margined broadly ovate acute or cuspidate scale: stigmas 2. In wooded districts, California to Alaska and across the continent.

Var. Bolanderi W. Boott Bot. Cal. ii, 236. Stems stouter and leaves broader: spikes 4-10, with more numerous flowers: scales hispid-awned. With the type, Washington to California.

§ 2 **OVALES** Kunth Enum. Pl. ii, 394. Spikes tawny or dark, rather large, sometimes crowded. Perigynia with a more or less winged margin which is mostly incurved at maturity making them concave.

C. siccata Dewey Am. Journ. Sci. x, 278. Rootstock long and stout: stems slender, erect, 1-2 feet high: leaves about a line wide, the upper sometimes exceeding the stem, the lower short: bracts short or the lower bristle-like and elongated: spikes 3-6, oblong or subglobose, 3-4 lines long, brownish, clustered or more or less scattered: staminate flower variously situated or whole spikes staminate: perigynia ovate-lanceolate, less than 3 lines long, wing-margined, tapering to a rough beak nearly as long as the body, about equalling the ovate-lanceolate membranous acute or acuminate scale: stamens 2. In dry ground, California to Brit. Columbia and New York.

C. pratensis Drejer Rev. Crit. Car. 24. Stems slender, erect when young, the summit at length nodding, 12-18 inches high: leaves about 1 line wide shorter than the stem: spikes 3-6, oblong or club-shaped, scattered or the upper contiguous, silvery-brown, shining, 3-5 lines long, less than 3 lines thick, several-flowered: staminate flowers basal: perigynia lanceolate, thin, pale, wing-margined, tapering into a beak nearly as long as the body, about as long as the lanceolate acute or acuminate membranous scale: stigmas 2. Eastern Oregon to Alaska, Labrador and the Rocky Mountains.

C. straminiformis Bailey Mem. Torr. Bot. Club i, 24. Stems 6 inches to 2 feet high, obtusely angled, nearly smooth: leaves flat, 1-2 lines wide, shorter than the stem: heads variegated, pale green and chestnut, 6-12 lines long, 6-10 lines thick, oblong, triangular-ovoid or subspherical, of 3-8 crowded ellipsoidal spikes: scales chestnut-color, pale in the middle, with narrow hyaline margins ovate, acute: perigynia broadly ovate or roundish, abruptly attenuate to a sharp minutely bidentate beak, broadly wing-margined to the base, the wings finely serrate, longer and broader than the scales. In dry soil on the high mountains, Washington to Calif.

C. feta Bailey Bull. Torr. Bot. Club xx, 417. Stems slender, 1-3 feet high: leaves 2 lines wide, shorter than the stem: heads ovoid or oblong, of 4-12 crowded or contiguous, spikes, naked or the lowest with a setaceous bract with a dilated base: perigynia pale fulvous, lanceolate, attenuate, rather sharply bidentate, winged, nearly 2 lines long, broader than the membranous fulvous lanceolate acuminate scales. In swales, Washington to California.

C. leporina L. Sp. 973. Stems slender, erect, roughish above, 12-18 inches high: leaves about 1 line wide, flat, shorter than the stems: bracts

very short and scale-like or wanting: spikes 4-7, oblong, obtuse, narrowed and staminate at base, 4-6 lines long, about 3 lines thick, dark brown, shining, clustered but distinct in a terminal oblong head about an inch long: perigynia erect or ascending, ovate-lanceolate, 2 lines long, rather narrowly winged, the rough tapering 2-toothed beak nearly as long as the body, longer and broader than the lanceolate acute membranous scale. Oregon to Brit. Columbia and the Rocky Mountains.

C. festiva Dewey Sill. Journ. xxix, 246. Cespitose: stems 6 inches to 2 feet high, sharply angled: leaves 3-5, the upper longest, commonly shorter than the stem, 2-3 lines wide; heads dark ferruginous, 9-12 lines long, 3-12 lines thick, of from 6-12 or more nearly equal roundish or ovoid spikes, contiguous in an oblong, or crowded in a spherical or ovoid cluster, naked or subtended by a scale-like or foliaceous bract that sometimes exceeds the stem; perigynia membranous, spreading or divergent, ovate, lanceolate or narrowly elliptical, attenuate to a longer or shorter obliquely cut beak, narrowly winged, serrate above on the sharp margins, longer than the scale. In moist meadows, California to the Arctic regions and the Rocky Mountains.

Var. gracilis Olney Proc. Am. Acad. viii, 407. Stems very slender, nodding at the top, 20-30 inches high: heads oblong, 12-18 lines long, of 3-6 roundish contiguous or approximate ferruginous spikes. Washington to California.

Var. stricta Bailey Mem. Torr. Bot. Club i, 51. Stems rather stiff 20-30 inches high: leaves stiff and the lower ones short: heads very dense globular or short-ovoid, light brown, 9-12 lines long: perigynia broad more or less nerved. In wet places, eastern Oregon to California.

Var. pachystachya Bailey l. c. Stems 1-3 feet high, flat and weak, longer than the lax leaves: heads small, globular or oblong, dull dark brown, the spikes often somewhat distant, very short: perigynia spreading, about equalling the ovate-lanceolate mucicose brown scales. Oregon to Alaska and Montana.

C. athrostachya Olney Proc. Am. Acad. viii, 393. Cespitose: stems acutely triangular, leafy, 8-24 inches high: leaves narrow, shorter than the stem: bracts with an expanded strongly nerved hyaline-margined base, the lower 3-5 foliaceous, much exceeding the stem: heads globose, straw-color, of 5-20 densely crowded spikes or the lowest distant: scales, membranous, pale ferruginous, ovate-lanceolate, acuminate: perigynia, ovate-lanceolate, attenuate to an elongated sharply bidentate beak, the winged margins serrate, about as long and broad as the scale. In the mountains of California to Brit. Columbia and the Rocky Mountains,

ORDER CIX GRAMINEÆ Juss. Gen. 28. (1789)

Annual or perennial plants with usually hollow cylindrical, rarely flattened, jointed stems with closed nodes, two-ranked usually linear parallel-veined leaves with sheathing base, the sheaths open on the side opposite the blade, and usually a scarious or cartilaginous ring called the ligule at the orifice of the sheath, and small flowers in spikelets which are arranged in panicles, racemes or spikes, and which consist of a shortened axis called the rachella, and two or more chaff-like distichous imbricated scales called glumes of which the first two are usually empty, in the axil of each of the others, except sometimes in the uppermost, is borne a flower and a two-nerved scale called

the palet, with its back turned toward the rachella and often enveloping the flower by its enfolded edges: at the base of the flower between it and its glume are usually two very small hyaline scales, called lodicules. Stamens 1-6, usually 3, with very slender filaments and two-celled usually versatile anthers. Pistil with a one-celled one-ovuled ovary and one to three, usually two styles with variously branched mostly plumose stigmas. Embryo small, situated at the base of the seed and covered only by the thin pericarp. Fruit a caryopsis, usually called a grain, with copious mealy albumen.

SUBORDER I PANICACEÆ R. Br.

Spikelets 1- or 2-flowered, when 2-flowered the upper fertile, the lower staminate. Rachella articulated below the glumes or the subtending involucre, not extending beyond the flower.

TRIBE I ANDROPOGONEÆ Spikelets perfect or one staminate or rudimentary, mostly silky. Flowering glumes and palet hyaline, none of the glumes spiny.

1 **Imperata** Spikelets in pairs both perfect: empty glumes clothed with long white silky hairs.

TRIBE II PANICEÆ Spikelet of one perfect flower with a staminate or neutral one below it, the latter often reduced to a single palet; sometimes appearing as if one-flowered by the suppression of the lower glume and the palet of the neutral flower.

2 **Paspalum** Spikelets apparently 1-flowered, plano-convex, on one side of a flattened rachis, without an involucre.

3 **Panicum** Spikelets $1\frac{1}{2}$ -2-flowered without an involucre, the lower usually minute.

4 **Chaetochloa** Spikelets 2-flowered, with an involucre of bristles proceeding from the pedicels.

TRIBE III ORYZEÆ Spikelets usually much compressed laterally, one-flowered. Empty glumes two or more. Stamens often 6.

5 **Homalocenchrus** Spikelets much flattened: glumes wanting: palet rigid.

SUBORDER II POACEÆ R. Br.

Spikelets not articulated below the glumes, one- to many-flowered, the imperfect flowers if any usually uppermost.

TRIBE IV PHALARIDEÆ Spikelets more or less laterally compressed, 1-3-flowered. Glumes 5, the first 2 below the articulation of the rachella the third and fourth very unlike the others; the fifth with a hermaphrodite flower.

6 **Phalaris** Spikelets 3-flowered, the lateral reduced to a rudiment, the fertile coriaceous.

7 **ANTHOXANTHUM** Spikelets 3-flowered, the lateral neutral, of a single

awned hairy palet.

- 8 *Hierochloa* Spikelets 3-flowered, the lateral ones staminate.

TRIBE V AGROSTIDÆ Spikelets all hermaphrodite and fertile, with 3 glumes, the first 2 empty. Rachella sometimes prolonged behind the paleæ into a naked or plumose bristle.

* Flower sessile within the glumes.

- 9 *Coleanthus* Spikelets in small umbellate clusters, all perfect.
10 *Sporobolus* Spikelets in contracted or open panicles, all perfect.

** Flower raised within the glume on a short rounded or stalk-like base.

Glumes long-awned.

- 11 *Polypogon* Glumes much longer than the flower.

+ + Glumes mostly awnless.

- 12 *Agrostis* Lower glumes exceeding the very thin obtuse palets: inflorescence spike-like to open paniculate.

- 13 *GASTRIDUM* Inflorescence spike-like: glumes with a shining ventricose base.

- 14 *Cinna* Flower distinctly stipitate: flowering glume short-awned below the tip.

- 15 *Muhlenbergia* Flowers mostly bearded at base, early deciduous: flowering glume awned from the apex.

+ + + Flowers with a more or less conspicuous tuft of hairs at base, shorter than the glumes.

- 16 *Calamagrostis* Spikelets 2-flowered and mostly with the rudiments of a second flower present: palet awned from below the apex.

TRIBE IV CHLORIDÆ Spikelets one, to several-flowered, in simple one-sided spikes. upon a jointless rachis.

* Spikelets one-flowered.

- 17 *Spartina* Spikelets much flattened laterally, in 2 rows upon one side of a 3-angled rachis: spikes racemed.

- 18 *Beckmannia* Spikes panicled: spikelets 2-flowered, or by abortion 1-flowered, upon one side of a flattened rachis.

** Spikelets 2-flowered or more, one flower perfect with one or more imperfect or neutral ones above it.

- 19 *Bouteloua* Flowering glumes 3-cleft and 3-awned at the apex: imperfect flowers often reduced to these awns.

- 20 *ELEUSINE* Spikes digitate at the summit of the stem: spikelets several-flowered.

TRIBE V STIPACÆ Spikelets strictly one-flowered. Flowers with a sharp-pointed callus at base, deciduous. Flowering glume wrapped around the flower and palet, coriaceous and indurated in fruit and terminated by a simple or triple awn.

- 21 *Stipa* Awn simple, long, twisted below, not caducous.

- 22 *Oryzopsis* Awn simple, caducous: flower clothed with long silky hairs.

- 23 *Aristida* Awn triple, continuous or articulated with the glume.
 24 *Phleum* Panicle dense and spike-like: glumes distinct: awn simple.
 25 *Alopecurus* Panicle spike-like: glumes more or less united at base: awn simple.

TRIBE VI AVENACEÆ Spikelets paniced 2-several-flowered, rachis often bearded, prolonged into an imperfect rudiment. Glumes mostly equalling or exceeding the flower. Flowering glumes usually bearing an awn on its back or between its teeth.

* Spikelets with 2 or more lower flowers perfect.

- 26 *Danthonia* Spikelets several-flowered, awned from the 3 united middle nerves.
 27 *AVENA* Spikelets 2-flowered, awned from the midnerve only.
 28 *Trisetum* Spikelets 2-several-flowered: flowering glume 2-toothed at the summit, awned from the midnerve only.
 29 *AIRA* Spikelets 2-flowered, both perfect, the rachella not prolonged beyond the upper one.
 30 *Deschampsia* Spikelets with 2 perfect flowers, the rachella prolonged beyond the second flower.

* * Spikelets 2-flowered with one flower staminate

- 31 *ARRHENATHERUM* Lower flower staminate, upper perfect and usually awnless.
 32 *HOLCUS* Lower flower perfect, awnless, upper staminate and awned.

TRIBE VII FESTUCEÆ Spikelets paniced, 2-many-flowered, the rachis usually prolonged and bearing an imperfect flower or bristle.

* Lower one or two flowers staminate or neutral.

- 33 *Munroa* Spikelets in clusters in the axils of the upper leaves, with the two lower glumes empty.
 34 *Phragmites* Spikelets in an ample panicle, with one staminate flower below 2-4 perfect ones: rachis bearded with long hairs.
 * * Lowest flowers all perfect: grain not adherent to the palet.
 + Flowering glumes pointed, awned or acute, the nerves, when present, running into the point.
 35 *DACTYLIS* Spikelets in dense one-sided clusters in a one-sided panicle: glumes herbaceous, compressed, awn-pointed.
 36 *Koeleria* Spikelets in a dense spike-like panicle: glumes membranous, keeled, pointed or mucronate.
 + + Flowering glumes pointless and, except in *Melica*, awnless, obtuse; the nerves parallel.
 ++ Flowering glume 1-nerved; the palet 3-nerved.
 37 *Eatonia* Glumes very unlike; the upper one much broader than the linear lower one and wrapped around the flower.
 ++ ++ One or two of the glumes 5-nerved or more.
 38 *Melica* Flowering glumes flattish on the back, 7-nerved or more, membranaceous at tip: fertile flowers 1-3, the upper enwrapping the

1-3 imperfect ones.

- 39 Distichlis** Flowers dioecious: flowering glumes much compressed laterally, many-nerved, somewhat coriaceous.
 ++ ++ ++ Glumes 1-3-nerved.
- 40 Catabrosa** Glumes membranous, erose-truncate.
- 41 Graphephorum** Rachella hirsute with stiff hairs, extended into a hairy appendage: flowering glumes membranous.
- 42 Panicularia** Spikelets several-flowered deciduous, the rachella breaking up into joints: flowering glumes rounded on the back, the 5-7 nerves not reaching the scarious mostly obtuse apex.
- 43 Puccinella** Flowering glumes chartaceous, convex on the back, faintly 2-nerved, the nerves not reaching the obtuse subdentate or or mucronulate apex.
- 44 Pleuropogon** Flowering glumes chartaceous, several-nerved, the nerves not reaching the truncate awned apex.
- 45 Poa** Flowering glumes laterally compressed, mostly keeled, 5-nerved, membranous, the margins or nerves below with cobwebby hairs or pubescent: palea falling with the glume.
- 46 Eragrostis** Flowering glume 3-nerved, keeled, deciduous, leaving the persistent palea.
 * * * Spikelets several-flowered: lowest flowers all perfect: grain adherent to the palea.

- 47 BRIZA** Spikelets somewhat heart-shaped: flowering glumes rounded, many-nerved, becoming ventricose.
- 48 Festuca** Spikelets flattish: flowering glumes rounded on the back, few-nerved, pointed or awned at the tip: ovary mostly smooth.
- 49 Bromus** Spikelets flattened: flowering glumes convex to compressed, mostly awned below the tip: ovary pubescent.

TRIBE VIII HORDEAE. Spikelets one- to several-flowered, sessile in alternate notches on the opposite sides of a zigzag rachis, either solitary or several together:

* Spikelets single at each joint of the rachis.

- 50 Scribneria** Spikes slender, solitary: spikelets 1-flowered, almost embedded in the notches of the rachis.
- 51 LOLIUM** Spikelets several-flowered, placed with the edge next to the rachis: the inner glumes wanting except the terminal one.
- 52 Agropyron** Spikelets 3- to several-flowered, placed flatwise on the rachis: both glumes present, standing right and left:
 * * Spikelets 2 or more at each joint of the rachis: glumes anterior, forming a sort of involucre to the spikelet.
- 53 Hordeum** Spikelets 1- to several-flowered, in three's at each joint: lateral spikelets usually sterile.
- 54 Elymus** Spikelets 1- to several-flowered, 2-4 at each joint, all perfect and similar: glumes shorter than the spikelets: flowering glumes not long-awned.
- 55 Sitanon** Spikelets 1- to several-flowered, 2-4 at each joint, all perfect: glumes very long, usually 2-parted to the base and long-awned: flowering glumes long-awned and 2-toothed, or 3-awned.

SUBORDER I PANICACEÆ R. Br. Verm. Schr. i, 114.

Spikelets one- or two-flowered, when two-flowered the second or terminal one is perfect and the lower one staminate or neutral. Rachella articulated below the empty glumes the spikelets falling from the pedicels entire either singly or in groups or with the joints of an articulated rachis.

Tribe 1 Andropogoneæ. Spikelets in spike-like racemes, 2 at each joint of an articulated rachis, one sessile and hermaphrodite, the other pedicellate and either hermaphrodite, staminate, neutral or or reduced to the pedicel only. glumes usually 4, the first 2 empty, larger and much firmer in texture than the others; the third usually with a staminate flower in its axil; the fourth hyaline with a fertile flower in its axil, usually awned. Awn usually twisted or geniculate.

1 IMPERATA Cyrill Pl. Rar. Ic. ii, 26. (1796.)

Panicle spike-like. Spikelets in pairs on unequal short clavate pedicels or one sessile, both perfect, awnless. Outer empty glumes clothed with long white silky hairs: third and fourth glumes and palet hyaline. Stamens 1 or 2. Stigmas 2.

I. Hookeri Rupr. Cefvers Vet. Acad. Stockh. 160. Stems 2-4 feet high, simple, smooth, from creeping rootstocks: radical leaves 4-12 inches long, the cauline shorter, decreasing upward: ligule short, ciliate: panicle nearly cylindrical, erect, 6-12 inches long, sometimes interrupted below: hairs dense, straight, about $\frac{1}{2}$ inch long, giving the peculiar leathery appearance, flecked with the yellow or brown anthers and stigmas. Along streams, eastern Oregon and Nevada to California and Texas.

Tribe 2 Paniceæ. Spikelets hermaphrodite, terete or flattened on the back. Glumes 2-4, when 4 there is sometimes a staminate flower or palea in the axil of the third. Axis of the inflorescence not articulated; the rachella being articulated below the glumes, the spikelets falling off singly from their pedicels.

5 PASPALUM L. Syst. ed. 10, ii, 855.

Spikes or racemes either solitary, few and digitate or many and paniced. Spikelets in 2-4 rows upon one side of a flattened or filiform jointless rachis, jointed upon their short pedicels, plano-convex, awnless, apparently one-flowered. Glumes 2, nearly equal, few-nerved. Flowering glumes roundish or ovate, coriaceous, convex and enclosing the palet. Scales 2. Stamens 3. Ovary smooth. Grain enclosed in the glume.

P. distichum L. Amœn. Acad. v, 391. Rootstock widely creeping, perennial: stems 6-18 inches high, clothed below with the somewhat crowded sheaths: leaves flat, 2-3 inches long, glaucous, rough above: spikes 2, spreading, one sessile, the other peduncled, 1-1 $\frac{1}{2}$ inches long, densely flowered: spikelets in 2 rows, ovate, acute, 1 $\frac{1}{2}$ lines long: glumes 3-nerved, more or less pubescent. In moist meadows Oregon to California and the southern Atlantic States: also in Europe.

3 PANICUM L. Sp. 55.

Spikelets 1- or 2-flowered, when 2-flowered the lower one sta.

minate only. Glumes 4, the 3 lower membranous, empty or the third with a staminate flower, the fourth chartaceous, shining, enclosing a palea of similar texture and a perfect flower. Stamens 3. Styles distinct. Stigmas plumose. Grain free, enclosed in the hardened fruiting glume.

* Spikelets in pairs, one sessile the other pedicelled, crowded on one side of simple flattened branches which are digitately clustered at the top of the stem: lower flower neutral, of a single palea.

P. SANGUINALE L. Sp. 57. Stems erect or decumbent, 1-3 feet long, often rooting at the lower nodes, smooth: leaves 2-6 inches long, 2-4 lines broad, acuminate: spikes 3-10, narrowly linear, 2-6 inches long, digitate or in approximate whorls at the summit of the stem: rachis flat, margined: spikelets lanceolate, acute. In fields and waste places throughout North America and Europe except the extreme north.

* Spikelets disposed in panicles, awnless.

+ Annual.

P. capillare L. Sp. 58. Stem erect or decumbent, 1-2 feet long, simple or sometimes branched: sheaths pilose-hirsute: leaves 6-12 inches long, 3-8 lines broad, more or less pubescent: terminal panicle 3-14 inches long, its lower branches at first included in the upper sheaths, finally exerted and widely spreading, 2-10 inches long: spikelets 1-1¼ lines long, acuminate. In dry soil, throughout most parts of North America and Europe.

+ + Perennials.

P. pubescens Lam. Encycl. iv, 748. Stems at first erect and simple, later profusely branched and leaning or ascending: sheaths hirsute to villous, often papillose: leaves rounded-truncate or often narrowed at base, those of the stem 2-3 inches long, those of the branches much shorter: primary panicle less than 3 inches long, ovoid, the branches ascending: spikelets hardly a line long, pubescent. In dry soil, eastern Washington to the Eastern States.

P. dichotomum L. Sp. 58. Smooth and glabrous or the lower nodes bearded: stems erect, 6-24 inches high, at first simple, later profusely dichotomously branched at about the middle: leaves light green, generally much narrowed toward the base, the primary ones distant, 2-3 inches long by 2-3 lines broad, those of the branches much smaller, sometimes involute: primary panicle usually long-exserted 1-2 inches long, the branches loose and spreading, bearing few glabrous ellipsoid spikelets about a line long. In dry woodlands, Washington to the Eastern States.

P. Scribnerianum Nash Bull. Torr. Bot. Club xxii, 421. Stems erect, 6-24 inches high, simple or later in the season dichotomously branched above, sparingly pubescent: sheaths shortly papillose-hispid, sometimes glabrate: leaves 2-4 inches long, 3-6 lines broad, rounded or truncate at base, acuminate, more or less spreading, smooth above, scabrous beneath: panicles small, the primary one exserted, ovoid, 1-3 inches long, its branches spreading 8-12 lines long, often flexuous: spikelets turgid obovoid, about 1½ lines long. In dry or moist soil, eastern Washington to the Eastern States.

P. Scoparium Lam. Encycl. iv, 744. ? Stems spreading, 6-24 inches long, geniculate at the lower nodes and at length branched: leaves lanceolate, 3-5 inches long, 4-6 lines broad, mostly erect and somewhat rigid; hairy beneath and fringed with spreading hairs at base: sheaths hairy panicle 2-3 inches long nearly simple, the simple branches bearing a few

large tumid obovate usually hairy spikelets $1\frac{1}{2}$ lines long. Common in open places, Washington to California.

* * * Spikelets crowded in 3-4 rows or irregularly on one side of the spike-like branches of the panicle.

P. CRUS-GALLI L. Sp. 56. Stems stout, 1-4 feet high, often branching at base: sheaths smooth and glabrous: leaves 6-20 inches long, $\frac{1}{4}$ -1 inch broad, glabrous, smooth or scabrous: panicle composed of 5-15 sessile erect or ascending branches, or the lower branches spreading or reflexed: spikelets ovate, green or purple, densely crowded, the glumes more or less awned. Common in fields and waste places throughout North America: naturalized from Europe.

4 CHÆTOCHLOA Scribn. U. S. Dept. Agr. Div. Agros. Bul. 4, 38.

Mostly annual grasses with erect stems, flat leaves and spike-like panicles. Spikelets 1-flowered or rarely with a second staminate one. Rachella with bristles below the articulation. Spikelets with 4 glumes, the 3 outer membranous, the third often subtending a palet and rarely a staminate flower, the fourth chartaceous, subtending a palet of similar texture and a perfect flower. Stamens 3. Styles distinct, elongated. Stigmas plumose. Grain free, enclosed in the glume.

C. VIRIDIS Scribn. l. c. 39. *Setaria viridis* Beauv. Stems erect or ascending, 1-3 feet high, simple or branched: sheaths glabrous: leaves 3-10 inches long, 2-6 lines wide: spikes 1-4 inches long: spikelets about a line long, elliptical, much shorter than the upwardly barbed bristles. In waste places and cultivated fields, throughout North America: introduced from Europe.

Tribe 3 Oryzæ Kunth Enum. i, 5. Spikelets usually much compressed laterally, 1-flowered, staminate, pistillate or hermaphrodite. Empty glumes 2 or none, the flower being subtended by the floral glume and palet alone. Stamens frequently 6. Axis of the inflorescence not articulated.

5 HOMALOCENCHRUS Mieg.; Hall Hist. Stirp. Helv. ii, 201.

Panicle loose, its base often enclosed by the upper sheath. Spikelets much flattened, more or less crowded and overlapping each other, awnless, 1-flowered. Glumes only one, hard, strongly flattened laterally, fringed on the keel with bristly hairs, 3-nerved. Stamens 1, 3, or 6. Ovary smooth. Styles short. Stigmas plumose with branching hairs. Grain flat, enclosed by the glume.

H. oryzoides Poll. Hist. Pl. Palat. i, 52. Stems 2-3 feet high: leaves flat, spreading, 6-8 lines wide, very rough upward: panicle much branched, spreading, 6-8 inches long: spikelets $2\frac{1}{2}$ -3 lines long, pale green: stamens 3. In wet places, eastern Oregon to California and the Atlantic States.

SUBORDER II POACEÆ R. Br. Verm. Schr. i, 115.

Spikelets one- to many-flowered, the imperfect or rudimentary flowers if any uppermost. Rachella usually articulated above the empty glumes so that these are persistent. In spikelets with 2 or more flowers the rachella is usually articulated below each flowering glume.

Tribe 5 *Phalaridæ* Kunth Enum. 118. Spikelets more or less laterally compressed, 1-3-flowered. Glumes 5, the first 2 empty and below the articulation of the rachella, the third and fourth usually empty, very unlike the outer ones, rarely subtending staminate flowers, sometimes reduced to mere bristles; the fifth glume with a 1-nerved or nerveless palet and a hermaphrodite flower.

6 PHALARIS L. Sp. 54.

* Panicle dense and spike-like: glumes keeled.

P. CANARIENSIS L. Sp. 54. Stems 1-3 feet high, from an annual root; leaves flat, with the upper sheaths much inflated: spikes 1-2 inches long, ovoid or somewhat cylindrical, very dense: glumes broad, with a conspicuous keel with a distinct green line within it: rudimentary flowers represented by small smooth lanceolate scales: perfect flowers with minute silky hairs. In fields and waste places: introduced from Europe.

P. Caroliniana Walt. Fl. Car. 74. *P. intermedia* Bosc. Stems 6 inches to 4 feet high, smooth, from an annual root: leaves short, an inch long or less, often glaucous; sheaths inflated: spikes 1-2 inches long, dense: spikelets 3 lines long: glumes with a broad keel, pointed rudimentary flowers linear, hairy, less than half as long as the perfect one which is long-pointed, hairy and one third shorter than the glumes, In waste places, Oregon to California and the southern Atlantic States.

P. amethystina Trin. Phalarid. 10. Stems rather slender, 2-8 feet high, from a perennial root: leaves often purplish, short, the sheaths inflated: spikes oblong, 1-2 inches long, usually purplish: spikelets 2 lines long or more: glumes but slightly keeled: rudimentary flowers hairy, more than half as long as the hairy perfect one. Along the coast, southern Oregon to Calif.

** Panicle branched: glumes not keeled.

P. arundinaceae L. Sp. 55. Stems 2-6 feet high, from creeping perennial rootstocks; leaves 3-20 inches long, 3-8 lines wide smooth panicle 4-8 inches long, its rough branches erect or somewhat spreading: spikelets 2 lines long, ovate: glumes pointed, 3-nerved, not keeled: rudimentary flowers reduced to narrow silky scales, one-third as long as the perfect one which is smooth or silky and one-third shorter than the glume. Common in low grounds California to Brit. Columbia and the Atlantic States: also in Europe and Asia.

7 ANTHOXANTHUM L. Sp. 28.

Panicle cylindrical, spike-like. Spikelets 3-flowered, the lateral flowers neutral and consisting of a single palet; the upper or central one perfect. Glumes thin, unequal, the lower smaller, 1-nerved, the upper about twice as long as the lower and 3-nerved. Palets of neutral flowers usually awned. Stamens 2. Ovary glabrous. Stigmas feathery. Grain ovate, enclosed by the glume.

A. ODORATUM L. Sp. 58. Stems erect and rather slender, 1-2 feet high, from a perennial root: leaves flat hairy: sheaths often hairy; the ligule short and obtuse: panicle 1-6 inches long, interrupted below, often brownish: spikelets 3-4 lines long: neutral palets 2-lobed, hairy, one with a bent awn from near the base, the other short-awned below the tip: whole plant pleasantly scented when drying. Common in lawns and waste places: introduced from Europe.

8 HIEROCHLOE Gmelin Fl. Sib. i, 101.

Panicle loose and spreading. Spikelets laterally compressed, 3-flowered, the 2 lower or lateral ones staminate, the upper or central one perfect. Glumes 5, the first and second about equal, acute, glabrous; the third and fourth somewhat shorter, obtuse, entire, emarginate, 2-toothed or 2-lobed with or without an awn, enclosing a palet and stamens; the fifth often produced into a short awn, enclosing a palet and perfect flower. Stamens 3 in the staminate flowers, 2 in the perfect one. Styles distinct. Stigmas plumose. Grain free, enclosed by the glume.

H. macrophylla Thurber: Bolander in Trans. Cal. Agr. Soc. 1864-65, 132. Stems 1-3 feet high forming large loose tufts, with leaves 12-18 inches long by 4-10 lines wide, rough on the upper surface and margins: panicle with rather distant branches in pairs: glumes greenish along the very distinct nerves, obtuse and barely equalling the staminate flowers, the lower palets of which are strongly fringed on the margins, notched at the apex and often with a slight mucro or awn: perfect flower pubescent toward the apex, otherwise smooth and shining; the flowering glume very obtuse and fringed on the margins. In forests, western Washington to California.

H. borealis R. & S. Syst. ii, 513. Stems 1-2 feet high, erect simple, smooth: lower leaves elongated, 4-8 inches long, 1-3 lines wide, scabrous, the upper ones $\frac{1}{2}$ -2 inches long: panicle 2-4 inches long, its branches 1-2 inches long, usually spreading, naked below: spikelets yellowish-brown and purple, 2-3 lines long: lower glumes glabrous; flowering glumes villous and strongly ciliate, entire, awn-pointed: palets villous at the apex. Along streams, Oregon to Alaska and the northern Atlantic States.

Tribe V Agrostidæ. Spikelets all hermaphrodite, one-flowered, with one pair of empty glumes, or these rarely wanting, usually as long as or exceeding the flowering glumes. Rachella sometimes prolonged behind the palet into a naked or plumose bristle.

9 COLEANTHUS Seidel Reichenb. Incon. Fl. Germ. i, 177.

Panicles simple or branched, the flowers in umbellate clusters of short 1-flowered rays. Empty glumes wanting: flowering glume membranous, 1-nerved, acuminate awned. Palet shorter than the glume, with 2 divergent nerves, keeled, bifid at the apex, the divisions acuminate: scales none. Stamens 2, with oblong anthers. Ovary sessile, smooth. Stigmas sessile, denticulate with subulate hairs. Grain oblong, somewhat longer than the glumes which are persistent and surround its base.

C. subtilis Seidel l. c. Stems slender, 1-3 inches long, forming loose tufts 1-4 inches in diameter, decumbent and geniculate below, often branched, from an annual root: leaves about 6 lines long, curved, smooth: ligule elongated, acute; sheaths all inflated: panicle 6-18 lines long, its base included in the upper sheath, mostly simple, with 3-4 umbellate clusters, sometimes with one or two short branches with an umbel at the end of each: pedicels longer than the spikelets, scabrous, glumes roughened on the keel. On low muddy flats along the Columbia river; also in northern Europe.

10 SPOROBOLUS R. Br. Prodr. Fl. Hol. i, 169.

Panicle open and pyramidal to narrow and spike-like. Spike-

lets 1-flowered. Glumes membranaceo-chartaceous, 1-nerved or nerveless, not awned but sometimes pointed. Flowers sessile, or with a minute callus, usually longer than the glumes. Palets similar to the glumes in texture, mostly 1- or indistinctly 3-nerved. Stamens 2 or 3. Ovary oblong. Stigmas with simple hairs.

S. asperifolius Thurber Bot. Cal. ii, 269. Stems 6-15 inches long, branched, decumbent at base, rooting at the nodes and thus forming broad matted tufts: leaves flat, 1-3 inches long, about 1 line broad, scabrous: ligules very short, truncate: sheaths smooth, loose, very short and overlapping below: panicle included at base, open, 3-5 inches long, pyramidal or ovoid, in outline, its scabrous branches solitary or in pairs: spikelets less than a line long, on pedicels 6 lines long: glumes nearly equal, acute, minutely scabrous: flowers slightly exceeding the glumes, the flowering glume sometimes with a minute mucro at its obtuse tip. In alkaline soil, Brit. Columbia to California and Nebraska.

S. cryptandrus Gray Man. ed. 2, 542. Stems 2-3 feet high, usually geniculate and branched below: sheaths smooth, strongly bearded at the throat, the lower shorter than the internodes: ligules reduced to a mere fringe: leaves flat, 3-6 inches long, about 2 lines wide, acuminate, scabrous above: panicle narrowly pyramidal, more or less enclosed by the upper sheath, 4-8 inches long, its branches mostly in pairs, spreading: spikelets a line long, short-pedicelled, rather crowded, lead-colored: empty glumes somewhat acute, the upper twice the length of the very narrow lower one: flowering glume about equalling the second one. In sandy soil, Oregon to the New England coast.

S. airoides Torr. Pac. R. Rep. vii, 21. Stems 2-3 feet high, somewhat rigid, smooth, forming large tufts, rarely branched, clothed below with dead sheaths: sheaths smooth, with a few long hairs at the throat, the 2 lower overlapping, the uppermost loose: ligules nearly obsolete: leaves very pale, convolute and tapering to a filiform point, the basal ones about half as long as the stems, the uppermost reduced to a mere filiform appendage to the sheath: panicle broadly pyramidal, soon exerted, 6-12 inches long, few-flowered: its slender branches solitary or in pairs, spreading or reflexed: spikelets a line long, brownish, on rather long pedicels: empty glumes rather obtuse, the first narrower and $\frac{1}{3}$ - $\frac{1}{2}$ as long as the second one; flowering glume slightly longer than the second one: palet about as long as the glume. On prairies, eastern Oregon to California and Nebraska.

S. cuspidatus Wood Bot. & Fl. 385. Smooth and glabrous: stems 1-2 feet high, erect, simple or somewhat branched: sheaths shorter than the internodes: ligule a mere ring: leaves 1-4 inches long, less than 1 line wide, erect, involute-setaceous, at least when dry: panicle 2-5 inches long, slender, its branches $\frac{1}{4}$ -1 inch long, appressed: spikelets $1\frac{1}{4}$ - $1\frac{1}{2}$ lines long: empty glumes acuminate or cuspidate, scabrous on the keel; flowering glume long-acuminate and cuspidate, sparingly scabrous. In dry soil, eastern Washington to the Missouri river.

S. depauperatus Scribn. Bull. Torr. Bot. Club. ix, 103. *Vilfa depauperata* Torr. Stems tufted, very slender, 3 inches to 2 feet long, decumbent and geniculate, often much branched: leaves short, often involute, very minutely scabrous above: sheaths rather loose, crowded and overlapping below: panicle $\frac{1}{2}$ -2 inches long, very narrow, of few solitary distant erect branches: spikelets 1 line long or less, short-pedicelled: empty glumes ovate, obtuse, nearly equal: flower about twice as long as the empty glumes, often blackish, deciduous; flowering glume obscurely 3-nerved, the mid-nerve often excurrent as a small mucro: palet nearly as long as the glume. On margins of ponds, eastern Oregon to California and New Mexico.

S. Bolanderi Vasey Bot. Gaz. xi, 337. Stems slender, about 1 foot long, decumbent below, smooth: ligules short and obtuse: leaves narrow, flaccid, the radical ones about 6 inches long: cauline ones similar, 1-2 inches long: panicle 2-3 inches long, open, lax, its lower branches in twos or threes, filiform, 12-18 lines long: empty glumes unequal, 1-nerved; flowering glume exerted, 5-nerved, softly pubescent on the nerves below. Collected at Multnomah Falls Oregon by Dr. H. N. Bolander.

S. confusus Vasey Beal Grasses N. Am. ii, 294. Stems slender, tufted, branching, 3-8 inches high from an annual root: sheaths loose: leaves flat, 6-12 lines long: panicle ovoid or oblong, with loose capillary branches: spikelets less than a line long, smooth, on capillary pedicels 3-4 times as long: empty glumes subequal, obtuse or retuse at the apex; flowering glume but little longer, barely acute. On sandy banks of streams, eastern Washington to California, Colorado and Montana.

S. gracillimus Vasey *Vilfa gracillima* Thurber. Stems capillary, smooth, much branched at base, forming small dense tufts, 3-12 inches high, the leafy portion about 2 inches high: sheaths equalling the internodes, smooth, with hyaline margins: ligules about a line long, obtuse and lacerate: leaves 3-6 lines long, less than a line wide, flat, involute at the apex, very minutely scabrous on the upper side and margins: panicle long-exserted, narrowly linear, few-flowered, interrupted below, its branches in twos or threes, appressed: spikelets about 1 line long: empty glumes subequal, membranaceous, very obtuse, distinctly 1-nerved, mucronate or erose-dentate at the apex: flowering glume 3-nerved, mucronate or tipped with a small awn. Edge of marshes in the high mountains, Oregon to California.

S. simplex Scribn. U. S. Dept. Agr. Bull. 11, 48. A densely cespitose leafy annual, 2-6 inches high: stems slender, smooth: lower sheaths loose, longer than the internodes: ligules a line or more long: leaves flat, 1-2 inches long, scabrous on the margins, very rough near the rigid apex: panicle linear, 1-2 inches long, its scabrous branches erect: spikelets 1 line long: empty glumes subequal, obtuse or truncate, scabrous on the back above, flower twice as long as the glumes: flowering glumes 3-nerved, mucronate pointed, scabrous above. In moist places, Idaho to California and Colorado.

S. filiformis Scribn. l. c. Bull 17, 173. A very slender densely tufted annual, 3-12 inches high: stems filiform and scape-like, with very short internodes below: leaves filiform, 6-12 lines long: panicle linear, long-exserted spikelets less than a line long: empty glumes subequal, obtuse and mucronate, flowers about twice as long as the empty glumes: flowering glume acute, 3-nerved, scabrous on the midnerve. In moist soil in the high mountains, Washington to California and Utah.

11 POLYPOGON Desf. Fl. Atl. i, 66. (1798.)

Annual or perennial grasses with flat leaves and numerous flowers in spike-like panicles. Spikelets 1-flowered. Glumes 3, the 2 outer empty, nearly equal, compressed, 1-nerved and bearing a long awn at or below the apex. Flower much shorter than the empty glumes, without manifest callus and naked at base. Flowering glume hyaline, broad, 1-nerved, truncate, toothed, awned at the apex: scales 2, falcate, entire, as long as the ovary. Stamens 3, with small anthers. Styles short, with long feathery stigmas. Grain free, enclosed in the glume and palea.

P. Monspeliensis Desf. l. c. 67. Stems 6-30 inches high erect from a procumbent geniculate base, often branching from the lower nodes: sheaths smooth usually shorter than the internodes: ligules 2-3 lines long, obtuse:

leaves flat, 2-6 inches long, 1-3 lines wide, somewhat scabrous: panicle 2-6 inches long cylindrical or somewhat interrupted, yellowish, dense and soft: empty glumes about 1 line long, obtuse, notched at the apex, bearing slender awns 2-3 lines long; flowering glume much shorter, erose-truncate, bearing a slender awn about $\frac{1}{4}$ line long inserted below the tip. Common in wet places, Brit. Columbia to Mexico and the Atlantic States.

P. littoralis Smith Comp. Fl. Brit. ed. 2, 13. Stems slender, from a perennial root, 1-2 feet long, often decumbent and forming large tufts: ligules 1-3 lines long, acute: leaves narrow, scabrous on both sides: panicle narrow, much lobed its whole length and sometimes completely interrupted below, often purplish: empty glumes scabrous, attenuate above into an awn as long as the body: flowering glume much shorter than the empty ones, obtuse, 2-toothed at the apex: awn 1 line long. In wet places, Oregon to California: also in Europe and South America.

12 AGROSTIS L. Sp. 6.

Annual or perennial grasses with flat or involute leaves and numerous flowers in more or less open panicles with whorled or clustered branches. Spikelets small, one-flowered or sometimes with the rudiments of a second flower. Empty glumes somewhat unequal, the lower usually longest, obtuse or acute, membranous. Flowers mostly shorter than the empty glumes, with a very short naked base. Flowering glume very thin, 3-5-nerved, pointless, naked, often bearing a slender straight awn on the back usually much below the apex. Palet obsolete, or present and shorter than or equalling the ovary, rarely nearly as long as the glume. Stamens mostly 3. Styles 2 distinct, short, with plumose stigmas.

A. equivalvis Trin. Agrost. ii, 116. Stems slender, erect, 1-2 feet high, smooth: sheaths smooth, shorter than the internodes: upper ligules about 1 line long: leaves flat, 4-6 inches long, smooth or nearly so: panicle 2-6 inches long, loose, very narrow, smooth and shining, the branches in whorls of 5 below, in pairs or solitary above, very unequal: spikelets 1-1 $\frac{1}{2}$ lines long, mostly in pairs: empty glumes nearly equal, acute, 1-1 $\frac{1}{2}$ lines long: flowering glume acute, 5-nerved: palet about as long as the glume. In moist ground, Alaska to California.

A. ALBA L. Sp. 63. (REDTOP.) Stems slender, erect, often decumbent at base, 6-30 inches high: sheaths smooth: ligules short and truncate or long and acute: leaves flat, 4-12 inches long, smooth or rough: panicle slender, 2-8 inches long; green, red or brownish, its roughish branches usually spreading in flower and more or less contracted afterwards: empty glumes nearly equal, or the lower slightly longest: flowering glume very thin, with some short hairs at base, shorter than the empty ones, rarely with a short awn: palet $\frac{1}{3}$ - $\frac{1}{2}$ as long as the glume. Common in meadows and waste places.

A. exarata Trin. Unifl. 207. Stems 1-3 feet high, erect, sometimes decumbent at base, simple, glabrous: sheaths usually shorter than the internodes: ligules 1-3 lines long: leaves 1-8 inches long, 1-4 lines wide, generally erect, flat or involute, scabrous: panicle contracted, 2-10 inches long, often interrupted, its branches 1-3 inches long, erect or appressed: spikelets crowded, 1-2 lines long: empty glumes subequal, scabrous: flowering glume $\frac{1}{4}$ - $\frac{3}{4}$ line long: palet minute. In moist meadows and along streams, Alaska to California and Nebraska.

A. asperifolia Trin. Mem. Acad. St. Petersb. ser. 6. 331. Pale green throughout or the inflorescence purplish: stems erect or slightly geniculate below, nearly smooth, 2-3 feet high: sheaths rather loose, smooth, the

lower exceeding the internodes: ligules almost herbaceous, 3-4 lines long, obtuse: panicle rather dense, narrow, erect, 7-10 inches long, its short branches erect: spikelets 1-1½ lines long, narrowly lanceolate, turgid: outer glumes unequal, hispidulous throughout and hispid on the keel: 1-2 lines long: flowering glume broadly oblong, minutely dentate at the truncate apex, thin-membranous, 5-nerved to the apex, ⅔ line long: palet minute or wanting. In moist places, Alaska to California.

A. densiflora Vasey Cont. Nat. Herb. 3, 702. A tufted annual: stems erect or geniculate at the lower nodes smooth, 9-12 inches high: sheaths rather loose, nearly smooth, crowded below, longer than the internodes: ligules 2 lines long, obtuse: leaves flat or folded, 2-3 lines wide, hispidulous on both sides, rather thick and rigid, erect tapering to the apex: panicle dense, 2-3 inches long, its scabrous branches glomerate: empty glumes 1¼ lines long, nearly equal, acuminate, carinate and hispidulous on the back: flowering glume oblong, truncate, smooth except a minute tuft of white hairs on the ventral side at base, 5-nerved, nearly 1 line long, with or without a slender awn a line or less long near the apex: palet wanting. Washington to California.

A. microphylla Steud. Syn. Pl. Gram. 164. Loosely tufted annual: stems slender, erect, 6-15 inches high, often branched at the base: sheaths nearly smooth, closed, shorter than the internodes: ligules 1-2 lines long, usually lacerate: leaves erect, flat or loosely involute, 1-3 inches long: panicle spike-like 1-3 inches long, light green or purplish, its branches 5-6 lines long: empty glumes nearly equal, 1½-2 lines long, subulate-pointed, hispid on the keel, 1-nerved: flowering glume broadly oblong, 4-toothed at the apex, thin, a line or less long, with a slender awn 2-3 lines long on its back above the middle: palet wanting. In the coast ranges, Oregon and California.

A. grandis Trin. Agrost. ii, 70. Stems erect, 1-2 feet high: sheaths smooth, much shorter than the internodes: ligule about 2 lines long, acute: leaves 2-8 inches long, 1-3 lines wide: panicle usually ample, 4-8 inches long, erect, dense, more or less interrupted below, its short branches erect: empty glumes ovate, acute or acuminate, 1½ line long, the lower one scabrous on the keel: flowering glume similar to the outer ones. In moist meadows, California to Washington.

A. verticillata Vill. Trin. Sp. Gram. i, t. 36. Stems 1-2 feet long, decumbent and taking root below, several of the lower nodes geniculate: sheaths loose, shorter than the internodes: ligules truncate, 1-2 lines long: leaves short, flat, 1-3 lines wide, roughish on the upper surface and margins: panicle 2-6 inches long, dense and spike-like, lobed and interrupted, its short branches crowded and spikelet-bearing from the base: empty glumes about equal, acute, roughened with minute pubescence: flowering glume about half as long as the outer ones, 5-nerved and minutely 5-toothed at the obtuse apex: palet nearly as long as the glume. In ditches and wet places, southern Oregon to California and Texas.

A. tenuiculmis Nash *A. tenuis* Vasey. Loosely tufted: perennial: stems slender, 6-10 inches high, somewhat geniculate below: leaves 1-2 inches long, narrow, about 2 on the stem: ligules short: panicle pyramidal, open, 2-3 inches long, its capillary branches in threes or fives below, the longest an inch or more long, spreading or ascending: spikelets less than a line long: empty glumes acute, purplish, the lower one a little shorter and broader: flowering glume thin, obtusish, 3-nerved above, a little shorter than the outer ones, not awned: palet very minute or wanting. On dry ridges, California to eastern Washington.

A. Pringlei Scribn. Am. Grasses i, 156. Stems erect or ascending, 1-2 feet long, from a stoloniferous perennial base: leaves flat, narrow, rather rigid: panicle narrow, loosely flowered, 3-8 inches long: empty

glumes about 2 lines long, acuminate-lanceolate, scabrous on the keel; flowering glume much shorter than the outer ones, densely hairy at base, obtuse, not awned. On the plains of southeastern Oregon to California.

A. canina L. Sp. 62. Stems slender, erect, 1-2 feet high, simple, smooth: sheaths shorter than the internodes: ligules 1-1½ lines long: leaves 1-3 inches long by a line wide, scabrous: panicle 2-7 inches long, contracted in fruit, its slender branches ascending or spreading in flower: spikelets a line long, on appressed pedicels: empty glumes subequal, acute, strongly scabrous on the keel; flowering glume about ⅔ as long as the outer ones, obtuse, smooth, bearing a straight or somewhat bent awn on the back just above the middle: palet minute or none. In meadows, Alaska to California and Pennsylvania.

A. Hallii Vasey Contr. Nat. Herb. 3, 74. Stems erect, simple, stout, smooth, 2-3 feet high: sheaths slightly roughened, usually crowded below: ligules acute, 2 lines long: radical leaves numerous, mostly involute, 3-6 inches long, 1-2 lines wide: panicle 6-9 inches long, narrow, its branches in clusters of 5-10, slender, scabrous, erect or slightly spreading, unequal: empty glumes lanceolate, acute, subequal, 1-1¼ line long, 1-nerved, hispid on the keel: flowering glumes oblong, obtuse, thin, smooth except 2 tufts of short hairs at the base, 5-nerved, ⅔ line long: palet wanting. In moist meadows, Washington to California.

A. Diegoensis Vasey. *A. foliosa* Vasey. Stems erect, or decumbent at base, smooth, 1-2 feet high: sheaths close, equalling or exceeding the internodes: ligules obtuse, 1-2 lines long: leaves flat, 4-8 inches long, 2-3 lines wide: panicle loose, 3-6 inches long, its slender scabrous branches 1-2 inches long, spreading or ascending: empty glumes ovate, acute, 1-nerved, 1-1½ lines long, usually equal, the lower one scabrous on the keel: flowering glume ovate-oblong, nearly equalling the outer ones, smooth except a tuft of hairs at base, 4-nerved above, the nerves terminating in 4 short teeth; awn arising at the middle or below, ½-2 lines long: palet wanting. On open hillsides in the mountains, Brit. Columbia to California.

A. geminata Trin. Unif. 207. Densely cespitose: stems slender, erect, 8-14 inches high, from a perennial root: leaves flat, mostly basal, 1-3 inches long: panicle loose, 2-4 inches long, its capillary branches mostly in pairs, spreading: empty glumes nearly equal 1¼-1½ lines long, lanceolate, scabrous on the keel: flowering glume less than a line long, obtuse or retuse; awn arising about the middle, not surpassing the glume. Washington to Alaska.

A. attenuata Vasey Bot. Gaz. xi, 337. Stems slender 2-3 feet high, from running perennial roots-tocks, usually solitary: sheaths shorter than the internodes, smooth: ligules 2-3 lines long, lanceolate, often lacerate at the acutish apex: leaves few, 3-6 inches long, 1-2 lines wide: panicle 2-6 inches long, the unequal capillary branches in fascicles of 2-7, spreading or ascending: empty glumes equal, oblong-lanceolate, acuminate, about 1½ lines long, scabrous on the keel: flowering glume oblong, obtuse, ⅔ as long as the outer ones: palet wanting. In wet mountain meadows, Oregon to California.

A. Scouleri Trin. Agrost. ii, 83. Stems slender, erect, 1-2 feet high, from a perennial root, somewhat rigid: sheaths smooth, longer than the internodes: ligules about 1 line long, obtuse, often lacerate: leaves 3-4 inches long, flat or involute, 1½ lines wide, tapering to a long point: panicle long-exserted, open and few-flowered, the lower branches over an inch long, clustered: empty glumes about 1 line long, acute, the lower a little longer and roughened on the keel, the upper roughened only at the tip: flowering glume 5-nerved, entire and somewhat truncate at the apex: palet hyaline, very minute. Nootka Sound to California.

A. Howellii Scribn. Loosely tufted perennial: stems rather slender, 1-2 feet long: ligules about a line long, usually obtuse and lacerate at the apex: panicle 4-8 inches long, its scabrous capillary branches 2-3 inches long, usually spreading: empty glumes 1 line or less long, acuminate-lanceolate; flowering glume lanceolate, acute, bearing a long slender bent awn on its back: palea hyaline, minute. On cliffs along the Columbia river.

A. scabra Willd. Sp. Pl. i, 370. Stem very slender, 1-2 feet high, from a perennial root, smooth: sheaths generally shorter than the internodes: ligules 1-2 lines long: leaves 2-5 inches long, $\frac{1}{2}$ -1 $\frac{1}{2}$ lines wide, usually erect roughish: panicle 6-12 inches long, usually purplish, its capillary branches spreading or ascending, or often drooping, the lower 3-6 inches long: empty glumes $\frac{3}{4}$ -1 line long, acute, scabrous toward the apex and on the keel; flowering glume nearly as long as the outer ones, rarely bearing a short awn on its back: palea very small. Common throughout most parts of North America.

A. Idahoensis Nash Bull. Torr. Bot. Club xxiv, 42. Stems cespitose, slender, 8-16 inches high, erect, bearing usually 2 distant leaves below the middle: lower sheaths short, the upper one elongated: ligules 1-2 lines long, obtuse cut-toothed at the apex: leaves 2-5 inches long, erect, acuminate at the apex, rough on the margins: panicle oblong 3-6 inches long, its branches and pedicels scabrous above: empty glumes lanceolate and acuminate, about 1 line long, scabrous on the keel, the first longer than the second: flowering glume about $\frac{2}{3}$ as long as the outer ones: palea wanting. In forests, Idaho.

A. varians Trin. Agrost. ii, 68. Stems slender, erect, densely cespitose, 3-10 inches high: sheaths longer than the internodes: upper ligule about $\frac{1}{2}$ line long, acutish: leaves very narrow, slightly scabrous above: panicle 1-2 inches long, dark purple, its branches an inch or less long, erect or ascending: empty glumes nearly equal, roughish on the keel toward the apex, subacute; flowering glume nearly as long as the outer ones, 2-toothed at the apex, awnless: palea wanting. In wet places on the high mountains, Washington to California.

A. Oregonensis Vasey. Stems slender, erect, 1-2 feet high, from a perennial root: leaves flat, 2-3 inches long, the upper one usually longest: ligules 1-2 lines long, acute: panicle long-exserted, 2-4 inches long, dark purple, narrow, its capillary branches 1-2 inches long, erect: empty glumes lanceolate, acuminate, about 1 line long; flowering glume hyaline, about $\frac{3}{4}$ as long as the outer ones, acute, not awned: palea wanting. In moist meadows about the base of Mount Hood, Oregon.

A. humilis Vasey Bull. Torr. Bot. Club x, 21. Stems densely cespitose, 2-6 inches high, from perennial roots: sheath usually only one, about $\frac{1}{4}$ as long as the stem: ligules auriculate or 3-lobed, $\frac{1}{2}$ line long: leaves mostly basal, 1-3 inches long, less than a line wide, erect: panicle narrow, 6-18 lines long, dark purple, its very few branches erect or appressed: empty glumes equal, lanceolate, acute, smooth, $\frac{3}{4}$ -1 line long; flowering glume nearly equalling the outer ones, lanceolate, minutely toothed at the apex: palea ovate-oblong. In wet meadows on high mountains, Washington to the Rocky Mountains.

A. virescens HBK. Nov. Gen. i, 135. Stems 1-2 feet high, from a perennial root: sheaths much shorter than the internodes mostly smooth: ligules more than a line long, truncate: leaves flat, erect, about 6 inches long by 4 lines wide, rough on both sides: panicle pale greenish tinged with purple, about 6 inches long, its branches in clusters about an inch apart on the common axis: empty glumes very acute, the lower terminated by a distinct seta, rough on the keel and pubescent all over; flowering glume about $\frac{1}{3}$ shorter than the empty ones, bearded at base by a few short white hairs, 5-nerved, the lateral nerves projecting as distinct teeth,

the central one excurrent at or below the middle as a strong bent awn 1-2 lines long: palet very small or none. Oregon to California.

13 GASTRIDIMUM Beauv. Agrost. 21.

Panicle contracted into a somewhat loose tapering spike. Spikelets 1-flowered. Empty glumes with an enlarged ventricose shining base, very acute above, obscurely keeled, the lower longest. Flowering glume less than $\frac{1}{4}$ as long as the empty ones, minutely hairy at base, very thin, truncate and dentate at the apex. Awn slender, arising just below the apex, equalling or exceeding the glumes. Palet equalling the flowering glume. Scales 2, linear, as long as the ovary. Stamens 3. Stigmas 2, subsessile.

G. AUSTRALE Beauv. l. c. Loosely cespitose: stems 6-24 inches high, smooth, branching at the lower nodes, geniculate below: sheaths shorter than the internodes, slightly roughened: ligules 2 lines long, lanceolate, fringed: leaves flat, 2-5 inches long, about 2 lines wide, scabrous on both sides, pale green: panicle 3-6 inches long, very pale green, shining with a satiny lustre; empty glumes about 2 lines long, very acute, slightly scabrous above, shining below: flowering glume hairy. On prairies, southern Oregon to California: introduced from Europe.

14 CINNA L. Sp. 5.

Tall grasses with flat leaves and numerous spikelets in more or less open panicles. Panicles flexuous, with spreading or erect branches. Spikelets one-flowered, more or less flattened. Empty glumes lanceolate, acute, one-nerved, the lower shortest, the upper equalling or slightly exceeding the flower. Flowering glume 3-nerved, acute and awnless, or bearing a short awn or seta just below the apex. Palet slightly shorter than the glume. Scales 2, very short. Stamens 1, 2 or 3. Ovary oblong, smooth. Styles 2, elongated. Stigmas plumose. Grain free, linear-oblong.

C. pendula Trin. Mem. Acad. St. Petersb. vi, 280. Stems usually slender, erect, 2-6 feet high, smooth: sheaths shorter than the internodes, sometimes slightly scabrous: ligules 1-2 lines long: leaves 4-10 inches long, 2-6 lines wide, scabrous: panicle 5-10 inches long, open, the capillary branches mostly spreading, flexuous and often drooping, the lower 2-5 inches long: empty glumes $1\frac{1}{2}$ lines long, scabrous, acute, strongly hispid on the keel: flowering glumes shorter than the outer ones, bearing a rough awn $1\frac{1}{2}$ lines long from the 2-toothed apex. In wet places, California to Alaska and the Eastern States.

15 MUHLENBERGIA Schreb. Gen. 44.

Mostly perennial grasses with flat or convolute leaves and paniculate inflorescence. Panicle contracted or open. Spikelets one-flowered, very rarely two-flowered. Empty glumes hyaline or membranous, acute, sometimes awned. Flowering glume 3-5-nerved, obtuse or acute, or often produced into a capillary awn. Palet 2-keeled. Stamens 2 or 3. Styles distinct, with plumose stigmas. Grain narrow, tightly enclosed in the glume.

M. glomerata Trin. Unif. 191. Stems 1-2 feet high, erect, usually much branched, smooth: sheaths smooth, those of the stem shorter than the internodes, those of the branches overlapping and often crowded:

ligules about one half line long, erose-truncate: leaves 2-5 inches long, 1-3 lines wide, scabrous: panicle 1-5 inches long, usually dense and interrupted, the branches 6-12 lines long, erect or appressed: empty glumes acuminate including the awn 2-3 lines long: flowering glumes $\frac{2}{3}$ as long as the outer ones, acuminate the strongly scabrous midrib excurrent as a short point. In wet places, eastern Washington to Brit. Columbia and the Eastern States.

M. sylvatica Torr. Fl. U. S. 87. Stems 1-3 feet high, erect, branched, smooth or sometimes scabrous: sheaths smooth or slightly scabrous, those of the stem shorter than the internodes: ligules about one-half line long, erose-truncate: leaves 2-7 inches long, 1-3 lines wide, rough: panicle 3-7 inches long, somewhat lax, the branches 1-3 inches long, erect or ascending: empty glumes $1\frac{1}{4}$ - $1\frac{2}{3}$ line long, awn-pointed, scabrous: flowering glume equalling or exceeding the outer ones, strongly scabrous, attenuate into a slender awn 2-4 times as long as the body. In moist woods and along streams Idaho to the Eastern States.

Var. setiglumis Watson Bot. King 378. Stems 1 foot high, nearly erect: panicle contracted, the branches solitary and densely flowered: empty glumes attenuate into a scabrous bristle, 2-3 lines long; the flowering glume with its long awn about twice longer. In the mountains, eastern Washington to Nevada.

M. comata Benth. Vasey Cat. Grasses U. S. 39. Stems slender, erect, 12-18 inches high, smooth: sheaths shorter than the internodes, smooth or slightly scabrous: ligules about one-half line long, truncate, naked or minutely ciliate: leaves 2-5 inches long, 1-2 lines wide, erect, flat, rough: panicle 2-4 inches long, dense, its branches 6-18 lines long, erect: empty glumes equal or the upper one a little the longest, smooth, scabrous on the keel: flowering glume shorter than the outer ones, smooth, bearing an awn 2-3 times its length. basal hairs silky, erect, fully as long as the glumes. On prairies, eastern Oregon to California and Colorado.

16 CALAMAGROSTIS Adans. Fam. Pl. ii, 31.

Mostly perennial grasses with flat leaves and paniculate inflorescence. Spikelets one-flowered, the rachella usually prolonged beyond the flower and pubescent. Empty glumes membranous, carinate: flowering glume hyaline, shorter than the empty ones, obtuse, usually copiously hairy at base, sometimes the hairs scanty or short, and bearing a dorsal awn. Palet shorter than the glume, two-nerved. Stamens 3. Styles short, distinct, with plumose stigmas. Grain free, enclosed in the glume.

C. Howellii Vasey Bot. Gaz. vi, 271. Densely tufted perennial: stems 10-20 inches high, erect or somewhat geniculate below, smooth: sheaths smooth, shorter than the internodes: ligules 1 line or more long, often lacerate at the obtuse or acutish apex: radical leaves numerous, loosely involute, erect, nearly equalling or exceeding the stems, persistent and green for several years: panicle 3-4 inches long, its branches spreading in flower, soon erect, the lower 6-18 lines long: empty glumes 2-3 lines long, nearly equal, lanceolate, acute, strongly keeled, the mid-rib prolonged into a short awn: flowering glume slightly shorter than the outer ones ovate-lanceolate, acute, the apex with 2 mucronate pointed teeth, the strong awn inserted about the lower third, half an inch long: palet shorter than its glume: basal hairs about half as long as the flower. On cliffs along the Columbia river near the Cascades.

C. purpurascens R. Br. Richards. App. Frankl Journ. 131. Rather rigid, cespitose perennial: stems erect, simple, smooth and shining, or

slightly hispid near the nodes, 2-2½ feet high: sheaths hispidulous or nearly smooth, much shorter than the internodes: ligules 2 lines long, lacerate or fimbriolate at the obtuse apex: radical leaves nearly as long as the stems, those of the stem 3-8 inches long, the uppermost shorter, all less than 2 lines wide: panicle narrow and spike-like, dense, 3-5 inches long, its branches appressed: empty glumes lanceolate, acute, smooth, purple at the apex or throughout, 2 lines long, the lower one carinate, 1-nerved, the second convex, distinct, 3-nerved: flowering glume oblong, erose at the obtuse apex, smooth, 4-nerved, 1½ lines long: awn attached ¼ way from the base, 2-4 lines long: basal hairs scanty and short: palet oblong, as long as the glume. In the high mountains, California to Alaska and Greenland.

C. Vaseyi Beal Grasses N. Am. ii, 344. Stems densely cespitose, 2-3 feet high, erect: sheaths shorter than the internodes: ligules about 1 line long, ciliate at the obtuse apex: leaves flat, rather rigid, 4-10 inches long, 1-2 lines wide: panicle 3-4 inches long, narrow and spike-like, often interrupted: empty glumes about 2 lines long, lanceolate, very acute or acuminate, rough on the keel: flowering glume 1½ lines long, 2-toothed at the apex: awn nearly straight, 1-2 lines long, attached below the middle: basal hairs short and rather scanty; palet linear-oblong, as long as the glume. In the mountains of Oregon and Washington.

C. Tweedyi Scribn. Vasey Mon. Grasses U. S. 83. A closely tufted stoloniferous perennial: stems erect, smooth, stout, 30-40 inches high: sheaths rather loose, smooth or slightly scabrous, shorter than the internodes: ligules thin, 2-4 lines long: leaves flat, hispid, 1-10 inches long, 3-5 lines wide: panicle close and spike-like, 3-4 inches long, the branches an inch long or less, appressed, unequal: empty glumes lanceolate, acute, nearly smooth, about 3 lines long, the first 1-nerved, slightly carinate, the second 3-nerved, convex: flowering glume ovate-oblong unequally toothed at the rounded apex 4-nerved 2½ lines long: awn attached ¼ way from the base, twisted and bent, 3-4 lines long: basal hairs short and unequal: palet lance-oblong, obtuse, smooth. In the Cascade Mountains of Wash.

C. Aleutica Bong. Veg. Sitcha 171. A densely cespitose perennial: stems erect, smooth, 2-5 feet high: sheaths loose, slightly roughened, usually shorter than the internodes: ligules ovate, nearly 2 lines long: leaves flat, or loosely involute, with long attenuate points, hispid on both sides, 10-20 inches long: panicle rather narrow, 6-20 inches long, its branches unequal, crowded in 10-15 clusters, the longer ones 1-3 inches long: empty glumes narrowly lanceolate, acute, hispid on the nerves, the first one carinate, 1-nerved, 2½-3 lines long, the second convex, 3-nerved, ¼ line shorter: flowering glume oblong, obtusely 2-lobed at the apex, thin, hispidulous, 2 lines long: basal hairs half as long as the glume: awn attached below the middle, not equalling the glume: palet oblong, irregularly toothed or fringed at the obtuse apex. In wet places near the coast, California to Alaska.

C. rubescens Buckl. Proc. Phila. Acad. 1863, 92. More or less purplish throughout: stems tufted, slender, erect, 30-40 inches high, from stout perennial rootstocks: sheaths half as long as the internodes: ligules 1½-2 lines long, lacerate at the acute apex: leaves of sterile shoots numerous, involute, setaceous, glaucous, scabrous, 5-10 inches long, 1½-2 lines wide, those of the stem 3-4, 2-7 inches long, usually with some woolly hairs at the base of the blade: panicle strict, dense, interrupted, 3-5 inches long, its short branches densely flowered to the base: empty glumes ovate-lanceolate, rough, acute, the first 1-nerved, the second 3-nerved: flowering glumes a little shorter, narrowly elliptical, acute, 2-toothed at the apex, the stiff twisted and bent awn arising a little below the middle and equalling the glume: basal hairs in 2 tufts, less than half as long as the glume. Oregon to California.

C. Suksdorfii Scribn. Vasey Monog. Grasses U. S. 82. A loosely tufted perennial: stems rather slender, 1-3 feet high, erect smooth: sheaths shorter than the internodes: ligules about 1 line long, obtuse, often lacerate: leaves usually involute, 6-12 inches long, about 1 line wide: panicle narrow, 2-6 inches long, densely flowered, its branches ascending or appressed: empty glumes oblong, acute, keeled, $1\frac{1}{2}$ line long: flowering glume lanceolate, about 1 line long, 2-toothed at the apex: awn nearly straight, attached below the middle, but little longer than the glume: basal hairs very few or none: palea lanceolate, nearly as long as the glume. In open woods, eastern side of the Cascade Mountains.

Var. luxurians Kearney U. S. Dept. Agr. Div. Agrost. Bull. 11, 24. Stems stout, 4-5 feet high, usually of softer texture: leaves softer and less involute: panicle larger and more loose. Washington to Brit. Columbia and Idaho.

C. Langsdorfii Trin. Unifl. 225. Densely cespitose perennial: stems erect, simple, 2-4 feet high, smooth or roughish: sheaths shorter than the internodes: ligules 1-3 lines long: leaves 4-12 inches long, 2-4 lines wide, scabrous: panicle 2-6 inches long, loose, its branches spreading, or sometimes erect, the lower 1-3 inches long: empty glumes 2-3 lines long, strongly scabrous, lanceolate, acuminate: flowering glume lanceolate, acute nearly equalling the outer ones, scabrous: awn stout, about equalling the glume: basal hairs numerous, nearly equalling the glume: palea lanceolate. In damp places, California to Alaska and across the continent.

C. lactea Beal Grasses N. Am. ii, 346. Stems stout, scabrous, 40-50 inches high: sheaths $\frac{1}{2}$ - $\frac{2}{3}$ as long as the internodes: ligules 1- $1\frac{1}{2}$ lines long: leaves 10-15 inches long, 2-3 lines wide, scabrous: panicle slightly exerted, silvery green, rather thin, 4-6 inches long, its branches in half-whorls of 4-6, the longest $1\frac{1}{2}$ - $2\frac{1}{2}$ inches long: empty glumes subequal, 2-3 lines long, lanceolate, the first 1-nerved, the second 3-nerved: flowering glume oval, acute, 2 lines long, the slender awn attached near the base and equalling the glumes: basal hairs numerous, about half as long as the glume. Northern Washington.

C. Canadensis Beauv. Agrost. 157. A densely cespitose perennial: stems 2-5 feet high erect simple, smooth or somewhat scabrous, sheaths shorter than the internodes: ligules 1-3 lines long: leaves 6-12 inches long or more, 1-4 lines wide, rough: panicle 4-7 inches long, open, usually purplish, the branches spreading or ascending, the lower 1-3 inches long, naked at the base: empty glumes subequal acute strongly scabrous, $1\frac{1}{2}$ -2 lines long: flowering glume lanceolate, about equalling the empty ones, scabrous: awn delicate, about equalling the glume: basal hairs numerous, about equalling or shorter than the glume. Common in wet meadows, California to Alaska and across the continent.

Var. acuminata Vasey U. S. Dept. Agr. Div. Agrost. Bull. 5, 26. Panicle commonly rather small, more flexuous, and densely flowered, usually dark purple: empty glumes narrower, sharp attenuate-acuminate, usually much more scabrous: awn longer, often exceeding the flowering glume. In meadows, California to Alaska and the Rocky Mountains.

C. Macouniana Vasey Contrib. U. S. Nat. Herb. iii, 81. Stems 2-3 feet high, erect, smooth: sheaths shorter than the internodes: ligules about 1 line long: leaves 3-7 inches long, 1- $2\frac{1}{2}$ lines wide, erect, acuminate, scabrous: panicle open, 3-5 inches long, its branches ascending or sometimes erect, the lower 1- $1\frac{1}{2}$ inches long: empty glumes about 1 line long, acute, scabrous, the first shorter than the second: awn a little exceeding the glume: basal hairs about equalling the glume. Washington to Brit. Columbia and Manitoba.

C. Scribneri Beal Grasses N. Am. ii, 343. Stems rather slender,

erect, 30-40 inches high, from a perennial base: sheaths scabrous, much shorter than the internodes: ligules $1\frac{1}{2}$ lines long; leaves scabrous, about 10 inches long, 2 lines wide: panicle lanceolate in outline, about 7 inches long, its branches erect, the longest 2-3 inches long: empty glumes equal, scabrous: flowering glume oval, truncate, 4-toothed, $1-1\frac{1}{2}$ lines long: awn rather short, attached below the middle and extending beyond the glume: basal hairs about 1 line long: palea nearly as long as its glume. Oregon and Washington to Montana.

C. Cusickii Vasey Contrib. U. S. Nat. Herb, iii, 81. Loosely tufted perennial with numerous sterile shoots and few erect flowering stems 3-4 feet high: sheaths nearly smooth, of the stem half as long as the internodes, or the lower ones equalling the internodes, of the shoots close and overlapping: ligules obtuse, 2-3 lines long: leaves flat, 6-15 inches long, 2-4 lines wide, hispid on both sides: panicle 6 inches long, narrow and densely flowered, its unequal branches erect or ascending, the lower ones 1-2 inches long: empty glumes lanceolate, acute or acuminate, convex, nearly smooth, rigid, the first 1-nerved, the second $2-2\frac{1}{2}$ lines long, the second obscurely 3-nerved and slightly shorter: flowering glume 4-toothed at the slightly cleft apex $1\frac{1}{2}$ lines long: awn attached below the middle, exceeding the glume: basal hairs scanty, about half as long as the glume. In the mountains of eastern Oregon to California.

C. neglecta Gaertn, Fl. Wett. i. 91. Glabrous and smooth throughout: stems slender, 18-30 inches high: sheaths shorter than the internodes: ligules $\frac{1}{2}$ line long or less, truncate: leaves narrow, involute, the basal $\frac{1}{2}$ as long as the stems, those of the stems 2-5 inches long, erect: panicle contracted, 2-4 inches long, its branches 1 inch long or less, erect: empty glumes about 2 lines long, acute, scabrous: flowering glume about $\frac{3}{4}$ as long as the outer ones, obtuse: awn bent, exceeding the glume: basal hairs numerous, about half as long as the glume. In wet places, Oregon and Washington to Labrador and Newfoundland.

C. inexpansa Gray Gram. et. Cyp. i, 20. Stems $1\frac{1}{2}$ -3 feet high, erect: leaves 2 lines wide or less, rough, flat, or involute at the apex, the basal often $\frac{1}{2}$ - $\frac{2}{3}$ as long as the stems: panicle contracted, 2-9 inches long, its branches 1-2 inches long, erect: empty glumes $1\frac{1}{2}$ -2 lines long, acute, somewhat scabrous: flowering glume obtuse, shorter than the outer ones: awn more or less bent, from a little shorter to longer than the glume: basal hairs equalling or shorter than the glume. Brit. Columbia to New York, to be looked for in Idaho.

Var. cuprea Kearney U. S. Dept. Agr. Div. Agrost. Bull. 11, 37. Somewhat stouter and more rigid: panicle more densely flowered: empty glumes copper-color or dark purple with copper-colored tips. In shallow water, base of Mount Adams, Washington.

Var. barbulata Kearney l. c. Stems stout, pubescent just below the strongly constricted nodes with short reflexed hairs, somewhat scabrous for some distance below the pubescence: sheaths strongly twisted: panicle rather rigid, purplish: awn very short, attached above the middle, not equalling the glume, often wanting. Mason Co. Washington.

C. hyperborea Lange Fl. Dan. 50. Stems $1\frac{1}{2}$ -3 feet high, erect, smooth: sheaths shorter than the internodes: ligules about 1 line long: leaves 2 lines wide or less, rough, flat, those of the stem 2-10 inches long: panicle narrow, 2-9 inches long, its branches 1-2 inches long, erect: empty glumes about 2 lines long somewhat scabrous, acute: flowering glume nearly equalling the outer ones, obtuse: awn more or less bent, from a

little shorter to slightly longer than the glume: basal hairs equalling or shorter than the glume. In bogs, Washington to California and the Eastern States.

Var. elongata Kearney l. c. 40. Less strongly cespitose and less rigid, with few sterile shoots; smaller spikelets and often less pointed empty glumes. California to Brit. Columbia and Ontario.

Var. Americana Kearney l. c. 41. Panicle usually very dense: empty glumes $1\frac{1}{2}$ -2 lines long, usually very acute. Oregon to Brit. Columbia and Hudson Bay.

C. crassiglumis Thurber Bot. Cal. ii, 281. Stems about 1 foot high, erect, rigid: sheaths loose, smooth, longer than the internodes: ligules obtuse, $\frac{1}{2}$ line long or less: leaves 2-6 inches long, spreading, involute toward the acute tips: panicle dense and spike-like, 2 inches long, deep purple, its branches glomerate, 2-6 lines long, appressed: empty glumes broadly lanceolate or lance-ovate, abruptly pointed, subcartilaginous with thin margins, hispidulous throughout, hispid on the nerves, 2 lines long or less: flowering glume oblong-ovate, toothed at the obtuse apex, minutely hispid, $1\frac{1}{2}$ lines long; awn attached at the middle or below, equalling or exceeding the glume: basal hairs numerous $\frac{2}{3}$ as long as the glume: palet oblong, about 1 line long, broadest at the apex. In swamps, northern California to Brit. Columbia.

CALAMOVILFA Hack. True Grasses, 113. (1890.)

Tall grasses with stout horizontal rootstocks, elongated leaves and numerous spikelets in more or less open panicles. Spikelets one-flowered, the rachella not prolonged beyond the flower. Glumes 3, one-nerved, acute, the two outer unequal empty: the third longer or shorter than the second, with a ring of hairs at base. Palet strongly 2-keeled. Stamens 3. Styles distinct, with plumose stigmas. Grain free. Seed adherent to the pericarp.

C. logifolia Hack. l. c. Stems stout, 5-6 feet high: sheaths longer than the internodes, smooth or more or less soft woolly: leaves very long and narrow, with involute attenuate points: panicle 5-20 inches long, at first rather narrow and close, but later spreading, its branches rather distant: spikelets compressed, 3-4 lines long: first glume cuneate, 2-3 lines long, second lance-linear and longer: flowering glumes as long as the second one, cuneate-lanceolate: basal hairs two-thirds as long as the glume. In sandy places, Brit. Columbia to eastern Oregon and Colorado.

Tribe 4 Chloridæ. Spikelets one- to several-flowered, in one-sided digitate or fasciculate, rarely solitary, spikes or racemes. Flowering glumes usually keeled, entire and unawned, or toothed and with one or three straight awns.

17 SPARTINA Schreb. Gen. 43.

Glabrous perennial grasses with horizontal rootstocks, flat or involute leaves and one-sided spikes in panicles. Spikelets narrow, borne in 2 rows on one side of a triangular rachis, articulated with the very short pedicels below the glumes. Glumes 3, the 2 outer empty, keeled, very unequal, the third subtending a perfect flower, keeled, equalling or shorter than the second. Palets often longer than the glumes two-nerved. Stamens 3. Styles filiform, elongated, with filiform papillose or shortly plumose stigmas. Grain free, laterally compressed.

S. cynosuroides Willd. Enum. 80. Stems 2-6 feet high, simple, smooth: sheaths longer than the internodes, those at the base of the stem crowded: ligules a ring of hairs: leaves a foot long or more, 3-7 lines wide, scabrous on the margins, becoming involute in drying, attenuate into long slender tips: spikes 5-30, 2-5 inches long, often on peduncles 6-12 lines long, erect or ascending: rachis rough on the margins: spikelets much imbricated, 6-7 lines long: empty glumes 2-4 lines long, awn-pointed or awned, strongly hispid-scabrous on the keel: flowering glume as long as the first, the scabrous midrib terminating just below the emarginate or 2-toothed apex: palet sometimes exceeding the glume. Along streams, eastern Oregon to Nova Scotia and Texas.

S. gracilis Trin. Mem. Acad. St. Petersb. vi, 110. Stems 1-3 feet high, erect, smooth: sheaths longer than the internodes, the lower ones crowded: ligules a ring of short hairs: leaves 6-12 inches long, 1-3 lines wide, flat or involute, attenuate into long tips: spikes 4-8, 1-2 inches long, appressed, more or less peduncled: empty glumes 3-4 lines long, acute scabrous-hispid on the keel, the first half as long as the second: flowering glume obtuse, slightly shorter than the second one: palet obtuse, about equalling the glume. In wet meadows, eastern Oregon to Brit. Columbia and Nebraska.

18 BECKMANNIA Host. Gram. Austr. iii, 5.

Tall erect grasses with flat leaves and erect spikes in a terminal panicle. Spikelets one- or two-flowered, compressed-globose. Glumes 3 or 4, the two lower membranous, saccate, obtuse or abruptly acute: flowering glumes narrow, thin-membranous. Palets hyaline, two-keeled. Stamens 3. Styles distinct, with plumose stigmas. Grain free, enclosed in the glume and palet.

B. erucæformis Host l. c. Glabrous throughout: stems often stout, 2-3 feet high, erect: sheaths longer than the internodes, loose: ligules 2-4 lines long, obtuse, often lacerate: leaves 3-10 inches long, 2-4 lines wide, rough: panicle 4-10 inches long, simple or compound, the spikes about 6 lines long: spikelets 1-2 lines long, 1-2-flowered, closely imbricated in 2 rows on one side of a flattish rachis: glumes smooth, the first two saccate and empty, obtuse or abruptly acute: flowering glumes acute, the lower usually awn-pointed. Common in ditches and along streams, California to Brit. Columbia and Iowa.

19 BOUHELLOUA Lag. Var. Cienc. y Litter Part 4, 134.

Annual or perennial grasses with flat or convolute leaves and numerous spikelets in one-sided spikes. Spikelets one- or two-flowered, arranged in two rows on one side of a flat rachis, the rachella extended beyond the base of the flowers, bearing 1-3 awns and 1-3 rudimentary glumes. Two lower glumes empty, acute, keeled: flowering glumes broader, 3-toothed, the teeth awn-pointed or awned. Palets hyaline, entire or toothed. Stamens 3. Styles distinct, with plumose stigmas. Grain free, oblong.

B. oligostachya Torr, Gray Man. ed 2, 553. Stems 6-13 inches high, glabrous: sheaths shorter than the internodes: ligules a ring of short hairs: leaves 1-4 inches long, 1 line wide or less, involute, at least at the long slender tips, smooth or scabrous: spikes 1-3, 1-2 inches long, often strongly curved, the rachis terminating in a short inconspicuous point: spikelets numerous, pectinately arranged, about 3 lines long, first glume hyaline, shorter than the membranous second one which is scabrous and sometimes long-ciliate on the keel: flowering glume pubescent, 3-cleft, the nerves terminating in awns: rachella with a tuft of long hairs under the rudimentary glumes and awns. On

prairies, Washington to California and Wisconsin.

20 ELEUSINE Gært. Fruct. et Sem. i, 7.

Tufted annual or perennial grasses with flat leaves and spicate inflorescence, the spikes digitate or close together at the summit of the stem. Spikelets several-flowered, sessile, closely imbricated in two rows on one side of the rachis, which is not extended beyond them. Flowers all perfect, or the upper staminate. Glumes compressed, keeled, the two lower empty, the others subtending flowers or the upper empty. Stamens 3. Styles distinct, with plumose stigmas. Grain loosely enclosed in the glume.

E. INDICA Gært. l. c. Stems 6-12 inches long, tufted, erect or decumbent, glabrous: sheaths loose, longer than the internodes, often crowded at the base of the stem, glabrous sometimes sparingly villous: ligules very short: leaves 3-12 inches long, 1-3 lines wide, smooth or scabrous: spikes 2-10, 1-3 inches long, whorled or approximate at the summit of the stems or one or two sometimes distant: spikelets 3-6-flowered, $1\frac{1}{2}$ -2 lines long: glumes acute minutely scabrous on the keel, the first 1-nerved, the second 3-7-nerved, the others 3-5-nerved. In fields and waste places, naturalized from Europe.

Tribe 3 Stipacæ. Spikelets strictly 1-flowered. Flowers with a sharp pointed callus, deciduous. Flowering glume enfolding the palet and grain, coriaceous and indurated in fruit, and terminated by a simple or triple awn.

21 STIPA L. Sp. 78.

Mostly tall grasses with usually convolute leaves and paniculate inflorescence. Panicle open, with a few spreading branches, or sometimes crowded and narrower spikelets 1-flowered, the cylindrical flower with an obconic bearded and often elongated sharp-pointed base. Glumes subequal, membranous, often terminated by a long subulate point. Flowering glume coriaceous, cylindrical-involute, enclosing the mostly shorter palet, entire at the apex or terminating in 2 minute sometimes hyaline teeth, naked or with a crown of short hairs, conspicuously awned. Awn articulated with the glume, often caducous, geniculate below, glabrous or pubescent, or plumose with spreading hairs. Stamens usually 3. Styles short, distinct: stigmas plumose with simple hairs. Grain cylindrical, smooth, free, enclosed in the glume.

S. occidentalis Thurber Bot. Wilkes 483. Stems slender 1-2 feet high, somewhat scabrous, pubescent at the nodes: sheaths close, hispid, shorter than the internodes: ligules 2-2½ lines long, lacerate at the apex: leaves filiform, convolute, sharp pointed, hispid, 2-12 inches long: panicle slender, 3-4 inches long, often included at the base, its branches mostly in twos, erect, 1-2 inches long: spikelets lanceolate, turgid, 4-6 lines long: empty glumes appressed, lanceolate, acute, thin, purplish below, smooth, the first one obscurely 5-7-nerved at base, 5-6 lines long, the second about 1 line shorter, 3-nerved: stipe obconical, acute, pubescent, ½ line long: flowering glumes thin-chartaceous, pubescent, plainly 5-nerved: awn articulated, persistent, flattened, twisted, $1\frac{1}{2}$ -2 inches long, bent near the middle, the lower half plumose: palet oblong, 2-2½ lines long, pubescent on the back and obtuse apex. Common in the mountains, central California

to Washington.

S. comata Trin. & Rupr. Mem. Acad. St. Petersburg. (vi.) v. 75. Stems stout, 1-4 feet high, mostly scabrous: sheaths loose, the uppermost sometimes inflated, smooth, at length shorter than the internodes: ligules conspicuous, acute, 2-3 lines long: leaves smooth or somewhat scabrous, the basal ones $\frac{1}{4}$ - $\frac{1}{2}$ as long as the stems, those of the stems 3-6 inches long, involute: panicle 6-9 inches long, loose, its branches 3-5 inches long, ascending: empty glumes 9-12 lines long, glabrous, acuminate into an awn 2-4 lines long: flowering glume 4-6 lines long; callus acute: awn slender, 4-8 inches long, spiral and pubescent below: palea equalling the glume. On prairies, eastern Oregon to Brit. Columbia, Alberta, Nebraska and Cal.

S. setigera Presl Reliq. Hænk. i. 226. Stems stout, $1\frac{1}{2}$ -3 feet high, often pubescent at the nodes: sheaths hairy at the throat. the lower shorter than the internodes: ligules truncate, about 1 line long: leaves of sterile shoots mostly involute, $\frac{1}{3}$ as long as the stem, those of the stem 2-3, often flat 6-18 inches long, 3-5 lines wide: panicle usually included at base in the upper sheath, 6-15 inches long, its slender branches mostly in pairs: empty glumes subequal, or the upper shorter, long-acuminate, 3-nerved, 8-12 lines long: flowering glume 6 lines long, silky-hairy on the nerves, the callus sharp and curved: awn 3-5 inches long, twisted and pubescent below, geniculate and above the middle bent again. On dry hills, eastern Oregon to California, Texas and Kansas.

S. Kingii Bolander Proc. Cal. Acad. iv, 170. Stems erect, smooth, 5-12 inches high, naked above, with but 2 nodes near the base which are covered with the remains of many sheaths: radical leaves half as long as or equalling the stem, setaceously convolute, minutely scabrous, stem leaves 2, the upper with close sheaths 3-6 inches long: ligule a line long, acute, often cleft: panicle narrow 1-2 inches long, the short erect branches scabrous empty glumes obtuse, eroded and sometimes mucronate hyaline with a tinge of purple at base; the first one $1\frac{1}{2}$ lines long: stipe obconical scarcely acute short-bearded: flowering glume ovate, brownish-purple, pubescent: awn persistent, finely pubescent, loosely twisted and somewhat bent below the middle: palea broadly ovate, obtuse. Eastern Oregon to Nevada and California.

S. Bloomeri Bolander l. c. 168. Stems $1\frac{1}{2}$ -3 feet high, clothed at base with the remains of old sheaths: sheaths shorter than the internodes, the upper somewhat inflated: leaves very narrow and convolute, smooth or somewhat roughened, the lower ones about half as long as the stems: panicle 6-12 inches long, erect, narrow, with distant branches: empty glumes 4 lines long, nearly equal, acuminate into a slender point, 3-nerved, minutely scabrous: flowering glume $2\frac{1}{2}$ lines long, minutely 2-toothed at the apex: awn 6-9 lines long, geniculate near the middle, almost plumose below, scabrous above: palea nearly as long as the glume. Eastern Oregon to Nevada and California.

S. Oregonensis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17, 130. Stems erect, slender 12-18 inches high; pubescent at the nodes: sheaths rather loose, minutely hispid, longer than the internodes; ligules lacerate, the lateral teeth longer: radical leaves 10-15 inches long, involute; those of the stem 3-6 inches long, conduplicate or involute, 1-2 lines wide: panicle narrow, included in the upper sheaths, the branches appressed, unequal, 1 inch long or less: empty glumes lanceolate, slender-pointed, convex and herbaceous below, thin-membranous and carinate above, sometimes purplish: first glume 5-6 lines long, second usually $\frac{1}{2}$ line shorter: stipe slender, curved, acute, short-bearded: flowering glume thin-chartaceous, with 2 ciliate teeth, pubescent, 5-nerved: awn twisted and pubescent below, naked above, usually bent twice, 1-2 inches long: palea lanceolate, cleft or erose dentate at the apex, pubescent between the 2 nerves, $1\frac{1}{4}$ lines long.

In the mountains, Washington to California.

S. viridula Trin. Bull. Sc. Acad. St. Petersb. i, 67. Stems $1\frac{1}{2}$ -5 feet high, with numerous withered sheaths at base: sheaths half as long as the internodes or less: ligules very short: leaves all involute-setaceous at the apex, smooth or slightly scabrous, pale green, the lower $\frac{1}{3}$ as long as the stem: panicle 6-18 inches long, narrow, loose, the short erect branches in twos or threes: spikelets 4-5 lines long, on short pedicels: empty glumes nearly equal, ovate, bristle-pointed, the lower 5-nerved, the upper 3-nerved: flowering glume about $\frac{1}{4}$ shorter than the empty ones, with short scattered hairs which form an irregular crown, and with 2 very minute hyaline teeth, the callus very short: awn $1-1\frac{1}{2}$ inches long, slender, flexuous, usually twice bent, pubescent below, scabrous above at length deciduous: palet more than half as long as the glume. California to Brit. Columbia and Nebraska.

S. minor Scribn. l. c. 11, 46. Densely cespitose: stems 16-24 inches high, smooth or very minutely pubescent below the nodes: sheaths smooth: ligules very short, slightly auricled, broader than the base of the leaves: leaves 5-15 inches long, 1-2 lines wide, with very long attenuate-involute tips: empty glumes lanceolate, sharply acuminate-pointed, 3-nerved near the base, the lower slightly broader and longer than the upper and less distinctly nerved: flowering glume, including the short callus, 2 lines long, thinly pilose all over and with a crown of hairs at the distinctly 2-toothed apex: awn once or twice bent, about 10 lines long, very minutely scabrous: palet about $\frac{1}{4}$ as long as the glume. Moist mountain sides, Idaho to Montana and Colorado.

S. Lemmoni Scribn, U. S. Dept. Agr. Div. Agrost. Circ. 30, 3. Stems slender, rigid, erect, 1-2 feet high, glabrous: sheaths glabrous, shorter than the internodes: ligules less than a line long, rounded, entire, leaves 2-5 inches long, 1-2 lines wide, glabrous beneath, pubescent and strongly striate above, closely involute when dry: panicle 5-6 inches long, strict, its branches erect, $1-1\frac{1}{2}$ inches long, few-flowered: empty glumes nearly equal, about 6 lines long, broadly lanceolate, long acuminate-pointed, 3-5-nerved, scarious except the nerves: flowering glume oblong, about 6 lines long, obtuse, 2-toothed at the apex, thinly pilose all over with appressed hairs: palet hairy, nearly as long as the glume. Dry rocky slopes, eastern Washington to California.

22 ORYZOPSIS Michx. Fl. i. 51.

Usually tufted grasses with flat or convolute leaves and paniced inflorescence. Spikelets broad, one flowered. Glumes 3, the 2 lower ones about equal, obtuse or acuminate, the third shorter or a little longer, broad, bearing a terminal awn which is early deciduous. Callus short and obtuse or a mere scar. Stamens 3: styles distinct. Stigmas plumose. Grain oblong, free, tightly enclosed in the glume.

O. cuspidata Vasey Special Rep. U. S. Dept. Agr. 63, 23. Closely tufted perennial: stems slender thickened at base, solid smooth 12-18 inches long: sheaths shorter than the internodes, smooth and close, the upper one longer and loose: ligules ovate, a line long, acute or lacerate: radical leaves numerous, the scarious sheaths clustered thick about the base of the stems, 6-10 inches long, involute: panicle very loose, 4-6 inches long, inclosed at the base, branches mostly in pairs, distant, horizontal, divided in pairs beyond the middle, bearing solitary spikelets on long flexuous pedicels: spikelets 3 lines long, first and second glumes equal, inflated and widened below, narrowed above to a long sharp point, scarious except the 5 nerves, minutely pubescent: flowering glume ovoid, or oblong, profusely

clothed with long white hairs $1\frac{1}{2}$ lines long, terminating in an awn 2 lines long which falls at maturity: palet conical, smooth, hard, brown. On sandy plains. Eastern Oregon to California, Texas and Brit. Columbia.

O. exigua Thurber Bot. Wilkes 481. Stems slender, erect, 6-15 inches high, hispid, the nodes black, scarcely constricted: leaves of sterile shoots numerous with close striate hispid sheaths and narrow involute wiry scabrous blades 4-7 inches long, of the stem usually 4, lower 2 with short overlapping sheaths and blades like the radical ones, next sheath above much shorter than the internodes with blades 2-4 inches long: ligules acute, 1-2 lines long: panicle narrow, secund, 2-3 inches long, its branches usually in pairs, erect: unequal: empty glumes oblong-ovate, barely acute, or abruptly acuminate, membranous, minutely scabrous, equal, 2-2½ lines long flowering glumes herbaceous, becoming chartaceous, obtuse or with purple teeth at the apex, short-pubescent throughout, 5 nerved. the nerves united above: awn persistent, minutely hispid, 2-3 lines long: palet equalling the glume, obtuse or bidentate at the apex. In the mountains of Oregon and Washington.

O. Hendersoni Vasey Contrib. U. S. Nat. Herb. 7, 267. Stems densely tufted, 7-10 inches high: lower sheaths rather loose: leaves scabrous, conduplicate, rigid pungent 4-5 inches long: panicle narrow 2½-4 inches long, its branches mostly in twos, the longest 1½-2½ inches long bearing 2-4 spikelets near the ends: empty glumes broadly oblong, obtuse and toothed, the first 3-nerved, the second 5-nerved: flowering glume linear, oblong, 2 lines long, smooth, coriaceous, obscurely 5-nerved, bearing 2 lateral teeth: awn curved, caducous, 5-6 lines long. Washington.

23 ARISTIDA L. Sp. 82.

Annual or perennial grasses with narrow leaves and various inflorescence. Spikelets narrow, one-flowered. Glumes 3, narrow, the 2 outer empty, carinate, the third rigid and convolute, bearing 3 awns, sometimes united at base, the lateral ones rarely wanting or reduced to rudiments. Palet 2-nerved. Stamens 3. Styles distinct. Stigmas plumose. Grain free, tightly enclosed in the glume.

A. purpurea Nutt. Trans. Am. Phil. Soc. (II) v, 145. Stems slender, tufted, erect, nearly smooth, 1-2 feet high: lower leaves with narrow close sheaths and slender involute blades 4-10 inches long: lower sheaths longer than the internodes, the upper ones much shorter: ligules a line of fine short hairs: panicle rather loose, narrow, 4-6 inches long, its branches 2-3 at each node, unequal the lower 1-2 inches long, naked below: spikelets 5-6 lines long, first glume narrowly lanceolate-linear, emarginate, mucronate, hispid on the keel, 1-nerved, 4-5 lines long; the second similar but nearly 2 lines longer, stipe hairy: flowering glume linear-lanceolate, recurved, slightly hispid on the nerves above, 4 lines long, terminating in 3 separate slender awns 1-2 inches long: palet obovate, thin, about $\frac{2}{3}$ line long. On prairies and ridges, eastern Washington to Brit. Columbia, Idaho and Texas.

A. oligantha Michx. Fl i, 41. Glabrous annual: stems slender, 1-2 feet high, erect, dichotomously branched, smooth or roughish: sheaths loose, longer than the internodes: ligules very short, minutely ciliate: leaves 1-6 inches long, $\frac{1}{2}$ -1 line wide, smooth, the larger ones attenuate into a long slender point: spikelets few, borne in a lax spike-like panicle: first glume 5-nerved, an inch long, attenuate or short-awned equalling or shorter than the second which bears an awn 2-4 lines long: flowering glume shorter than the first one, bearing 3 slender divergent or spreading awns, the middle one 1-3 inches long, the lateral ones somewhat shorter.

On dry plains, southern Oregon to the Eastern States.

A. fasciculata Torr. Ann. Lyc. N. Y. i, 154. Glabrous: stems slender, erect, 1-2 feet high, often branched at the base: sheaths shorter than the internodes: ligules short, ciliate: leaves erect, 6 inches long, 1 line wide or less, flat, attenuate to a long point, smooth or scabrous: panicle 3-7 inches long, at first strict, its branches finally more or less spreading: first glume linear 1-nerved, shorter than the second, 4-5 lines long: second one similar, about 6 lines long: flowering glumes about equalling the second one terminating in 3 nearly equal slender awns 6-8 lines long. On dry plains, Idaho to California and Kansas.

24 PHLEUM L. Sp. 59.

Annual or perennial grasses with flat leaves and numerous spikelets in dense spicate panicles. Spikelets one-flowered. Glumes 3, the 2 lower ones empty, membranous, compressed, keeled, the apex obliquely truncate, the midnerve produced into an awn. Flowering glume much shorter and broader, hyaline, truncate, denticulate at the summit. Palet narrow, hyaline. Stamens 3. Styles distinct, somewhat elongated, with plumose stigmas. Grain ovoid, loosely enclosed by the glume and palet.

P. pratense L. Sp. 59. Smooth or nearly so: perennial with bulbous roots: stems 1-4 feet high, erect, simple: sheaths usually exceeding the internodes, sometimes shorter, the upper ones long, and not inflated or very slightly so: ligules 1-2 lines long, rounded: leaves flat, 3-16 inches long, 2-3 lines wide, smooth or scabrous: panicle usually elongated, cylindrical 1-7 inches long: empty glumes exclusive of the awns $1\frac{1}{2}$ lines long ciliate on the keel, the awn less than half their length: flowering glume very thin, truncate: palet equalling the glume. Common in fields and waste places.

P. alpinum L. Sp. 59. Smooth or nearly so perennial: stems erect, 6-18 inches high, simple: sheaths often much shorter than the internodes, sometimes longer, the upper one usually much inflated: ligules about 1 line long, truncate: leaves smooth beneath, scabrous above, the lower 2-3 inches long, 1-4 lines wide, the upper one usually very short: panicle short and dense, ovoid to oblong, $\frac{1}{2}$ -2 inches long, 3-6 lines thick: empty glumes, exclusive of the awn $1\frac{1}{2}$ lines long, strongly ciliate on the keel, the awn about half as long as the body: flowering glume oblong. In wet meadows on high mountains, California to Alaska and across the continent.

25 ALOPECURUS L. Sp. 60.

Annual or perennial grasses with usually flat leaves and numerous spikelets in dense spike-like panicles. Spikelets one-flowered, flattened. Empty glumes acute, sometimes short-awned, more or less united below, compressed, keeled, the keel ciliate or somewhat winged. Flowering glume obtuse or truncate, hyaline, three-nerved, awned on the back. Palet hyaline, acute. Stamens three. Styles distinct or rarely united at base. Stigmas elongated, hairy.

A. AGRESTIS L. Sp. ed. 2, 89. Stems 1-2 feet high, erect, simple: sheaths shorter than the internodes: ligules 1 line long, truncate: leaves 2-7 inches long, 1-3 lines wide, scabrous, especially above: panicle $1\frac{1}{2}$ -4 inches long, 2-4 lines thick: empty glumes united at base for about half their length narrowly wing-keeled, 2-2 $\frac{1}{2}$ lines long, the nerves smooth or

scabrous, sometimes hispid below: flowering glume equalling or exceeding the outer ones, smooth, the awn inserted near the base, about twice its length. In waste places and ballast grounds, introduced from Europe.

A. geniculatus L. Sp. 60. Stems slender, 6-18 inches high, erect with decumbent geniculate base, simple or sparingly branched, smooth: sheaths usually shorter than the internodes, loose or somewhat inflated: ligules 1-3 lines long: leaves 1-6 inches long, $\frac{1}{2}$ -2 lines wide, scabrous, especially above: panicle 1-3 inches long, $\frac{1}{2}$ -2 lines thick: empty glumes slightly united at base, 1-1 $\frac{1}{4}$ lines long, obtuse or subacute, glabrous except on the pubescent lateral nerves and strongly ciliate keel: flowering glume somewhat shorter, obtuse, glabrous, the awn inserted at or below the middle, equalling or exceeding it. Common in wet places, California to Alaska and across the continent.

Var. robustus Vasey Bull. Torr. Bot. Club xv, 13. Stems 20-30 inches long, sometimes branched: leaves flat, hispid above, 3-6 inches long, 2-3 lines wide. In the mountains, Washington to Alaska.

A. PRATENSIS L. Sp. 60. Stems slender 12-30 inches high, simple, erect: sheaths usually much shorter than the internodes, loose or somewhat inflated: ligules about $\frac{1}{2}$ line long, erose-truncate: leaves 2-4 inches long, 1-3 lines wide, scabrous, at least above: panicle 1-3 inches long: 4-6 lines wide: outer glumes, united at base for about $\frac{1}{4}$ their length, 2-3 lines long, acute, glabrous except the sparingly pubescent lateral nerves and the strongly ciliate keel: flowering glume slightly shorter, obtuse, glabrous, the awn inserted about $\frac{1}{4}$ way from the base and surpassing it. Common in cultivation and waste places: naturalized from Europe.

A. Californicus Vasey l. c. Stems slender, smooth, geniculate below, 10-15 inches long often branched: sheaths loose, the upper one inflated, smooth, shorter than the internodes: ligules about 2 lines long, acute: leaves 1-5 inches long, flat, hispid above: panicle cylindrical, dense, 1-2 inches long, $\frac{1}{4}$ - $\frac{3}{8}$ line thick: empty glumes oblong, obtuse, carinate slightly united at base, thin, purple above, hairy on the keel, and slightly pubescent the obscure lateral nerves, 1 $\frac{1}{4}$ -1 $\frac{3}{4}$ lines long: flowering glume oblong-ovate, obtuse, its edges united $\frac{1}{4}$ way from the base, smooth, about equalling the lower ones: awn arising near the base of the glume twisted, bent near the middle, 2-3 lines long: palet wanting. In wet places, California to the Willamette Valley Oregon and Idaho.

A. pallescens Piper Fl. Palouse Reg. 18. A pale green smooth tufted perennial: stems 16-24 inches high, erect, or slightly geniculate below: sheaths shorter than the internodes, inflated, smooth: ligules scabrous, 1 $\frac{1}{2}$ -2 lines long: leaves flat, 3-12 inches long, 1-3 lines wide, acuminate, strongly scabrous above: panicle usually well exerted, pale and silvery, 1-3 inches long, about 3 lines thick, erect: empty glumes nearly equal, 1-3 lines long, strongly ciliate on the keel, obtuse: flowering glume hyaline, 2-nerved, as long as the outer ones, obtuse: awn arising near the base, stout bent, 3 lines long. Common in wet places about Pullman Washington.

A. saccatus Vasey Bot. Gaz. vi, 290. Tufted, apparently annual: stems erect, or slightly geniculate at base 5-10 inches high, smooth, simple: sheaths rather loose, the upper one inflated, slightly roughened usually shorter than the internodes: ligules membranaceous, 1 $\frac{1}{2}$ lines long: leaves narrow, rough on both sides, 1-3 inches long: empty glumes united at base, ovate-oblong, barely acute, carinate, scabrous at the apex, puberulent throughout, ciliate on the keel and lateral nerves, 2 lines long: flowering glume broadly oblong, truncate, the margins united to the middle or above, smooth except the ciliate apex, 4-nerved, 2 lines long: awn arising near the base of the glume, twisted, bent 3-4 lines long: palet wanting. On the margins of pools that are dry in summer, eastern base of the Cascade Mountains at Barlow Gate, Oregon.

A. Howellii Vasey Bull. Torr. Bot. Club, xv, 12. A low tufted annual, often purplish throughout: stems erect, or somewhat geniculate at base, mostly simple, smooth, 3-6 inches high: sheaths loose or vaginate, the upper one more inflated, smooth, the lower shorter than the internodes, the upper one exceeding the internode, with a short blade: ligules membranous, obtuse, 1 line long: leaves filiform-convolute, exceeding the stem: panicle cylindrical, 1 inch long, usually included at base: empty glumes slightly united at base, oblong, obtuse, carinate, scarious on the margins, ciliate on the keel and silky on the lateral nerves and near the base, $1\frac{1}{4}$ - $1\frac{1}{2}$ lines long: flowering glume broadly ovate oblong, truncate, thin, smooth, 4-nerved, equalling the empty ones: awn arising below the middle of the glume, slender, naked below, bent, 3 lines long: palet wanting. Margins of small pools that are dry in summer, on the rocky plains near Medford southern Oregon.

A. occidentalis Scribn. Bot. Gaz. xi, 170. Stems rather slender, 2-3 feet high: sheaths loose, shorter than the internodes: leaves flat, 2-4 inches long: panicle oblong, an inch long: outer glumes united at the base, about 2 lines long, acute, pubescent with short hairs, the keel ciliate with long hairs: flowering glume a little shorter than the outer ones, glabrous except at the villous apex: awn inserted below the middle, straight, much exceeding the glume. Wet meadows and banks of streams, in the high mountains, Idaho to Montana and Colorado.

Tribe 5 Avenæ. Spikelets two- to several-flowered. Outer empty glume usually longer than the first flowering one. One or more of the flowering glumes awned on the back, or from between the teeth of the bifid apex. Awn usually twisted or geniculate. Callus and usually the joints of the rachis hairy.

26 DANTHONIA DC. Fl. Fr. iii, 32. (1805.)

Mostly perennial grasses with flat or convolute leaves and contracted or open panicles. Spikelets 3- to several-flowered, the flowers all perfect, or the upper staminate, pubescent, extended beyond the flowers. Glumes 5 to several, the 2 lower empty, keeled, acute, subequal, persistent, generally exceeding the uppermost flowering one. Flowering glumes rounded on the back, 2 toothed, deciduous, the awn arising from between the acute or awned teeth, flat and twisted at base, bent. Palet hyaline 2-keeled near the margins, obtuse or 2-toothed. Stamens, 3. Styles distinct, with plumous stigmas. Grain free, enclosed in the glume.

D. Californica Bolander Proc. Calif. Acad. ii, 182. Stems slender, 1-4 feet high, erect, or geniculate at the lower nodes, smooth: leafy nearly so the top: sheaths rather loose, closed at the hairy throat, usually pubescent mostly shorter than the internodes: ligules nearly obsolete: leaveoas of the radical shoots numerous, with short sheaths and slender involute blades 4-8 inches long; of the stem with flat or loosely involute blades, scabrous, especially toward the involute point, often thinly pubescent, 2-5 inches long: inflorescence a short simple panicle: spikelets cuneate, compressed, 5-8-flowered: empty glumes lanceolate, with long carinate or in lute points, 6-7 lines long: flowering glumes broadly lanceolate, acuminate with 2 teeth 1 line long at the apex, smooth except a tuft of pilose hairs on each margin, or often slightly ciliate throughout: awn inserted at the base of the sinus, slightly hispid, often twisted and bent, 3-5 lines long: palet oblong, 3-toothed at the apex. In moist ground, Washington to California.

D. intermedia Vasey Bull. Torr. Bot Club x, 52. Densely tufted:

stems slender 1-2 feet high: leaves of sterile shoots with crowded sheaths and narrow involute blades, sparsely pilose to glabrous, 4-12 inches long: sheaths of the stem shorter than the internodes, more or less pilose: ligules short, ciliate: inflorescence a short spicate panicle of 3-12 erect spikelets: empty glumes lanceolate, acute or acuminate, keeled, smooth, 4-5 lines long, exceeding the flowering glumes which are broadly lanceolate, 2-3 lines long, acutish, 2-toothed, the awn more or less bent and twisted, 4-6 lines long. On low prairies, eastern Washington to southern California Montana and Canada.

Var. Cusickii Williams. Larger: leaves longer flatter, softer, less scabrous, quite destitute of pubescence, rather large spikelets and usually more open panicle. In the Blue Mountains of Oregon.

D. unispicata Munro. Stems loosely tufted, 6-12 inches high: sheaths shorter than the internodes, or the lower ones longer, pubescent with long white hairs: ligules very short or reduced to a row of white hairs: leaves flat or more or less involute with acuminate tips, 2-4 inches long, more or less pubescent: inflorescence a single terminal spikelet: empty glumes lanceolate, long-acuminate, exceeding the upper flowering one, glabrous, 6-12 lines long: flowering glumes lanceolate, acute, 4-5 lines long, terminating in 2 usually dark-colored awns, ciliate on the margins: central awn twisted and bent below the middle, about 6 lines long. In partially barren places, eastern Washington to California.

D. Americana Scribn. U. S. Dept. Agr. Cir. 30, 5. A slender densely caespitose perennial 8-16 inches high, with short slightly inflated sheaths, narrow mostly involute leaves and simple panicles of 1-4 large spikelets: sheaths much shorter than the internodes, pubescent, at least the lower ones long-bearded at the throat: empty glumes acuminate-lanceolate the narrowed apex obtuse, 6-9 lines long, as long as or slightly exceeding the flowers: flowering glumes 5-4 lines long, rounded and glabrous on the back, densely silky villous on the margins from just above the base to a little above the middle, abruptly 2-toothed, the teeth very slender bristles 2-3 lines long: awn very slender twisted below, 3-5 lines long. Brit. Columbia to California and Chile.

27 AVENA L. Sp. 76.

Annual or perennial grasses with usually flat leaves and numerous spikelets in panicles. Spikelets one- to several-flowered, the lower flowers perfect, the upper often staminate or imperfect. Glumes 3 to several the 2 outer empty, somewhat unequal, membranous, persistent. Flowering glumes deciduous, rounded on the back, acute, generally bearing a dorsal awn, the apex often 2-toothed. Palet narrow, 2-toothed. Stamens 3. Styles short, distinct, with plumose stigmas. Grain oblong, deeply furrowed, enclosed in the glume and palet, free or sometimes attached to the palet.

A. FATUA L. Sp. 80. Stems stout, 1-4 feet high, erect, smooth: sheaths, smooth, or scabrous at the summit, sometimes sparingly hirsute, the lower often longer than the internodes: ligules 1-2 lines long: leaves 3-8 inches long, 1-4 lines wide: panicle open 4-12 inches long, the branches ascending: spikelets 2-4 flowered, drooping: empty glumes 9-12 lines long, smooth, flowering glumes 6-9 lines long, with a ring of stiff brown hairs at base, pubescent with long rigid brown hairs, bearing, a long bent and twisted awn. In fields and waste places: naturalized from Europe.

VAR. GLABRESCENS Coss. Stems stout, pale, $1\frac{1}{2}$ - $2\frac{1}{2}$ feet high: sheaths equalling the internodes: leaves flat, 4-6 inches wide: flowering glumes

smooth except the ring of stiff white hairs at the base, and the scabrous apex. In cultivated fields and waste places: naturalized from Europe.

A. Smithii Porter, Gray Man. ed. 3, 640. Stems 2-5 feet high, erect, simple, scabrous: sheaths shorter than the internodes, very rough: ligules 2 lines long: leaves 4-8 inches long, 3-6 lines wide, scabrous: panicle 6-12 inches long, the branches finally spreading: spikelets 3-6-flowered; empty glumes smooth, the second 3-4 lines long, 3-nerved: flowering glumes 5 lines long, naked at base, strongly nerved, scabrous, bearing an awn $\frac{1}{4}$ - $\frac{1}{2}$ their length. Eastern Washington to Michigan.

28 TRisetum Pers. Syn. i, 97. (1805.)

Mostly perennial tufted grasses with flat leaves and spike-like or open panicles. Spikelets 2-4-flowered, the flowers all perfect or the uppermost staminate. Rachella glabrous or pilose, extended beyond the flowers. Glumes 4-6, membranous, the two lower empty, unequal, acute, persistent. Flowering glume usually shorter than the empty ones, deciduous, 2-toothed, bearing a dorsal awn below the apex, or the lower one sometimes awnless. Palet narrow, hyaline, 2-toothed. Stamens 3. Styles distinct. Stigmas plumose. Grain free, enclosed in the glume.

T. barbatum Steud. Syn. Pl. Gram. 229. Stems erect, or decumbent at base, often branched below, smooth, leafy nearly to the panicle, 1-3 feet high: sheaths sparsely retrorsely hispid, half open above, shorter than the internodes: ligules obtuse, erose, 1 line or less long: leaves 3-6 inches long, 2-3 lines wide, scabrous, sparsely pubescent or nearly smooth: panicle open to constricted, 4-8 inches long, its branches 3 inches long or less: spikelets loosely 3-6-flowered, 7-10 lines long; first empty glume very narrowly ovate, subulate-acute, smooth except the slightly hispid prominent keel, 3-4 lines long; second one lanceolate, acute, 5-6 lines long: flowering glumes lanceolate, with 2 teeth about $\frac{1}{2}$ line long, pubescent, 5-7 lines long: awn inserted at the base of the sinus bent, hispid and twisted below: palet linear thin. Washington to California.

T. canescens Buckley Proc. Acad. Phil. 1862, 100. Stems erect, nearly smooth, 2-3 feet high: sheaths open above, canescent to nearly smooth, shorter than the internodes: ligules ovate, erose or lacerate, 2-3 lines long: leaves flat, 4-10 inches long, 3-4 lines wide, canescent to nearly smooth: panicle narrow, 6-8 inches long, its branches unequal, 2 inches or less long, erect: spikelets slightly compressed, 3-4 lines long, 2-flowered or with only 1 imperfect one: first empty glume narrowly ovate, acute, slightly carinate, thin, hispid on the keel, $1\frac{1}{2}$ -2 lines long; second one broadly lanceolate, acute, about 3 lines long: flowering glume ovate-lanceolate, cleft $\frac{1}{3}$ way from the apex, minutely scabrous, 3 lines long: awn attached at the base of the cleft, hispid, twisted and bent. Common in wooded districts, California to Alaska.

T. cernuum Trin. Mem. Acad. St. Petersburg. 1830, i, 61. Stems slender, erect, smooth, 2-3 feet high: sheaths loose, open above, smooth or scabrous above, shorter than the internodes: ligules ovate, lacerate: 1-6 lines long: leaves flat, scabrous on both sides or nearly smooth beneath, 5-10 inches long, 3-6 lines wide: panicle rather loose, nodding, 5-8 inches long, its branches slender, ascending: spikelets 2-4-flowered, 3-4 lines long: first empty glume narrowly ovate, carinate 1- $\frac{1}{2}$ lines long; second one broadly oblong, obtuse or acuminate, thin, hispid on the keel above, 3-nerved below, 2-2 $\frac{1}{2}$ lines long: awn arising below the base, of the cleft, 3-5 lines long. Along streams in the mountains, California to Alaska.

T. subspicatum Beauv. Agrost. 180. Softly pubescent to glabrous:

DESCHAMPSIA

stems simple, erect, 6-20 inches high: sheaths usually shorter than the internodes: ligules $\frac{1}{2}$ -1 line long: leaves 1-4 inches long, 1-2 lines wide: panicle spike-like, 1-5 inches long, often interrupted below, its branches $1\frac{1}{2}$ inches long or less, erect: spikelets 2-3-flowered, the empty glumes hispid on the keel, shining, the second about $2\frac{1}{2}$ lines long: flowering glumes 2- $2\frac{1}{2}$ lines long, acuminate, scabrous: awn inserted below the sinus, bent and twisted below. In rocky places in the high mountains, California to Alaska and across the continent.

Var. molle Gray Man. 641. Stems and leaves minutely soft-downy
Range of the type.

29 AIRA L. Sp. 63.

Mostly annual grasses with narrow leaves and contracted or open panicles. Spikelets small, two-flowered, both flowers perfect. glumes 4, the two lower empty, thin-membranous, acute, subequal, persistent: the flowering glumes usually contiguous, hyaline, mucronate or 2-toothed, deciduous, bearing a delicate dorsal awn inserted below the middle. Palet a little shorter than the glume, hyaline, 2-nerved. Stamens 3, with plumose stigmas. Grain enclosed in the glume and palet and often adherent to them.

A. CARYOPHYLLEA L. Sp. 66. Smooth and glabrous throughout: stems 6-10 inches high, erect, from an annual root: sheaths mostly basal: ligules $1\frac{1}{2}$ lines long: leaves 6-25 lines long, involute-setaceous: panicle 1-4 inches long, open, the branches spreading or ascending: spikelets 1- $1\frac{1}{4}$ lines long, the empty glumes acute: flowering glumes very acute, 2-toothed 1 line long: awn 1-2 lines long. Common in dry open places: naturalized from Europe.

A. PRÆCOX L. Sp. 65. Smooth throughout: stems 1-4 inches high, erect, from an annual root, simple, rigid: sheaths shorter than the internodes: ligules about $1\frac{1}{2}$ lines long: leaves 1 inch long or less, involute-setaceous: panicle contracted, strict, 6-12 lines long, its base often enclosed in the upper sheath: spikelets about $1\frac{1}{2}$ lines long, the empty glumes acute: flowering glumes acuminate, 2-toothed at the apex, about $1\frac{1}{2}$ lines long: awn straight, 1-2 lines long. In dry places: naturalized from Eu.

30 DESCHAMPSIA Beauv. Agrost. 91. (1812.)

Perennial grasses with flat or involute leaves and numerous flowers in contracted or open panicles. Spikelets 2-flowered, both perfect; the hairy rachella extended beyond the flowers or rarely terminated by a staminate one. Glumes 4, rarely more, the 2 lower empty, keeled, acute, membranous shining, persistent; the flowering glumes of about the same texture, deciduous, 2-toothed at the apex and bearing a dorsal awn. Palet narrow, 2-nerved. Stamens 3. Styles distinct. Stigmas plumose. Grain free, enclosed in the glume.

D. cæspitosa Beauv. Agrost. 160, t. 18, fig. 3. Densely cespitose with very numerous basal leaves: Stems erect, slender 2-4 feet high; simple, glabrous: sheaths much shorter than the internodes: ligules 1-3 lines long: leaves flat 1- $1\frac{1}{2}$ lines wide, smooth beneath, strongly scabrous above, the basal ones $\frac{1}{4}$ - $\frac{1}{2}$ as long as the stem, those of the stem 2-6 inches long: panicle open 3-6 inches long, the branches widely spreading or ascending often somewhat flexuous the lower 2-5 inches long: spikelets $1\frac{3}{4}$ -2 lines long: empty glumes unequal, lanceolate, acute; flowering glume oblong,

about $1\frac{1}{4}$ lines long, erose-truncate at the apex; awn straight, inserted above the middle, 1-2 lines long. Common in moist meadows, California to Alaska and across the continent.

D. atropurpurea Scheele Flora xxvii, 56. Stems 6-18 inches high, erect, simple, rigid: sheaths shorter than the internodes: ligules truncate, 1 line long or less: leaves 2-5 inches long, 1-2 lines wide, flat: panicle 1-2 inches long, narrow, usually purple or purplish, its branches erect, or sometimes ascending, the lower 6-18 lines long: empty glumes broadly lanceolate, acute, $2\frac{1}{2}$ lines long: flowering glumes oblong, erose-truncate at the apex, about $1\frac{1}{4}$ lines long: awn bent and much exceeding the glume, Alpine summits of the high mountains, Oregon to Alaska and across the continent.

D. elongata Munro in Benth. Pl. Hartw. 242, t. 228. Densely cespitose perennial: stems very slender, 1-2 feet high, simple, erect,: leaves very numerous, mostly basal, 1-18 inches long, flat and smooth, less than 1 line wide: ligules elongated: panicle very long and narrow, 4-12 inches long, its very unequal scabrous capillary branches mostly appressed: empty glumes about 2 lines long, linear-subulate, nearly equal, green and scabrous on the keel: flowering glumes about 1 line long, smooth and shining, with a silky tuft at base, irregularly 5-toothed above, with a very slender awn 2 lines long from near the base, Common in open woods, California to Washington, west of the Cascade Mountains.

D. calycina Presl Rel. Hænk. i, 251. Loosely tufted annual: stems slender, 2-24 inches high, sometimes geniculate and sparingly branched below: leaves very narrow those of the stem 1-2 inches long, with elongated ligules: panicle very loose, and open, 1-12 inches long, the lower branches in threes, the others in pairs or solitary, distant, mostly spreading: empty glume 3 lines long or more, linear-lanceolate, green and rough on the keel: flowering glumes about a line long, shining below its truncate 4-toothed apex, the hairs at base $\frac{1}{3}$ as long: awn inserted just below the middle, about 3 lines long, twisted below and bent near the middle common in places that are wet in spring. California to Washington.

31 ARRHENATHERUM Beauv. Agrost. 55, t. 11, fig. 5.

Tall perennial grasses with flat leaves and narrow or open panicles. Spikelets 2-flowered, the upper flower perfect, the lower staminate the rachella extended beyond the flowers. Glumes 4, the 2 lower empty, thin-membranous, keeled, very acute or awn-pointed, unequal, persistent: flowering glumes rigid 5-7-nerved deciduous, the first bearing a long bent and twisted dorsal awn inserted below the middle, the second unarmed. Palet hyaline, 2-keeled. Stamens 3. Styles short distinct. Stigmas plumose. Grain ovoid free.

A. ELATIUM Beauv. M. & K. Deutsch. Fl. i, 546. Glabrous perennial: stems 2-4 feet high, erect, simple: lower sheaths longer than the internodes: ligules 1 line long: leaves 2-12 inches long, 1-4 lines wide, scabrous: panicle 4-12 inches long, narrow, branches erect, the lower 1-2 inches long, empty glumes finely roughened, the second 4 lines long, nearly twice as long as the first one: flowering glumes about 4 lines long. In meadows and waste places; naturalized from Europe.

31 HOLCUS L. Sp. 1047.

Annual or perennial grasses with flat leaves and open or spike-like panicles. Spikelets diœcious, 2-flowered, the lower flower

perfect, the upper staminate. Glumes 4, the two lower empty, membranous, keeled, the first 1-nerved, the second 3-nerved and often short-awned. Flowering glumes chartaceous, that of the upper flower bearing a short awn. Palet narrow, 2-keeled. Stamens 3. Styles distinct, with plumose stigmas. Grain oblong, free, enclosed in the glume.

H. LANATUS L. Sp. 1048. Light green, densely and softly pubescent stems $1\frac{1}{2}$ - $2\frac{1}{2}$ feet high, erect, often decumbent at base, simple: sheaths shorter than the internodes: ligules $\frac{1}{2}$ -1 line long: leaves 1-6 inches long, 2-6 lines wide: spikelets 2 lines long: empty glumes about 2 lines long, white villous, the upper awn-pointed: flowering glumes 1 line long, smooth, glabrous and shining, the lower sparsely ciliate on the keel, somewhat obtuse, the upper 2-toothed and bearing a hooked awn just below the apex. Common in meadows and waste places: introduced from Europe.

Tribe 4 Festucaceæ. Spikelets two- to several-flowered, usually hermaphrodite, pedicellate, in panicles or racemes, the former sometimes dense and spike-like. Flowering glumes usually longer than the empty ones, awnless or with one to several mostly straight awns which are either terminal or borne just below the apex.

33 MUNROA Torr. Pac. R. Rep. iv, 158. (1856.)

Low diffusely branched grasses with flat pungently pointed leaves and few flowers in panicles. Spikelets in clusters of 3-6. nearly sessile in the axils of the floral leaves, 3-5-flowered, the flowers all perfect. Glumes 5-7, the two lower empty, lanceolate, acute, 1-nerved, hyaline. Flowering glume larger, 3-nerved, one or two empty ones above the flowering ones. Palets hyaline. Stamens 3. Styles distinct, elongated: stigmas barbellate or short-plumose. Grain free, enclosed in the glume and palet.

M. squarrosa Torr. l. c. Stems 2-8 inches long, tufted, erect, decumbent or prostrate, much branched: sheaths short, crowded at the nodes and at the ends of the branches, smooth, pilose at the base and throat, sometimes ciliate on the margins: ligules a ring of hairs: leaves 1 inch long or less, 1-6 lines wide, rigid, scabrous: spikelets 2-5-flowered, the flowers perfect: empty glumes 1-nerved: flowering glumes 2- $2\frac{1}{2}$ lines long, longer than the empty ones, 3-nerved, the nerves excurrent and forming 3 teeth or awns, with tufts of hairs about the middle: palets obtuse. On dry plains, eastern Oregon to Alberta and Texas.

34 PHRAGMITES Trin. Fund. Agrost. 134.

Tall perennial grasses with broad flat leaves and very numerous flowers in ample panicles. Spikelets 3- to several-flowered, the first flower often staminate, the others perfect. Rachella articulated between the flowering glumes, long-pilose. Two lower glumes empty, unequal, membranous, lanceolate, acute, shorter than the spikelet, the third glume empty or subtending a staminate flower. Flowering glumes glabrous, narrow, long-acuminate, much exceeding the short palets. Stamens 3. Styles distinct, short. Stigmas plumose. Grain free, loosely enclosed in the palet and glume.

P. communis Trin. l. c. Stems stout, 3-15 feet high, erect, from long

horizontal perennial rootstocks, glabrous: sheaths shorter than the internodes, loose: ligules a ring of very short hairs: leaves 6-18 inches long, 4-9 lines wide: spikelets crowded on the ascending branches: first glume 1-nerved, $\frac{1}{2}$ - $\frac{2}{3}$ as long as the second one: flowering glumes 5-6 lines long, 3-nerved, long-acuminate, equalling the hairs of the rachella. In bogs and wet places nearly throughout North America: also in Europe and Asia.

35 DACTYLIS L. Sp. 71.

Tall perennial grasses with broad flat leaves and numerous spikelets crowded in paniculate short capitate clusters. Spikelets 3-5-flowered, all perfect or the upper staminate, the two lower glumes empty, thin-membranaceous, keeled, unequal, mucronate. Flowering glumes longer than the empty ones, rigid, 5-nerved, keeled, the midnerve extended into a point or short awn. Palets shorter than the glumes, 2-keeled. Stamens 3. Styles distinct. Stigmas plumose. Grain free, enclosed in the glume and palet.

D. GLOMERATA L. Sp. 71. Stems simple, erect, 2-4 feet high: sheaths shorter than the internodes: smooth or rough: ligules 1-2 lines long: leaves 3-9 inches long, 1-3 lines wide, flat, scabrous: panicle 3-8 inches long, its branches spreading or ascending in flower, erect in fruit, the lower 1-3 inches long, spikelet bearing from about the middle: spikelets in dense capitate clusters, 3-5-flowered: empty glumes 1-3-nerved, the first shorter than the second: flowering glumes 2-3 lines long, rough, pointed or short-awned, ciliate on the keel. In fields and waste places, naturalized from Europe.

36 KCELERIA Pers. Syn. i, 97.

Tufted perennial or annual grasses with flat or setaceous leaves and numerous spikelets in spike-like panicles. Spikelets 2-5-flowered. Glumes 4-7, the two lower empty, narrow, acute, unequal, keeled, scariosus on the margins. Flowering glumes 3-5-nerved. Palets hyaline, acute, 2-keeled. Stamens 3. Styles very short, with plumose stigmas. Grain free, enclosed in the glume.

K. cristata Pers. l. c. Stems erect, simple, rigid, often pubescent just below the panicle: sheaths often shorter than the internodes, smooth or scabrose, sometimes hirsute: ligules $\frac{1}{2}$ line long: leaves 1-12 inches long, $\frac{1}{2}$ - $1\frac{1}{2}$ lines wide, erect, flat or involute, smooth or rough, often more or less hirsute: panicle 1-7 inches long, pale green, usually spike-like, the branches erect or rarely ascending, 1 inch long or less: empty glumes unequal, the first one about 2 lines long, scariosus except the green keel; second one longer, scabrous on the keel; flowering glumes scariosus, $1\frac{1}{2}$ -2 lines long. On sandy bars along rivers. California to Brit. Columbia and Pennsylvania.

37 EATONIA Raf. Journ. Phys. lxxxix 104.

Tufted perennial grasses with flat leaves and usually contract-panicles. Spikelets 2-3-flowered, the rachella extended beyond the flowers. Two lower glumes empty, shorter than the spikelet, the first linear acute, 1-nerved, the second much broader, 3-nerved, obtuse or rounded at the apex or sometimes acute, the margins scariosus: flowering glumes narrow, usually obtuse. Palets narrow, 2-nerved. Stamens 3. Styles distinct, short. Stigmas plumose. Grain free loosely enclosed in the glume and palet.

E. obtusata Gray Man. ed. 2, 558. Stems often stout, 1-2½ feet high, erect, simple, smooth: sheaths shorter than the internodes, usually more or less rough, sometimes pubescent: ligules ½-1 line long: leaves 1-9 inches long, 1-4 lines wide, scabrous: panicle 2-6 inches long, dense and usually spike-like, strict, the branches 1½ inches long or less, erect: spikelets crowded, 1¼-1½ lines long: empty glumes unequal, often purplish, the first narrow, shorter than and about ¼ as wide as the obtuse or almost truncate second one: flowering glumes narrow, obtuse, ¾-1 line long. California to Washington and the Eastern States.

E. Pennsylvanica Gray l. c. Stems slender, erect, smooth, 1-3 feet high: sheaths shorter than the internodes: ligules ⅔ line long: leaves 2-7 inches long, 1-3 lines wide, rough: panicle 3-7 inches long, contracted, often nodding, lax, its branches 1-3 inches long: spikelets 1½-1¾ line long, usually numerous, somewhat crowded, and appressed to the branches: empty glumes unequal, the first narrow, shorter than and about ¼ as wide as the obtuse or abruptly acute second one which is smooth or somewhat rough on the keel: flowering glumes narrow, acute, 1¼ lines long. In moist soil, eastern Washington to the Eastern States.

38 MELICA L. Sp. 66.

Tall perennial grasses with flat leaves and contracted or open panicles. Spikelets 1- to several-flowered, often secund, rachella extended beyond the flowers and usually bearing 2-3 empty club-shaped hooded scales, convolute around each other. Two lower glumes empty, membranous, 3-5-nerved; flowering glumes larger, rounded on the back, 7-13 nerved, sometimes bearing an awn, the margins more or less scarious. Palets broad, shorter than the glume, 2-keeled. Stamens 3. Style distinct. Stigmas plumose. Grain free enclosed in the glume and palet.†

§ 1 EUMELICA. Empty glumes nearly or quite equalling the flowers. Flowering glumes scarious margined, obtuse and entire at the apex. Sterile flowers clavate, hooded, or like the others, but smaller.

M. interrupta Trin. Mem. Acad. St. Petersb. 1840, 59. Stems tufted, slender, 1-3 feet high, from strong fibrous roots: leaves narrow, long-acuminate, from smooth to very scabrous and pilose-pubescent: panicle 8-12 inches long, its branches in remote fascicles, very unequal, the lower 1-3 inches long: spikelets 5 lines long, minutely scabrous, 1-flowered, with an imperfect floret: first empty glumes 3-nerved, second larger and indistinctly 5-nerved: flowering glume acutish, strongly 7-nerved, usually purplish above except the scabrous margins: palet about as long as the glume, 2-toothed: sterile flowers short-pedicelled, ⅔ as long as the perfect ones, sometimes enclosing a second one. Oregon to California.

M. stricta Bolander Proc. Cal. Acad. iii, 4. Densely tufted, 1-2 feet high, pale green: stems erect, or geniculate below, branched at base, softly pubescent to scabrous: sheaths retrorsely velvety-pubescent, longer than the internodes: ligules about 2 lines long: leaves 3-4 inches long, 1-2 lines wide, flat, or involute toward the rather rigid points, velvety-pubescent on both sides: panicle secund, of 6-12 nodding spikelets, the scabrous branches mostly single, erect, making the panicle appear single: spikelets 5-7 lines long, with 2-3 perfect flowers and rather large rudiments: empty glumes lance-oblong, narrowed below, obtuse or barely acute, thin smooth, 5-nerved, 4-6 lines long, the first slightly shorter; flowering glumes lanceolate, acute, minutely hispid, 7-nerved, 4½-5½ lines long: palet obovate-oblong, obtuse, minutely hispid, pubescent on the arched keels. In the high

mountains of eastern Oregon to California and Nevada.

M. bulbosa Geyer, Hook. Journ. Bot. viii, 19. Stems 1-3 feet high, enlarged and bulb-like at base: sheaths longer than the internodes, nearly smooth to scabrous: leaves 2-3 inches long setaceously convolute, nearly smooth to scabrous: ligules nearly 2 lines long, often coarsely lacerate: panicle strict, 4-8 inches long, interrupted below, the branches mostly in pairs, very unequal, erect: spikelets with 2-3 perfect flowers, about 4 lines long: empty glumes membranaceous, broad, obtuse, the lower 3-5-nerved, the upper 5-7-nerved: flowering glumes 3-4 lines long, scarious-margined, minutely scabrous, 7-nerved, the unequal nerves all ceasing below the broad hyaline obtuse apex: palet ciliate on the keels: sterile floret often double, the uppermost minute and hooded. About the base of cliffs, eastern Oregon to California.

M. fugax Bolander Proc. Cal. Acad. iv, 104. Stems slender, 6-12 inches high, enlarged and bulb-like at base: sheaths longer than the internodes, nearly smooth to scabrous: ligules about 1 line long, truncate at the apex: leaves flat or somewhat involute, 1-6 inches long, 1-2 lines wide, the lower obtuse or barely acute, the upper acuminate and often setaceously pointed: panicle 2-4 inches long, its branches mostly in pairs, erect or somewhat spreading, very unequal, the longest 1-2 inches long: spikelets 3-4 lines long, usually purplish, of 3-5 perfect flowers: empty glumes 3-5-nerved, obtuse, with broad scarious margins; the first about $1\frac{1}{2}$ lines long, the second broader and about 2 lines long; flowering glumes strongly 7-nerved, only the midnerve reaching the narrow scarious apex: palets slightly shorter than the glume, minutely ciliate: sterile flowers similar to the glumes. About the base of cliffs, eastern Washington to California.

§ 2 **BROMELICA** Thurber Bot. Cal. ii, 304. Spikelets of 3-8 perfect flowers, the lower exceeding the empty glumes. Flowering glumes prominently 7-nerved, apiculate or distinctly awned by the excurrent midnerve at the notched or bifid or narrowly truncate or long-attenuate tip.

M. bromoides Gray Proc. Am. Acad. viii, 409. Stems slender, 3-4 feet high, enlarged and bulb-like at base: lower sheaths longer than the internodes, the upper shorter, smooth: leaves flat, 6-12 inches long, setaceously acuminate: ligules about 1 line long or less, the upper ones often lacerate: panicle very loose, 6-8 inches long, very long-exserted, its capillary branches few and spreading, 2-3 inches long, bearing only one or two spikelets 6-8 lines long: first empty glume about 1 line long, acute, the second broader, nearly 2 lines long, obtuse or barely acute, with broad scarious margins: flowering glumes about 4 lines long, narrowly margined, lanceolate, acute: palet about 3 lines long, ciliate on the nerves. On open ridges southern Oregon to California.

Var. Howelli Scribn. Proc. Phila. Acad. 47. Panicle more open and fewer-flowered: flowering glumes longer and entire or but slightly notched at the apex. On dry ridges southwestern Oregon.

M. Harfordii Bolander Proc. Cal. Acad. iv, 102. Stems erect, branched below, slender rather wiry, 1-3 feet high, not bulbous at base: sheaths slightly scabrous, about equalling the internodes: ligules 1-2 lines long, leaves flat or involute, scabrous above, slender-pointed, 6-10 inches long, 1-3 lines wide: panicle strict, 6-12 inches long, its scabrous branches erect: or appressed, unequal, 2 inches long or less bearing 1-3 erect spikelets: empty glumes oblanceolate, obtuse or barely acute, the first 5-nerved, 3-4 lines long, the second $\frac{1}{2}$ line longer and 5-7-nerved; flowering glumes lanceolate, barely acute or emarginate or sometimes short-awned, scarious-margined above, minutely appressed-silky throughout, pilose on the margin-

al nerves below the middle, 7-9-nerved, 4-5 lines long: palet oblong, obtuse or emarginate, pubescent on the 2 arched keels, 3-4 lines long. On open ridges in the mountains, Oregon to California.

Var. minor Vasey, Beal Grasses N. Am. ii, 510. Stems slender, 10-15 inches high erect: panicles very simple, $1\frac{1}{2}$ -4 inches long: spikelets usually 3-flowered. On dry ridges in the Siskiyou Mountains.

M. aristata Thurber, Bolander Proc. Cal. Acad. iv, 103. Stems slender, tufted, 2-4 feet high: leaves flat, 2-4 inches long, 3 lines wide: panicle narrow, 5-12 inches long, its branches erect: spikelets 3-5-flowered, pale or purplish: first empty glume oblong, about 3 lines long; the second about a line longer: flowering glumes about 5 lines long, with a few stiff marginal hairs near the base, very scabrous, the central nerve excurrent just below the bifid tip as an awn 3-5 lines long: palet about $3\frac{1}{2}$ lines long, strongly ciliate at the apex. In mountains, Washington to California.

M. acuminata Bolander l. c. 104. Stems slender, erect, 2-3 feet high, with thickened bulbous base: sheaths mostly equalling or shorter than the internodes, more or less pubescent: ligules 1-2 lines long, laciniate: panicle 4-12 inches long, narrow, the capillary branches erect or barely spreading: spikelets 3-5-flowered, often purplish: first empty glume linear, about 2 lines long, much smaller than the acuminate second one: flowering glumes lanceolate, long-acuminate about 5 lines long, 5-7-nerved: ciliate on the margins below: palet about half as long as the glume, densely ciliate above, narrowly truncate. In open woods, California to Alaska.

M. spectabilis Scribn. Proc. Philad. Acad. 1885, 45. A slender tufted stoloniferous perennial: stems about $2\frac{1}{2}$ feet high, with a corm at the base of each: sheaths mostly longer than the internodes: ligules white, about 1 line long: leaves 3-4, flat or involute, scabrous, 7-10 inches long, 1-2 lines wide: panicle simple, 5-8 inches long, its slender branches solitary or in pairs, sometimes in threes, the longest $1\frac{1}{2}$ -2 inches long: spikelets 3-8-flowered: empty glumes ovate, obtuse or acute, with transverse nerves near the middle, the first 3-nerved, the second 5-nerved, $2\frac{1}{2}$ -3 lines long: flowering glumes $3\frac{1}{2}$ -4 lines long, abruptly tapering, oval, the apex with 2 very short teeth or a notch, 7-9-nerved: palet elliptical, $2\frac{1}{2}$ lines long. Oregon to Montana and California.

M. scabrata Scribn. Piper & Beattie Fl. Palouse Reg. 25. Stems mostly solitary, erect, 2-4 feet high, with bulbous base: sheaths nearly as long or longer than the internodes, scabrous: leaves flat, linear, 5-7 inches long, 1-2 lines wide, scabrous on both sides: panicle erect, narrow, 3-7 inches long, lower branches mostly in threes, the 2 outer short and bearing a single spikelet, the central one longer and bearing 2-5 spikelets 5-7-flowered, usually purple; lower empty glumes $2\frac{1}{2}$ lines long, the upper $3\frac{1}{2}$ -4 lines long, acutish: flowering glumes about $3\frac{1}{2}$ lines long all minutely scabrous. In low meadows about Pullman Washington.

39 DISTICHLIS Raf. Journ. Phys. lxxxix, 104.

Diocious grasses with rigid stems, creeping or decumbent at base, flat or convolute leaves, and numerous spikelets in spike-like panicles. Spikelets flattened, more numerous on the staminate plants than on the pistillate, 6-16-flowered. Rachella continuous in the staminate spikelets, articulated in the pistillate. Two lower glumes empty, narrow, keeled, acute, shorter than the flowering ones. Flowering glumes broader, many-nerved, acute, rigid. Palets 2-keeled. Stamens 3. Styles thickened at the base, rather long, distinct. Stigmas long-plumose. Grain free enclosed in the glume and palet.

D. maritima Raf. l. c. Glabrous throughout: stems 3 inches to 2 feet high, erect, from horizontal rootstock, often decumbent at base: sheaths shorter than the internodes, often crowded: ligules a ring of very short hairs: leaves $\frac{1}{2}$ -9 inches long, 1-2 lines wide, flat or involute: panicle dense and spike-like 1-3 inches long, the branches 1 inch long or less, erect: spikelets 6-16-flowered, 4-9 lines long, pale green or purplish: empty glumes acute, the first 1-3-nerved, $\frac{2}{3}$ as long as the 3-2-nerved, second one: flowering glume $1\frac{1}{2}$ - $2\frac{1}{2}$ lines long, acute or acuminate. In salt marshes along the coast Brit. Columbia to California and in the interior, also on the Atlantic coast.

40 CATABROSA Beauv. Agrost. 97, t. 19, fig. 8.

Perennial grasses with soft flat leaves and open panicles. Spikelets usually 2-flowered. Two lower glumes empty, thin-membranaceous, much shorter than the flowering ones, unequal, rounded or obtuse at the apex. Flowering glumes membranous, erose-truncate. Palea barely shorter than the glume. Stamens 3. Styles distinct, with plumose stigmas.

C. aquatica Beauv. Agrost. 157. Smooth and glabrous: stems erect, from a creeping base, $\frac{1}{3}$ -2 feet high, bright green, flaccid: sheaths usually longer than the internodes, loose: ligule $1\frac{1}{2}$ -5 inches long, 1-3 lines wide, flat, obtuse: panicle 1-8 inches long, open, the branches whorled, spreading or ascending, very slender $\frac{1}{2}$ -2 inches long, spikelets $1\frac{1}{4}$ - $1\frac{3}{4}$ lines long, the empty glumes rounded or obtuse, the first about half as long, as the second which is crenulate on the margins: flowering glumes 1- $1\frac{1}{4}$ lines long, 3-nerved, erose-truncate at the apex. In water or wet places, Washington to Alaska and Labrador to Nebraska: also Europe and Asia.

41 GRAPHEPHORUM Desv. Bull. Soc. Philom. ii, 189.

Erect grasses with flat leaves and usually contracted nodding panicles. Spikelets 2-4-flowered, flattened, the rachella prolonged beyond the flower. Glumes 4-6, the 2 lower ones empty, somewhat shorter than the flowering ones, thin-membranaceous, acute, keeled. Flowering glumes membranous, obscurely nerved, entire, sometimes short-awned just below the apex. Stamens 3. Styles distinct, with plumose stigmas. Grain glabrous.

G. Wolfii Vasey Des. Cat. Gr. U. S. 66. Stems slender, 15-30 inches high, from a perennial root: sheaths about as long as the internodes: ligules about a line long: leaves flat, scabrous, 6-10 inches long, 2-3 lines wide: panicle erect, subsperate, 3-9 inches long: spikelets 2-4-flowered, purplish: rachella villous: empty glumes elliptical, nearly equal, about 3 lines long the first 1-nerved, the second 3-nerved: flowering glumes 2- $2\frac{1}{2}$ lines long, less than 1 line wide, obscurely 5-nerved, obtuse, lacerate, sometimes split or 2-toothed, bearing an awn $\frac{1}{2}$ line long: palea shorter than or nearly equalling the glumes. Dry rocky slopes, eastern Oregon to Montana and California.

42 PANICULARIA Fabr. Enum. Hort. Helmst. 373. (1763.)

GLYCERIA R. Br. (1810.)

Mostly perennial grasses with flat leaves and numerous spikelets in more or less open panicles. Spikelets 2-20-flowered, terete or sometimes flattened. Two lower glumes empty, obtuse or acute, 1-3-nerved: flowering glumes membranous, rounded on the back, 5-9-nerved, the nerves disappearing in the hyaline apex.

Palets scarcely shorter than the glumes, rarely longer, 2-keeled. Stamens 2 or 3. Styles distinct, with plumose stigmas. Grain smooth, enclosed in the glume and partly free, or when dry slightly adhering to the palet.

P. fluitans Kuntze Rev. Gen. Pl. 782. *G. fluitans* R. Br. Stems 2-5 feet high, erect: stout, simple smooth, often rooting from the lower nodes: sheaths loose, generally longer than the internodes smooth or rough: ligules 2-3 lines long: leaves 5-12 inches long, 2-6 lines wide scabrous: often floating: panicle 9-18 inches long; the lower branches at first appressed, later ascending 3-6 inches long: spikelets linear, 7-13-flowered, 4-12 lines long: empty glumes unequal, 1-nerved, the lower acute or obtuse, the upper obtuse or truncate. In water and bogs, California to Alaska and across the continent.

P. borealis Nash Bull. Torr. Bot. club xxiv, 348. Stems weak, erect, glabrous, $1\frac{1}{2}$ -3 feet high: sheaths loose, longer than the internodes: leaves 4-10 inches long, pale green, nearly smooth: panicle lax, 7-15 inches long, the branches single or in pairs usually short and erect: spikelets linear, 5-7 lines long: flowering glumes very thin, $1\frac{1}{2}$ -2 lines long, 7-nerved, the nerves minutely hispid. In shallow ponds, eastern Washington to California and the Eastern States.

P. nervata Kuntze l. c. *G. nervata* Trin. Stems slender, erect, 1-3 feet high, simple, smooth: sheaths shorter than the internodes, usually more or less rough: ligules $\frac{1}{2}$ line long, truncate: leaves 6-12 inches long, 2-5 lines wide, acute, smooth beneath, rough above: panicle 3-8 inches long, open, the filiform branches spreading, ascending or often drooping, rarely erect, the lower ones 2-5 inches long: spikelets 3-7-flowered, $1-1\frac{1}{2}$ lines long: empty glumes obtuse, 1-nerved; flowering glumes about $\frac{3}{4}$ line long, obtuse or rounded at the apex, with 7 sharp distinct nerves and evident furrows between them. Common in wet places and along streams, California to Alaska and across the continent.

P. pallida Kuntze l. c. 783. Pale green, stems 1-3 feet long, assurgent, simple, smooth: sheaths loose, shorter than the internodes, ligules 2-3 lines long, acute: leaves 2-6 inches long, 1-2 lines wide, smooth beneath, rough above: panicle 2-7 inches long, the branches erect or ascending, often flexuous, 1-2 inches long: spikelets 4-8-flowered, $2\frac{1}{2}$ - $3\frac{1}{2}$ lines long: empty glumes unequal, the first 1-nerved, obtuse, shorter than the 3-nerved and truncate second one: flowering glumes $1\frac{1}{4}$ - $1\frac{1}{2}$ lines long, truncate and denticulate at the apex, sharply and distinctly 7-nerved, with plain furrows between the nerves. In shallow water, Washington to Indiana and New Brunswick.

P. pauciflora Kuntze l. c. *G. pauciflora* Presl. Stems stout, 2-4 feet long: sheaths nearly smooth, loose, usually longer than the internodes ligules rounded or more often lacerate 2-3 lines long: leaves 6-15 inches long: 3-9 lines wide: panicle 5-8 inches long, somewhat contracted and flexuous or at length loose and open, usually purplish, its branches hispid, 4 inches long or less: spikelets 5-7-flowered, 2-3 lines long: empty glumes less than half as long as the flowering ones, the first ovate, denticulate, near the subacute apex, smooth, 1-nerved $\frac{1}{2}$ line long; the second arose at the rounded apex, 3-nerved, nearly 1 line long: flowering glumes broadly oblong, arose at the rounded scarious apex, hispidulous on the keel, prominently 5-nerved, $1-1\frac{1}{4}$ lines long: palet oblong, emarginate, slightly pubescent on the 2 keels, nearly equalling the glume. In shallow water or wet places, California to Alaska and Colorado.

P. Americana MacM. Met. Minn. 81. Stems stout, erect, simple, smooth, 3-5 feet high: sheaths loose, smooth or somewhat rough: ligules 1-2 lines long, truncate: leaves 7-12 inches long, 3-8 lines wide, usually smooth beneath, rough above: panicle 8-16 inches long, its branches spreading, ascend-

ing or rarely erect, 4-8 inches long, spikelets 4-7-flowered, 2-3 lines long: empty glumes acute, 1-nerved: flowering glumes about 1 line long, obtuse or rounded at the apex, sharply and distinctly 7-nerved, the furrows between the nerves evident. In wet soil, Alaska to California and Neb.

43 PUCINELLIA Parl. Fl. Ital. i, 366.

Perennial grasses with flat or involute leaves and contracted or open panicles. Spikelets 2-10-flowered. Two lower glumes empty: obtuse or acute, unequal: flowering glumes obtuse, or acute, rounded on the back, 5-nerved, the nerves very obscure or almost wanting. Palets about equalling the glumes. Stamens 3. Stigmas sessile, simply plumose. Grain compressed, usually adhering to the palet.

P. maritima Parl. l. c. 370. Stems stoloniferous, 6-24 inches high, erect, or decumbent at base, smooth, simple: sheaths usually exceeding the internodes: ligules $\frac{1}{2}$ -1 line long: leaves 1-5 inches long, 1 line wide or less, flat to involute: panicle 2-6 inches long, open, its branches ascending or rarely erect, 1-2 inches long: spikelets 3-10-flowered, 3-7 lines long: empty glumes unequal, the first usually 1-nerved, the second 3-nerved: flowering glumes $1\frac{1}{2}$ -2 lines long, obtuse or truncate. In salt marshes along the coast.

P. angustata Nash Bull. Torr. Bot. Club xxix, 513. *Poa angustata* R. Br. Stems erect, 4-12 inches high, simple: sheaths usually longer than the internodes: ligules 1 line long: leaves $\frac{1}{2}$ -3 inches long, 1 line wide or less: panicle 1-2 inches long, contracted, its branches short and erect or appressed: spikelets 2-7-flowered, 3-4 lines long: empty glumes obtuse or rounded at the apex, the first 1-nerved, the second 3-nerved: flowering glume $1\frac{1}{4}$ - $1\frac{1}{2}$ lines long, usually purplish, rounded at the apex. In salt marshes along the coast, Oregon to Alaska, and Labrador to Maine: also Europe and Asia.

P. distans Parl. l. c. 367. *Glyceria distans* Wahl. Stems 1-2 feet high, erect or sometimes decumbent at base, tufted: sheaths often shorter than the internodes, glabrous: ligules $\frac{1}{2}$ -1 line long: leaves 1-6 inches long, 1-2 lines wide, flat or folded, usually stiff and erect, smooth beneath: panicle 2-7 inches long, open, rarely contracted, its branches spreading or ascending, whorled, the lower 1-4 inches long, sometimes reflexed: spikelets crowded, 3-6 flowered, $1\frac{1}{2}$ - $2\frac{1}{2}$ lines long: empty glumes obtuse or acute, 1-nerved; the second exceeding the first: flowering glumes $\frac{1}{2}$ -1 line long, obtuse, obscurely nerved. Along the coast of Washington, and on the Atlantic coast from Nova Scotia to New Jersey: also in Europe.

P. Lemmoni Scribn. Am. Grasses ii, 276. *Glyceria Lemmoni* Vasey. Densely cespitose, with numerous involute-setaceous radical leaves, pale green and glaucous: stems slender, 4-16 inches high, smooth, simple: sheaths shorter than the internodes, smooth: ligules nearly 1 line long, acute: leaves setaceous, 2-4 inches long, smooth: panicle long-exserted, often purplish, 1-4 inches long, open, its unequal scabrous branches spreading or ascending, the lower 1-2 inches long: spikelets narrow, 7-flowered, 2-3 lines long; first glume less than a line long; the second about twice as long: flowering glumes about a line long, abruptly pointed. In alkaline meadows: eastern Oregon to California and Brit. Columbia.

44 PLEUROPOGON R. Br. App. Parry Voy. 286.

Perennial grasses with flat leaves and rather few spikelets in

simple racemes. Spikelets 5-20-flowered, all perfect or the upper staminate. Two lower glumes empty, unequal, thin-membranous, 1-nerved, or the second imperfectly 3-nerved: flowering glumes longer, membranous, 7-nerved, the middle nerve excurrent as a short point or awn. Palets nearly equalling the glumes, 2-keeled, the keels winged or appendaged. Stamens 3. Styles short, with plumose stigmas. Grain free, enclosed in the glume and palet.

P. Californicum Benth. Vasey Grasses Pac. Slope, ii, 68. Stems erect, or somewhat decumbent at base, rather weak, 2-4 feet high: sheaths smooth, equalling or exceeding the internodes, the lower ones short and membranous: ligules 2-3 lines long: leaves flat or folded, 3-21 inches long, 1-3 lines wide, obtuse, smooth, or barely rough above: panicle a simple leucand raceme, 6-12 inches long: spikelets linear-oblong, 10-20-flowered, about 1 line long: empty glumes oblong, obliquely obtuse, smooth, 1-nerved below, the first 1-1½ lines long, the second 1 line longer: flowering glumes lance-oblong, erose or dentate at the membranous obtuse apex, scabrous, strongly 7-nerved, 3-4 lines long: awn arising below the apex, 1-5 lines long: palets oblong, obtuse, nearly equalling the glumes. In low meadow sands, southern Oregon to California.

P. refractum Benth. Vasey l. c. 69. Tufted from a strong creeping rootstock: stems rather weak, 2-4 feet high, erect, smooth, simple: sheaths nearly smooth, equalling or slightly exceeding the long internodes: ligules 1-2 lines long, truncate: leaves flat or folded, scabrous above, 2-10 inches long, 2-4 lines wide: panicle a simple secund raceme of 6-10 spikelets pendent on recurved pedicels, 6-12 lines long: spikelets linear-oblong, 8-12-flowered, about 1 inch long: empty glumes lance-oblong, obtuse or emarginate, often denticulate, thin, smooth, 1-nerved, 2-3 lines long, the second slightly longer: flowering glumes lance-oblong, erose or dentate at the truncate membranous summit, nearly smooth, prominently 7-9-nerved, 3½-4 lines long: awn arising at the apex, 2-4 lines long: palet-linear, emarginate, shorter than the glumes. Along mountain streams, Oregon and Washington.

45 POA L. Sp. 67.

Annual or perennial grasses with flat or convolute leaves and numerous spikelets in open or contracted panicles. Spikelets 2-6-flowered, compressed, the rachella usually glabrous. Flowers all perfect or rarely diœcious or polygamous. Glumes membranous, keeled, the two lower empty, 1-3-nerved: the flowering glumes longer than the empty ones, generally with a tuft of cobwebby hairs at base, 5-nerved, the marginal nerves usually pubescent. Palets a little shorter than the glumes, 2-nerved or 2-keeled. Stamens 3. Styles short, distinct, with plumose stigmas. Grain free, or sometimes adherent to the palet.

§ 2 MELICOIDES Glumes obtuse or barely acute, the empty ones 1-5-nerved, the flowering ones without cobwebby hairs at base, not prominently keeled.

P. argentea Howell Vasey Bull. Torr. Bot. Club. xv, 11. Stems slender, loosely tufted, 6-8 inches high, erect or somewhat decumbent at base: sheaths loose and membranous, longer than the internodes: ligules acute, 1½-2 lines long: leaves of the sterile shoots numerous, curved,

conduplicate, $\frac{3}{4}$ -3 inches long, less than 1 line wide: panicle 1-1½ inches long, oblong, loosely-flowered, with a pale silvery hue: spikelets oblong-linear, 3-4 lines long, 3-5-flowered: empty glumes subequal, 2-2½ lines long, 3-, 4- or 5-nerved, obovate, with shining scarious margins: flowering glumes nearly 3 lines long, oval or ovate, denticulate, 5-7-nerved: palea lanceolate, about as long as the glumes. On the top of Ashland Butte in the Siskiyou Mountains, Oregon.

P. macrantha Vasey Bull. Torr. Bot. Club. xv, 11. Stems stout, smooth, 15-20 inches high, from stout perennial creeping rootstocks, dichotomous: sheaths loose, equalling or exceeding the internodes: ligules $\frac{1}{2}$ -1 line long: leaves folded or involute, the lower ones with sterile branches in their axils, 6-10 inches long, blunt or abruptly acute at the apex: panicle 2-5 inches long, sometimes interrupted below, its branches in twos or threes, erect, the longest 1½-2½ inches long: staminate spikelets 5-8 lines long, compressed, 4-7-flowered, yellowish: empty glumes oblong-lanceolate, the first, 4-5 lines long, 3-5-nerved, ciliate on the midnerve; second 4-6 lines long, 3-7-nerved: flowering glumes 4-5 lines long, oval or lanceolate, with soft hairs at base and minutely pubescent on the nerves, the apex notched, awnless, 3-10-nerved: palea but very little shorter than its glume, linear, ciliate on the keels; pistillate spikelets rather smaller and more compact. On sand-dunes along the coast of Oregon and Washington.

§ 2 EUPOA Glumes usually acute, more or less prominently carinate, with or without cobwebby hairs at the base of the flowering glumes.

P. ANNUA L. Sp. 68. A soft depressed or sometimes erect annual: stems weak, 2-12 inches long: sheaths shorter than the internodes: ligules 1-2 lines long: basal leaves $\frac{1}{2}$ - $\frac{2}{3}$ as long as the stem; those of the stems 3, flat or conduplicate, abruptly acute, the upper $\frac{1}{2}$ -2 inches long: panicle ovoid or pyramidal, subsecund, 1-3 inches long, its branches mostly in pairs, the longest 1-2 inches long, sometimes drooping: spikelets 2-3 lines long, 3-7-flowered, oval or ovate-lanceolate: empty glumes compressed; the first 1-3-nerved, the second 3-nerved, broadest at or above the middle, usually 1-2 lines long: flowering glumes ovate-oval, smooth, erose at the apex, 1-2 lines long, with soft hairs on the keel for half its length and on the lower part of the lateral nerves: palea about 2½ lines long, ciliate or pubescent on the keels. Common everywhere: naturalized from Europe.

P. subaristata Scribn. Macoun Cat. Can. Pl. 4, 227, name only. A slender densely tufted perennial 10-20 inches high: leaves of sterile shoots conduplicate, scabrous, 2½-5 inches long: sheaths of the stem 2, smooth, the upper one nearly half as long as the stem: ligules $\frac{1}{2}$ line long: upper leaf pungent, $\frac{1}{2}$ -2 inches long: panicle linear to oval, dense, somewhat interrupted, 1½-3 inches long: spikelets linear-lanceolate, 4-7-flowered, 3-5 lines long; empty glumes subequal, linear-lanceolate, 3 lines long, 1-nerved; flowering glumes linear-lanceolate, 3 lines long, scabrous on the nerves, not webbed: palea 2½ lines long, ciliate on the keels. Idaho to Wyoming.

P. Cusickii Vasey Cont. U. S. Nat. Herb. i, 271. A glabrous, tufted perennial 16-20 inches high: leaves of the stem 2: lower sheaths longer than the internodes: ligules 1-1½ lines long: leaves flat or involute, acute, 2-2½ inches long, less than 1 line wide: panicle more or less exserted, narrow, 3-5 inches long, the branches mostly in pairs, the longest 1½-2 inches long, bearing 4-8 spikelets on the outer half: spikelets 3-3½ lines long, 2-3-flowered: rachella hispidulous: empty glumes with broad chaffaceous-hyaline margins, first ovate-lanceolate, nearly 2 lines long, 1-nerved, rarely 3-nerved, second oval erosely acute, about 2 lines long, 3-nerved: towering glumes keeled 2-2½ lines long, scabrous, oval, subacute: palea 5 lines long, 2 toothed, ciliate on the keels. In the mountains of eastern

Oregon.

P. reflexa Vasey & Scribn. Cat. Grasses U. S. 83. A slender perennial 2-5 feet high: ligules 1 line or less long: leaves 2-4 inches long, 1-2 lines wide, nearly smooth, flat, abruptly pointed: panicle open, pyramidal, 2-4 inches long, its branches often reflexed, the longest 2-4 inches long, bearing 2-4 spikelets near the ends: spikelets linear, 4-5 lines long, 2-4 flowered: empty glumes unequal; the first 1-nerved, 1-1½ line long; the second 1¾-2 lines long, 3-nerved, oval; flowering glumes slightly pubescent at base, 1¾-2 lines long, oval, abruptly pointed: palelets nearly as long as the glumes. Idaho to Montana, Colorado and New Mexico.

P. nervosa Vasey Grasses Pac. Slope, ii, 81. A tall often dioecious loosely tufted perennial: stems rather slender, from slender stoloniferous rootstocks, 1½-3 feet high, erect, smooth: leaves of sterile shoots numerous, flat or conduplicate, scabrous above, rather thin, 6-12 inches long, 1-2 lines wide, those of the stem usually 3: sheaths closed, smooth, shorter than the long internodes: ligules obtuse, 1-2 line long: panicle loose, 3-6 inches long, its lower branches scabrous, 2-4 at each of the 6 or 7 nodes, 1-2 inches long, bearing 2-5 spikelets near the extremities: spikelets compressed, 4-5 lines long, 4-7 flowered: empty glumes ovate, acute, carinate, hispid on the keels, 1¼-1½ lines long: flowering glumes lanceolate, barely acute, scarious-margined, scabrous on the nerves or throughout, often villous below but not webbed, 5-nerved, 2 lines long: palelets lance-oblong, ciliate on the keels, nearly equalling the glumes. In open places in wooded districts California to Alaska and Montana.

P. Idahoensis Beal Grasses N. Am. ii, 539. A slender tufted erect perennial 20-30 inches high with 2 or 3 distant leaves: leaves of sterile shoots numerous, mostly filiform, 6-10 inches long, flaccid, erect; those of the stem with long sheaths, and erect filiform blades 1-3 inches long; ligules acute, about 1 line long: panicle loose, and flexuous, 3-4 inches long, its scabrous capillary branches in twos or threes or solitary, the longer 1½ inches long, with few spikelets near the extremities: spikelets compressed; 3-5 lines long, rather loosely 4-7-flowered: empty glumes nearly equal, linear-ovate, acute, with broad scarious margins; flowering glume 2½-3 lines long, lance-oblong, subacute, scarious at the apex, minutely scabrous throughout: palelet nearly equalling the glume. On rocky slopes, eastern Oregon to Idaho.

P. Sandbergii Vasey Contrib. U. S. Nat. Herb. i, 276. Stems tufted, 10-16 inches high, slender, the lower portion bearing about 2 sheaths with very short blades: ligules about 1 line long: panicle 1½-3 inches long, sometimes very narrow, the branches ascending, nearly smooth, the lower in twos or threes, unequal, the longer 1-2 inches long: spikelets 2-4-flowered, about 3 lines long, purplish: empty glumes lanceolate, subacute: flowering glumes linear-oblong, obtuse, nearly 2 lines long, sparingly pubescent or puberulent, somewhat villous near the base but not webbed, scarious at the apex: palelets equalling the glumes. On grassy slopes, Clearwater Valley, Idaho.

P. incurva Scribn. & Williams U. S. Dept. Agr. Div. Agrost. Cir. 9, 6. Stems slender, closely cespitose, 6-10 inches high, flexuous, smooth: sheaths smooth, shorter than the internode: ligules acute, often irregularly fimbriate: leaves rather rigid, flexuously recurved, convolute, smooth below, minutely hispidulous above and at the acute apex, 1-2½ inches long, those of the radical shoots much the longest: panicle few-flowered, purplish, its branches mostly solitary: spikelets compressed, loosely 2-3-flowered, about 2½ lines long: empty glumes unequal, the lower oblong-lanceolate, subacute, indistinctly 3-nerved, about 1 line long, the upper broadly ovate, distinctly 3-nerved, usually 1½ lines long, flowering glumes rounded on the back densely pubescent below rather broadly scarious-

margined above, about 2 lines long: palet nearly or quite equalling the glume. Olympic Mountains Washington at about 6000 feet elevation.

P. occidentalis Vasey & Scribn. Cont. U. S. Nat. Herb. i, 274. A loosely tufted, perennial: stems slender, 2-3 feet high, rather weak, more or less scabrous: sheath shorter than the internodes: ligules ovate, $1\frac{1}{2}$ -2 lines long, leaves of the stems 3-6, flat, 2-7 inches long, 1-3 lines wide: panicle 4-10 inches long, its filiform branches in pairs or threes, or solitary below, the longest 2-6 inches long, bearing 2-6 spikelets near the extremities: spikelets ovate or ovate-lanceolate, 3-4 lines long, usually 4-flowered: first empty glume lanceolate, 1-nerved, $1\frac{3}{4}$ lines long, acuminate; second ovate-lanceolate, $2\frac{1}{4}$ lines long; flowering glumes oblong-lanceolate, $2\frac{1}{2}$ -3 lines long, acute, very thinly pubescent on the marginal nerves and the lower half of the keel: palets nearly as long as the glume. In moist woods, northern Oregon to Alaska.

P. Kelloggii Vasey Grasses Pac. Slope, ii, 79. Stems tufted, from stoloniferous rootstocks, slender, 2-3 feet high: leaves from the base numerous with short scarious sheaths, and flat or loosely involute blades 6-12 inches long: leaves of the stem usually 3: sheaths nearly smooth, nearly equalling or exceeding the internodes, the upper one extending nearly to the panicle: ligules 1 line long, or less: panicle pyramidal, open, its scabrous branches divergent or horizontal, 1-3 inches long: spikelets oblong, compressed, 3 lines long, loosely 2-3-flowered: empty glumes ovate, acute, hispid on the keel, the first 1-nerved, $1\frac{1}{4}$ lines long; the second $\frac{1}{4}$ line longer and 3-nerved; flowering glumes lance-ovate, acute, smooth except the long thin web at the base, 5-nerved nearly to the apex, the midnerve barely excurrent, about 2 lines long: palet linear-oblong, 2-toothed, nearly smooth on the green keels, $\frac{1}{4}$ line shorter than the glumes. Eastern Oregon to California.

P. Bolanderi Vasey Bot. Gaz. vii, 32. A loosely tufted perennial: stems erect, or slightly geniculate below, somewhat thickened at the base, smooth: basal leaves thin and lax, smooth, 3-6 inches long, of the stems 3-4: sheaths smooth, closed at the throat, shorter than the internodes: ligules obtuse, $1\frac{1}{2}$ -2 lines long: stem leaves 2-4 inches long, about 2 lines wide, flat, rather abruptly pointed, thin and smooth: panicle erect, slender, 4-6 inches long, its branches smooth, 2-4 at each of the 4 or 5 distant nodes, erect or at length spreading: spikelets 1-3-flowered, $1\frac{1}{2}$ -2 lines long: empty glumes ovate, nearly acute, smooth, the first 1-nerved, 1 line long, the second obscurely 3-nerved and longer: flowering glumes ovate-oblong, obtuse or barely acute, scarious-margined, nearly smooth except the slight web at the base, 5-nerved, $1\frac{1}{4}$ lines long: palet oblong, obtuse, green, nearly smooth, slightly shorter than the glume. In moist places in the Coast Mountains, Oregon to California.

P. Howellii Vasey & Scribn. Cat. Grasses U. S. 82. A densely tufted pale green perennial with fibrous roots: stems erect, nearly smooth, 1-2 feet high: sheaths nearly smooth, half open above, shorter than the internodes: ligules 2-3 lines long, obtuse and lacerate at the apex: basal leaves numerous, flat, thin, 3-6 inches long, 1-2 lines wide; of the stem 2 or 3, flat, or involute near the attenuate points, 2-4 inches long: panicle rather loose and open, 5-8 inches long, its branches 2-5 at each of the 5 or 6 nodes, erect until near maturity, the longer 2-3 inches long: spikelets 2-3 lines long, loosely 2-5-flowered: empty glumes ovate, acute, thin, green, sparingly hispid on the keels, 1- $1\frac{1}{2}$ lines long: flowering glumes ovate, acute, green except the narrow membranous margins, pubescent throughout, 5-nerved, $1\frac{1}{2}$ lines long: web at base thin, about as long as the glume: palet oblong, emarginate, nearly smooth, on the green keels, slightly shorter than the glume. In dry open places in forests, western Oregon to Cal.

P. purpurascens Vasey Bot. Gaz. vi, 297. Stems wiry, erect, 1-2

feet high, smooth or slightly scabrous, from stout creeping perennial rootstocks: sheaths smooth, the lower ones short but exceeding the internodes: ligules obtuse, 1 line long or less, or often nearly obsolete: panicle oblong, 1-3 inches long: leaves flat or involute, 2-6 inches long, 1-2 lines wide: panicle 1-3 inches long, its branches hispid, 2-4 at each of the 5-7 nodes, 1 inch long or less, nearly erect or somewhat spreading: spikelets rather turgid 3-5-flowered: empty glumes ovate, acute or acutish, smooth, $1\frac{1}{2}$ -2 lines long: flowering glumes lance-ovate, minutely scabrous, hispid-ciliate on the keel, purple with scarious tips, 5-nerved, $2\frac{1}{2}$ -3 lines long: palet oblong, obtuse or retuse, 2 lines long, ciliate on the keels. On the highest peaks of the Cascade Mountains, Washington to California.

P. pratensis L. Sp. 67. Stems slender, erect, simple, 1-4 feet high, from long running rootstocks: sheaths often longer than the internodes: ligules truncate, $\frac{3}{4}$ line long, or less: leaves 2-10 inches long, flat or involute $1\frac{2}{3}$ -3 lines wide: panicle 2-8 inches long, usually pyramidal, its branches spreading or ascending, 1-3 inches long: spikelets 3-5-flowered, 2- $2\frac{1}{2}$ lines long: empty glumes unequal, glabrous, rough on the keel, the lower 1-nerved, the upper 3-nerved: flowering glume $1\frac{3}{8}$ line long, acute, 5-nerved, webbed at the base, the marginal nerves and midnerve silky-pubescent below. Common everywhere.

P. compressa L. Sp. 69. Pale bluish-green and glabrous: stems 6-24 inches long, decumbent at base, from long horizontal rootstocks, smooth, much flattened: sheaths loose, mostly shorter than the internodes: ligules $\frac{2}{3}$ line long: leaves 1-4 inches long, about 1 line wide, smooth, beneath, rough above: panicle usually contracted, its branches erect or ascending, 1 inch long or less: spikelets 3-9-flowered, $1\frac{1}{4}$ -3 lines long: empty glumes acute, 3-nerved; flowering glumes 1- $1\frac{1}{4}$ lines long, obscurely 3-nerved, the nerves slightly pubescent toward the base. In fields and waste places: naturalized from Europe.

P. Wheeleri Vasey Rothr. Rep. Bot. U. S. Surv. vi, 291. Stems 10-30 inches high, from perennial running rootstocks: ligules about 1 line long: leaves of sterile shoots 7-10 inches long, 1-2 lines wide, rigid, conduplicate or involute, with a firm oblique point: panicle open, 4-6 inches long, ovoid, its slender branches mostly in pairs, the longer about 2 inches long, spikelets lance-elliptical, 2-4 lines long, 3-flowered: empty glumes subequal, ovate-lanceolate 3-nerved; the second one 2 lines long; flowering glumes not webbed, 2 lines long, ciliate on the lateral nerves and on the lower part of the keel, oval, subacute, with scarious margins: palets truncate very nearly as long as the glumes, ciliate on the keel. Eastern Washington to Colorado.

P. acutiglumis Scribn. U. S. Dept. Agr. Div. Agrost. Cir. 9, 4. A loosely tufted perennial: stems smooth or somewhat roughened at the nodes, about 2 feet high, sheaths shorter than the internodes: ligules about 2 lines long, often more or less fimbriately divided: stem leaves 2-3, minutely roughened on both sides: panicle ovate in outline, about 4 inches long, its branches in twos or threes, rough-hispid, ascending, the lower ones 1- $2\frac{1}{2}$ inches long: spikelets lanceolate, acute, 5-7 lines long loosely 4-7-flowered: empty glumes unequal, hispid on the back, the lower long-acuminate, 3-nerved, the upper lanceolate, acute, more or less distinctly 5-nerved, 2 lines long; flowering glumes narrowly oblong-lanceolate, acute, 5-nerved, hispid on the back: palets oblong-linear, acute, a little shorter than the glumes, ciliate on the keels. Near Grave Creek, southern Oregon.

P. epillis Scribn. l. c. A closely cespitose perennial with numerous basal leaves from intravaginal shoots: stems slender, smooth, sheaths mostly shorter than the internodes: ligules of the stems leaves acute, $1\frac{1}{2}$ line long: leaves smooth, flat or convolute, 2-10 inches long, panicle contracted, its smooth branches erect or ascending, 1-2 inches long: spikelets ovate-

lanceolate 3-4 flowered, about 4 lines long: empty glumes smooth, unequal, the lower lanceolate or broader, acute or acuminate, 1-nerved, 1 line long; the upper broadly ovate, acute, 3-nerved, about $1\frac{1}{2}$ lines long: flowering glumes 5-nerved, rough-hispid on the back, oblong-elliptical, obtuse, about 2 lines long: paleas a little shorter than the glumes, ciliate on the keels, the apex bidentate. In open places in timberland, eastern Washington to Colorado.

P. confinis Vasey Grasses Pac. Slope, ii, 65. A caespitose imperfectly dioecious perennial, with long running rootstocks: stems erect, slender, 4-12 inches high, smooth: sheaths shorter than the internodes, open above: ligules a line long to obsolete: leaves of sterile, shoots numerous with smooth scarious-margined sheaths and involute blades 2-6 inches long, about $\frac{1}{2}$ line wide: panicle oblong, 1-2 inches long its scabrous, branches in threes, twos or solitary, 1 inch long or less: spikelets slightly compressed, 2-3 lines long, 3-6-flowered: empty glumes broadly ovate, acute, 1-nerved, nearly smooth, 1- $1\frac{1}{2}$ lines long, the second slightly longer but neither equalling the first floret: flowering glumes broadly ovate, acute, not webbed, 5-nerved, about $1\frac{1}{2}$ lines long: paleas ovate-oblong pubescent on the keels: staminate flowers with abortive ovaries, and pistillate flowers with imperfect stamens. On sandy ground along the coast, Oregon to Alaska.

P. flava L. Sp. 68. *P. serotina* Ehrh. Stems slender, simple or rarely branched, smooth, $1\frac{1}{2}$ -5 feet long: sheaths usually shorter than the internodes, smooth: ligules 1-2 lines long: leaves 2-6 inches long, 1-2 lines wide, smooth or rough: panicle 6-14 inches long, open, the branches spreading or ascending, 2-5 inches long: spikelets 3-5-flowered, $1\frac{1}{2}$ -2 lines long: empty glumes rough above on the keels, the lower usually 1-nerved; the upper three-nerved: flowering glumes obtuse, somewhat webbed at base, 1- $1\frac{1}{2}$ lines long, silky-pubescent on the lower half of the marginal nerves and the midnerve. In moist meadows, Oregon to Brit. Columbia and Illinois: also Europe and Asia.

P. nemoralis L. Sp. 69. Stems slender, 6-24 inches high, erect, simple smooth: sheaths usually shorter than the internodes: ligules $\frac{1}{2}$ -1 line long, truncate: leaves 1-4 inches long, 1 line wide or less, smooth or rough: panicle 2-5 inches long, open, its branches erect or ascending 1-2 inches long: spikelets 2-5-flowered $1\frac{1}{4}$ - $2\frac{1}{2}$ inches long: empty glumes acute; or acuminate, 1-3-nerved: flowering glumes obtuse or acute, 1- $1\frac{1}{2}$ lines long, faintly 5-nerved, somewhat webbed at the base, the middle and marginal nerves silky on the lower half. Eastern Washington to the Eastern States.

P. GLAUCA Vahl Fl. Dan. t. 964. Stems erect, 6-24 inches high, rigid, glabrous and somewhat glaucous: sheaths longer than the internodes: ligules 1 line long: leaves 1-2 inches long, 1 line wide or less, smooth beneath, scabrous above: panicle 1-4 inches long, open, with erect, or ascending branches 6-18 lines long: spikelets 2-4-flowered, $2\frac{1}{2}$ -3 lines long: empty glumes acute, 3-nerved, glabrous, rough on the upper part of the keel: flowering glumes $1\frac{1}{3}$ - $1\frac{1}{2}$ lines long, obtuse or acutish, rough, not webbed at the base, the lower part of the midnerve and marginal nerves silky-pubescent. Oregon to the Rocky mountains and Maine: also in Europe.

P. laxa Hænke Sudet. 118. Stems 6-12 inches high, erect: sheaths often longer than the internodes: ligules about 1 line long: leaves 1-3 inches long, $\frac{1}{2}$ -1 line wide, acuminate: panicle 1-4 inches long, its branches usually erect, sometimes ascending, 1 inch long or less: spikelets 3-5-flowered, 2- $2\frac{2}{3}$ lines long: empty glumes usually 3-nerved acute, glabrous, rough on the keel at the apex: flowering glumes $1\frac{2}{3}$ - $1\frac{3}{4}$ lines long, obtuse, 3-nerved, or sometimes with an additional pair of obscure nerves, the midnerve pilose on the lower half, rough above; the lateral ones pilose below. Washington to Alaska and across the continent: also in Europe.

P. gracillima Vasey Contrib. U. S. Nat. Herb. i, 272. A densely tufted perennial: stems slender, 15-25 inches high, erect, smooth: sheaths shorter than the internodes, smooth: ligules about 2 lines long, lanceolate, acute: leaves of sterile shoots thin, smooth, acute, flat or conduplicate, filiform, 2-5 inches long, $\frac{1}{4}$ - $\frac{1}{2}$ line wide, those of the stem 2, the upper with very long sheath and short blade: panicle open, pyramidal or ovoid, 2-4 inches long, its scabrous branches in twos to fives, the longest 2-2 $\frac{2}{3}$ inches long, bearing 2-4 spikelets on the outer third: spikelets oval or ovate-lanceolate, 3-5-flowered, 4-6 lines long: empty glumes lanceolate, acute, 3-nerved, the first 2-2 $\frac{1}{4}$ lines long; the second a little longer: flowering glumes elliptical, 2-3 lines long, subacute or obtuse usually purplish with a wide scarious tip, scabrous, pubescent on the nerves below: palets linear, as long as the glumes. On cliffs along streams, Oregon and Washington.

P. saxatilis Scribn. & Williams U. S. Dept. Agr. Div. Agrost. Cir. 9. A closely caespitose perennial: Stems erect, very smooth, 10-18 inches high: sheaths smooth, or the lower ones sparsely pubescent, shorter than the internodes: ligules 1-2 lines long: leaves flat, soft, smooth, 1-2 inches long: panicle lax, 2-4 inches long, its filiform branches ascending, the lower ones about 2 inches long: spikelets compressed, lanceolate, 4-5 lines long, 3-5-flowered: empty glumes somewhat unequal obtuse or subacute, 3-nerved, smooth, about 2 lines long: flowering glumes obscurely 5-nerved, minutely scabrous on the back with broad scarious erose-dentate margins, 2-3 lines long: palet nearly equalling the glumes, ciliate on the keels, bidentate at the apex. Dry rocky places on Mount Rainier, Washington.

P. invaginata Scribn. & Williams l. c. 6. A smooth caespitose perennial with numerous intravaginal shoots and marcescent sheaths: sheaths smooth: ligules acute, 2-2 $\frac{1}{2}$ lines long: leaves mostly flat, rather narrow, smooth or the margins minutely hispidulous near the base: panicle subpyramidal to oblong, its filiform scabrous branches mostly in threes or fives: spikelets compressed, lanceolate, rather loosely 2-5-flowered, 2 $\frac{2}{3}$ -4 lines long: empty glumes 3-nerved, narrowly oblong to oblong-ovate, obtuse to subacute, the lower 1 $\frac{1}{2}$ -2 lines long, the upper a little longer: flowering glumes keeled, oblong-ovate, 5-nerved, minutely scabrous above, pubescent below on the nerves, 2-3 lines long: palets shorter than the glumes, ciliate on the keels. On bluffs along the Columbia river near Hood River Oregon to California.

§ 3 **ATROPIS** Rupr. Fl. Samoj. 64: as Genus. Empty glumes much shorter than the florets: flowering glumes chartaceous, rarely herbaceous, convex on the back; the midnerve often reaching the denticulate apex, or extending as a mucro; the lateral nerves all vanishing at some distance below the broad scarious apex.

P. Suksdorfii Vasey Beal Grasses N. Am. ii, 574, under Atropis. A densely tufted light green perennial: stems 5-7 inches high: ligules truncate, about 1 line long: leaves of sterile shoots rigid, recurved, conduplicate, pungent pointed, 2-4 inches long, those of the stem erect and shorter: panicle narrow, simple, spike-like, 1-4 inches long: spikelets linear-lanceolate, 1-3-flowered, 2-3 lines long: empty glumes linear-lanceolate; the first 3-nerved 2-2 $\frac{1}{2}$ lines long; the second a little longer: flowering glumes chartaceous, ovate, 2-2 $\frac{1}{2}$ lines long: palets ciliate on the keels. On gravelly banks near glaciers, Washington.

P. Vaseyochloa Scribn. U. S. Dept. Agr. Div. Agrost. Cir. 9, 1. *P. pulchella* Vasey. Stems densely tufted, 5-10 inches high: erect or ascending from the base, smooth: leaves of the sterile shoots numerous, conduplicate, abruptly pointed, 1-2 inches long, less than 1 line wide: those of the stem 1 or 2, 6-12 lines long: panicle ovoid or pyramidal, 1-2 inches long, its branches

mostly in pairs, smooth, each bearing a single spikelet: purplish, oval or linear 3-5-flowered, 3-5 lines long: empty glumes obtuse or acute, often erose-denticulate, broadly scarious-margined; the first ovate-lanceolate, 1-nerved; the second oval-lanceolate, 3-nerved, 2 lines long: flowering glumes ovate-lanceolate, 3-5-nerved, not pubescent nor webbed at base: palets curved, linear, $2\frac{1}{2}$ lines long 2-toothed, scabrous on the keels. On the plains of eastern Oregon and Wash.

P. Fendleriana Vasey Grasses Pac. Slope ii, 74. A densely tufted completely diceious perennial: stems erect, scabrous to nearly smooth, 1-2 feet high: sheaths rather loose, scabrous above, shorter than the internodes: ligules 1-2 lines long: leaves of sterile shoots very numerous, conduplicate, 6-12 lines long, about 1 line wide: panicle 2-4 inches long, oblong, its minutely scabrous branches in twos or threes, erect or somewhat spreading, 1-2 inches long: spikelets compressed 3-4 lines long, 3-5-flowered: empty glumes broadly ovate, acute, carinate, minutely scabrous, 1-nerved, 1-2 lines long the first slightly smaller: flowering glumes ovate-oblong, erose or emarginate at the obtuse apex, carinate, hispid on the keel above and more or less pubescent on the marginal nerves and midnerve below, 2-3 lines long: palets oblong, emarginate, pubescent on the keels. On dry hills, eastern Washington to California and the Rocky Mountains.

P. lucida Vasey Cont. U. S. Nat. Herb. i, 274. A slender tufted perennial: stems 18-24 inches high, smooth: sheaths equalling or shorter than the internodes, smooth: ligules 2 lines long: radical leaves 5-7 inches long 1-2 lines wide; those of the stem about 3, 2-3 inches long: panicle 4-6 inches long, narrow, its branches mostly in twos or threes, the lower ones 1-2 inches long, erect or appressed: spikelets 3-4 lines long 3-4-flowered, shining, pale green: empty glumes oblong, abruptly acute, unequal, $1\frac{1}{2}$ -2 lines long, smooth, scarious at the apex and margins: flowering glumes 2 lines long, linear-oblong, obtuse, sparsely and minutely scabrous, slightly pubescent near the base of the keel and lateral nerves, scarious at the apex, 5-nerved: palet nearly equalling its glume. On high hills, eastern Wash. to Colo.

P. Leckenbyi Scribn. l. c. 2. A pale green tufted perennial: stems 2-2 $\frac{1}{2}$ feet high, smooth, often rooting at the lower nodes: sheaths smooth, all but the uppermost exceeding the internodes, the lower ones membranous, inflated: ligules about 3 lines long, acute, often fimbriately divided: radical leaves long and slender, glaucous, green, smooth beneath, rough above and on the margins, acute, flat: panicle 5-7 inches long; its branches erect, the longer ones 2-3 inches long: spikelets oblong-lanceolate, 6-7 lines long, 5-6-flowered, compressed: empty glumes subequal 3-nerved, rough-hispid on the nerves rather narrowly lanceolate, acute or acuminate 4 lines long: flowering glumes ovate-oblong, 5-nerved, 3-5 lines long, scarious-margined, often erose dentate above, hispidulous on the upper and pubescent on the lower half: palets shorter than the glumes, conspicuous, ciliate on the keels and minutely pubescent below, narrowed above to an erose ciliate apex. Dry and very sandy soil eastern Washington.

P. Nevadensis Vasey Scribn. Bull. Torr. Bot. Club x, 66. A loosely tufted perennial: stems rather stout, 20-40 inches high, scabrous below the panicle: ligules shorter than the internodes: ligules about 2 lines long, scabrous: leaves of sterile shoots very narrow, flat or conduplicate, 6-12 inches long, scabrous, those of the stems usually 3, with sheaths 4-8 inches long and blades 1-4 inches long: panicle narrow rather densely flowered, 4-6 inches long, its branches 2 or more at each joint, erect: spikelets 3-5 lines long, 3-8-flowered: empty glumes $1\frac{1}{2}$ -2 lines long, nearly equal obtuse or subacute, 3-nerved, scabrous: flowering glumes 2 lines long, oblong, obtuse, scarious-margined above with a few very short hairs at base: palet ciliate on the keels. Moist soil, Oregon to Nevada Brit. Colum-

bia and North Dakota.

P. lævigata Scribn. *P. laevis* Vasey, not Barb. Stems tufted, pale, slender, erect, smooth, 2-3 feet high, with 2 or 3 distant leaves; sheaths smooth: ligules acute: leaves of sterile shoots narrow, 5-8 inches long, those of the stem shorter: panicle narrow, rather loose 4-8 inches long, sometimes interrupted below, its branches erect or appressed the lower in twos or threes, unequal, the longest 1-2 inches long: spikelets linear, 3-5 lines long, about 5-flowered: empty glumes nearly equal, linear-lanceolate, acute, thin, pale and scarious except on the minutely scabrous midrib: flowering glumes 2-2 $\frac{2}{3}$ lines long, linear-oblong, subacute, 5 nerved, minutely scabrous, slightly pubescent on the keel and marginal nerves near the base, the apex scabrous and yellowish-tinged in age, somewhat erose: palea equalling the glumes, scabrous on the keels. Eastern Washington to Brit. Columbia, Montana and Arizona.

P. longiligula Scribn. U. S. Dept. Agr. Div. Agrost. Cir. 9, 3. A caespitose glaucous perennial: stems rather stiff, 16-20 inches high: basal sheaths persistent and rather crowded: ligules conspicuous, 2-5 lines long: leaves of sterile shoots erect or spreading, usually 6-10 inches long, flat or conduplicate, with conspicuous decurrent ligules: cauline leaves shorter, the upper ones sometimes reduced to a mere mucro, all rather rigid and mucronate-pointed: panicle ovate in outline, 3-5 inches long, its lower branches 1-2 inches long: spikelets compressed, ovate-lanceolate, rather acute, 4-6-flowered, 3-6 lines long: empty glumes unequal, more or less rough-hispid on the back, the lower lanceolate, acute or acuminate, 1-nerved, 3 lines long; the upper much broader, 3-nerved; flowering glumes ovate-oblong, obtuse, 5-nerved, more or less scabrous above, woolly-pubescent on the lower half of the keel and marginal nerves, with broad hyaline margins, 2 $\frac{2}{3}$ -3 lines long: palea much shorter than the glumes, hyaline with green hispid-pubescent keels. Oregon to South Dakota and Arizona.

P. Lettermani Vasey Contrib. Nat. Herb. i, 273. A dwarf densely tufted perennial: stems 2-4 inches high: sheaths loose, longer than the internodes: ligules rather conspicuous, acute: radical leaves flat, 1-2 inches long, $\frac{1}{2}$ -1 line wide; those of the stem 1 or 2, about 1 inch long: panicle 6-12 lines long, oblong, rather dense, its branches mostly in twos, short, erect, with 1-3 spikelets at the extremities: spikelets 1 $\frac{1}{2}$ -2 lines long, 2-4-flowered, purplish: empty glumes nearly as long as the spikelets, oblong-lanceolate, acute, nearly equal, smooth; flowering glumes 1-1 $\frac{1}{2}$ lines long ovate-oblong, acute, or subobtuse, obscurely nerved, smooth, scarious at the apex: palea nearly equalling the glume, acutely 2-toothed at the apex. On Mount Rainier Washington at 9000 feet altitude, and Gray's peak Col.

P. Pringlei Scribn. Bull. Torr. Bot. Club x, 31. Stems tufted, 5-10 inches high, slender, wiry, with 1 or 2 leaves: ligules conspicuous, 2 lines long: leaves mostly basal, 1-2 inches long, convolute, rigid, those of the stem with very short or nearly obsolete blades: panicle 6-12 lines long, compact, oblong, the few branches mostly in pairs, erect, with 1-2 spikelets each: spikelets 3 lines long, mostly 2-flowered, oblong, turgid, purplish: empty glumes thin, membranous, ovate-lanceolate nearly as long as the florets; flowering glumes about 3 lines long, oblong-lanceolate, subulate, scarious at the apex, smooth, obscurely 5-nerved,; palea a little shorter, acutely 2-toothed. On the high mountains, California to Washington.

P. Leibergii Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 8, 6, t. 11. A densely caespitose fibrous-rooted glabrous perennial: stems slender, 2-6 inches high, the base clothed with loose scarious sheaths: ligules hyaline, about 1 line long: radical leaves numerous, 1-2 inches long, about $\frac{1}{2}$ line wide, those of the stem 6-12 lines long, conduplicate when dry, minutely scabrous along the margins and at the apex, otherwise smooth: panicle simple, of 1-7 spikelets, its lower branches usually in pairs, each branch

bearing a single spikelet: spikelets 2-3-flowered, 3-4 lines long, rather broadly ovate: empty glumes somewhat unequal, the first broadly lanceolate, 1-nerved, subacute, the second much broader than the first, 3-nerved, from subacute to broadly truncate at the erose-dentate apex: flowering glumes glabrous, 2-3 lines long, distinctly 5-nerved, obtuse and erose-dentate at the scarious apex: palets a little shorter than the glumes. On the summits of high ridges. Malheur county Oregon.

P. Buckleyana Nash Bull. Torr. Bot. Club. *P. tenuifolia* Buckley. A slender tufted perennial: stems erect, 12-20 inches high, usually glabrous and tinged with brown or pink: sheaths smooth, the lower longer than the internodes: ligules 1-2 lines long, acute or acaminate, radical leaves numerous, flat or conduplicate, 2-6 inches long, less than 1 line wide, often abruptly acute at the apex, those of the stem 2, 1-2 inches long: panicle erect, narrow, 1-3 inches long, its filiform branches in twos or threes, 3-12 lines long, erect or somewhat spreading: spikelets rather firm 3-5 lines long, mostly 3-flowered, pubescent, elliptical-lanceolate: empty glumes obtusely keeled, 3-nerved near the base, the first linear-lanceolate, about $1\frac{1}{2}$ lines long, second elliptical-lanceolate, about 2 lines long: flowering glumes 2-2 $\frac{1}{2}$ lines long, elliptical or linear-oblong, acute to obtuse entire or erose, pubescent on the lower third, puberulent above: palets linear, 2-toothed, 2 lines long. Common on dry plains, eastern Oregon to Brit. Columbia.

Var. stenophylla Vasey, Beal grasses N. Am. ii, 580, under *Atropis*. Stems stouter: panicle open in flower: spikelets 4-6-flowered: glumes slightly larger. On dry hillsides near Roseburg Oregon.

P. Canbyi *Glyceria Canbyi* Scribn. An erect smooth stout perennial: stems simple $3\frac{1}{2}$ -4 feet high: sheaths shorter than the internodes: ligules broad, obtuse, 3-4 lines long: leaves of the stem 3-4, flat below, conduplicate above, 7 inches long, 3-5 lines wide: panicle linear or lanceolate, usually interrupted below, about 7 inches long, its branches in half-whorls, erect or ascending, densely flowered, the longer 2-4 inches long: spikelets 3-5-flowered: empty glumes oval, acute or obtuse, almost keeled, 3-nerved, the first $1\frac{1}{2}$ -2 lines long, second 2-3 lines long: flowering glumes oval, scabrous 2-2 $\frac{1}{2}$ lines long, 5-nerved, often irregularly toothed at the acute apex: palets 2 lines long, narrow, 2-toothed at the apex. In the Cascade Mountains of Washington.

46 ERAGROSTIS Beauv. Agrost. 70, t. 14, fig. 11. (1812)

Annual or perennial grasses with flat leaves and contracted panicles. Spikelets two- to several-flowered, more or less flattened. Two lower glumes empty, unequal, shorter than the flowering ones, keeled, one-nerved, or the second one three-nerved: Flowering glumes membranous, keeled, three-nerved. Palets shorter than the glumes prominently two-nerved or two-keeled, usually persistent on the rachella. Stamens 2 or 3. Styles distinct, short, with plumose stigmas. Grain free, loosely enclosed in the glume and palet.

E. reptans Nees Agrost. Bras. 514. A glabrous annual: stems 1-18 inches long, creeping, often forming mats 2-20 inches in diameter and 1-6 inches high, branching, the branches erect or ascending: sheaths shorter than or equalling the internodes, villous at the summit: ligules a ring of short hairs: leaves 1-2 inches long, $\frac{1}{2}$ -1 line wide, flat, smooth beneath, rough above: spikelets dioecious, 10-35-flowered, 2-8 lines long: empty glumes unequal, the first $\frac{1}{2}$ - $\frac{2}{3}$ as long as the second: flowering glumes about $1\frac{1}{4}$ lines long, broadly ovate, acute: palets shorter than the glumes, ciliate on the keels. In wet places Oregon to the Eastern States.

E. *intescens* Scribn. U. S. Dept. Agr. Div. Agrost. Cir. 9, 7. A low much branched and densely caespitose annual, 4-8 inches high: sheaths loose, smooth or with a few short hairs at the throat: ligules very short, ciliate: leaves flat, 1-3 inches long, 1-2 lines wide, minutely scabrous above, very acute: panicle pale green or straw-color, 2-4 inches long, its branches ascending to appressed, spikelets narrowly oblong, 3-12-flowered: empty glumes unequal, the first about $\frac{1}{2}$ line long, the second $\frac{1}{3}$ longer; flowering glumes about 1 line long, obtuse, 3-nerved. On sandy banks along Snake river eastern Washington to Idaho.

47 BRIZA L. Sp. 70.

Annual or perennial grasses with flat or convolute leaves, and open or rarely contracted panicles. Spikelets flattened, several-flowered, nodding: flowers perfect, glumes thin, membranous, strongly concave, the two lower empty, 3-5 nerved, flowering glumes imbracted, broader than the empty ones, 5-many-nerved, the uppermost glumes often empty. Palets much shorter than the glumes, hyaline, 2-keeled or 2-nerved. Stamens 3. Styles distinct, with plumous stigmas. Grain usually free, enclosed in the glume and palet.

B. *MINOR* L. Sp. 70. Stems slender, 4-15 inches high, from an annual root, simple: sheaths shorter than the internodes: ligules 1-3 lines long, acute: leaves 1-5, 1-4 lines wide, sometimes scabrous: panicles 2-5 inches long, open, its capillary branches spreading or ascending, 1-3 inches long: spikelets 3-9-flowered, 1-1 $\frac{1}{2}$ lines long, about 2 lines broad, truncate at the base: glumes scarious-margined, the empty ones about 1 line long: flowering glumes much broader and deeply saccate, about $\frac{3}{4}$ line long. Common in southwestern Oregon to California: naturalized from Europe.

48 FESTUCA L. Sp. 73.

Annual or perennial grasses with flat or convolute leaves and paniculate inflorescence. Spikelets two- to several-flowered, the two lower glumes empty, more or less unequal, acute, keeled: flowering glumes membranaceous, narrow, rounded on the back, 5-nerved, usually acute, and generally awned at the apex. Palets scarcely shorter than the glumes. Stamens 1-3. Styles very short, distinct, with plumose, stigmas. Grain glabrous, elongated, often adherent to the glume or palet.

F. *microstachya* Nutt. Journ. Acad. Phila. n. s. i, 187. Stems slender, erect, 6-20 inches high, from an annual root: sheaths shorter, than the internodes, smooth or pubescent: ligules very short: leaves 2-4, erect, slender, 1-4 inches long: panicle erect, racemose or spicate, 2-5 inches long, its branches channelled, single or some of the lowest in pairs, erect, spreading or deflexed, the longest 6-18 lines long: spikelets 1-5-flowered: empty glumes involute, the first 2-3 lines long, second 3-5 lines long: flowering glumes convex, involute, acuminate, scabrous: 2 $\frac{1}{2}$ -4 lines long: palets scabrous, bearing 2 short awns: stamens 1: very variable. On dry open ridges, Arizona to Brit. Columbia.

Var. *ciliata* Gray, Beal Grasses N. Am. ii, 587. Axis, branches of panicle and glumes all strongly ciliate. On dry ridges, southern Oregon to California.

Var. *pauciflora* Scribn. Vasey, Cat. Grasses U. S. 90. Stems slender, 1-2 feet high: panicle loose, with longer branches: spikelets 1-2-flowered, the flowering glumes with awns 6-12 lines long. On dry open

places near Portland Oregon.

F. MYURUS L. Sp. 74. A soft rather pale green annual: stems slender, smooth, erect, or geniculate at base, 1-3½ feet high; sheaths smooth, longer than the internodes: ligules very short: leaves 3-5, erect, slender 3-6 inches long: panicle narrow, more or less secund, 2-15 inches long its scabrous triquetrous branches in twos and threes below, appressed, the longest racemose, 1-6 inches long: spikelets on stout pedicels, linear, 5-8-flowered 5-6 lines long; the first glume 1 line long or less; the second involute, lanceolate 2-3 lines long: flowering glumes scabrous, involute, acuminate, 2-3 lines long, exclusive of the awns which are 4-10 lines long: palea lanceolate, scabrous on the keels, bearing 2 short awns: stamens one. Common in fields; naturalized from Europe.

F. octoflora Walt. Fl. Car. 71. *F. tenella* Willd. An erect slender tufted annual or biennial: stems sparingly branched 1-2 feet high: sheaths shorter than the internodes, sometimes pubescent: ligules about ½ line long: leaves erect, slender, 1-4 inches long, panicle simple, erect, 2-5 inches long, narrow, or spreading at the base; its branches in pairs or solitary, the longest 1-3 inches long: spikelets flat, oval 2-6 lines long, 7-13-flowered: empty glumes involute so as to appear subulate, the first 1¼ lines long, the second about 2 lines long: flowering glumes involute, acuminate, scabrous, 1½-2 lines long, with an awn ½-3 lines long: palea a little shorter than the glumes: stamens 2. On dry barren ground, Oregon to California and the New England States.

F. confinis Vasey Bull. Torr. Bot. Club xi, 126. A tufted stout light green perennial: stems erect, 2-4 feet high: sheaths loose, shorter than the internodes: ligules truncate, ½-3 lines long: leaves of sterile shoots half as long as the stem, with long slender points, those of the stem 2-3, 5-8 inches long, 2-3 lines wide, flat or involute, smooth or scabrous: panicle narrow, 4-6 inches long, its branches in twos or threes, erect, the longer 1-2 inches long: spikelets oblong or ovate-lanceolate, 3-9 lines long, 2-3 flowered: empty glumes chartaceous, the first ovate, 1½-3 lines long, 1-nerved the second linear-lanceolate, 3-3½ lines long, 3-nerved: flowering glumes 2½-3 lines long, lanceolate, scabrous, rather firm, acute or acuminate, nearly awnless: palea elliptical, scabrous, ciliate on the keels. South-eastern Oregon to Utah and Wyoming.

F. denticulata Beal Grasses N. Am. ii, 589. *F. ambigua* Vasey, not Le Gall. A rather stout erect perennial: stems erect, 2½-4 feet high: sheaths scabrous, longer than the internodes: ligules very short: leaves of sterile shoots rather rigid, 7-10 inches long, those of the stem usually 4, flat or becoming involute, with long attenuate points: panicle 7-10 inches long, its branches flexuous, mostly in pairs, the longest 3-5 inches long: spikelets purplish, 3-4-flowered: empty glumes narrow, the first about 1 line long, the second 2 lines long, 3-nerved: flowering glumes 3-4 lines long, obscurely 5-nerved, scabrous, acuminate, bearing an awn 4-8 lines long: palea 2-toothed. Oregon.

F. Californica Vasey Cont. U. S. Nat. Herb. i, 277. Stems erect, rather stout, 2-5 feet high, from a perennial root: leaves of sterile shoots numerous, scabrous, involute, ¼-½ as long as the stem, about 2 lines wide, of the stem usually 2: sheaths scabrous, shorter than the internodes hairy at the throat: ligules a ciliate fringe: panicle open, pyramidal, 4-7 inches long, the lower branches slender, mostly in distant pairs, the longest 2-5 inches long: spikelets 4-6-flowered 6-8 lines long, empty glumes ovate-lanceolate; the first 3 lines long, the second 3½ lines long: flowering glumes linear-lanceolate, 4-5 lines long, bearing a short awn, scabrous: palea scabrous, linear, 2-toothed. Edge of woods and open places, western Oregon.

F. Howellii Hack. *F. viridula* Vasey. A densely tufted perennial: sheaths shorter than the internodes: ligules less than 1 line long: leaves of

sterile shoots numerous, about half as long as the stem; those of the stem 2-3, erect, involute, 2-3 inches long: panicle erect, open 3-5 inches long, its branches mostly in pairs, the lower $\frac{1}{2}$ -2 inches long: spikelets brownish red, linear-lanceolate, 4-7 lines long, 4-8-flowered: empty glumes unequal, the first lanceolate, acute, 2 lines long, the second a line longer; acuminate, flowering glumes linear-lanceolate, 5-nerved, $2\frac{1}{2}$ -3 lines long, palea lanceolate, scabrous below and on the keels. On the highest peaks of the Cascade Mountains.

F. ELATOR L. Sp. 75. A tufted perennial: 2-6 feet high, often with short creeping rootstock: sheaths smooth, shorter than the internodes: ligules short: leaves of the stem 2-4, flat, 6-10 inches long, 2-3 lines wide: panicle contracted after flowering, 4-10 inches long: its branches mostly in pairs, the longest 3-5 inches long: spikelets linear-oblong, 6-11-flowered, 6-8 lines long: empty glumes lanceolate, the first $1\frac{1}{4}$ line long, the second a little longer; flowering glumes oblong, acute, scabrous toward the tip, rarely awned, 5-nerved, $2\frac{1}{2}$ -3 lines long: palea linear, scabrous on the keel. Common in meadows and waste places: introduced from Europe.

F. Jonesii Vasey l. c. 278. A densely tufted, perennial: stems erect, 3-4 feet high: sheaths usually scabrous, shorter than the internodes: ligules less than a line long: radical leaves numerous, about half as long as the stem; those of the stem 3-4, flat or involute, 5-15 inches long, 2-4 lines wide: panicle slender, open, 7-15 inches long, its capillary flexuous branches single or in pairs the lowest remote, 3-5 inches long: spikelets narrow, 3-5-flowered, 5-6 lines long: flowering glumes scabrous, linear-lanceolate, 2-3 lines long, 3-5-nerved: awns slender, 3-7 lines long: palea linear-lanceolate: stamens 3. Oregon to Brit. Columbia and Idaho.

F. brevifolia R. Br. Parry first Voy. Suppl. 280. A densely tufted perennial: stems rigid, 2-5 inches high: sheaths shorter than or equalling the internodes: leaves of sterile shoots setaceous, 1-3 inches long, those of the stem short or almost obsolete: panicle dense, linear, simple, racemose, 2-3 lines long; spikelets elliptical, 3 lines long, 1-4-flowered: empty glumes scarcely equal, the second broadly lanceolate: flowering glumes 1-2 lines long, elliptical-lanceolate, keeled above: awn 1 line or less long: palea oblong, acute, 2-toothed. On high mountains eastern Oregon to Alaska and the Rocky Mountains.

F. ovina L. Sp. 73. A densely tufted perennial: stems slender, erect, rigid, simple, 6-20 inches high: sheaths usually crowded at the base of the stems: ligules short: leaves filiform or setaceous, those of the stem few, 1-3 inches long, erect, the basal ones numerous: panicle 1-3 inches long, often secund, narrow, its branches short, usually erect or appressed: spikelets 3-5-flowered: empty glumes unequal, acute, the first 1-nerved, the second 3-nerved; flowering glumes $1\frac{1}{2}$ -2 lines long, smooth, acute, usually short-awned. On plains and rocky slopes in various forms, Mexico to Alaska and across the continent: also Europe and Asia.

Var. duriuscula Hack. Monog. Fest. Eu. 89. *F. duriuscula* L. Stems taller and stouter, panicle usually more open: flowering glumes about 3 lines long. Oregon to Alaska and the Rocky Mountains: also in Europe.

Var. polyphylla Vasey, Beal l. c. 597. Stems $2\frac{1}{2}$ -3 feet high, grooved below the panicle: leaves of sterile shoots numerous; sheaths split for most of their length: panicle open, 4-8 inches long; spikelets linear-lanceolate, 5-flowered: the second glume ovate-lanceolate 3-nerved. flowering glumes slender 3- $3\frac{1}{2}$ lines long. Oregon.

Var. ingrata Hack. in herb. Beal l. c. 598. Stems 20-30 inches high; leaves of sterile shoots scabrous, 8-10 inches long; those of the stem 3-5 inches long; panicle 4-6 inches long: its branches in pairs or single the longest about 2 inches long; spikelets 6-8-flowered: the second glume

linear, acute, 3-nerved, about 3 lines long: flowering glumes elliptical-lanceolate, about 3 lines long, the awn $\frac{1}{2}$ -2 lines long. Southern Oregon.

Var. Columbiana Beal l. c. 599. Stems 20-30 inches high, with 2 nodes: sheaths smooth: leaves of sterile shoots 7-12 inches long, firm, glaucous: scabrous, nearly cylindrical: panicle thin, 2-7 inches long, its branches scabrous, the longer 2-3 $\frac{1}{2}$ inches long: spikelets 4-7 lines long, 3-7-flowered, the first empty glume narrow about 2 lines long, the second linear, acute, 2 $\frac{1}{2}$ -3 lines long: flowering glumes 3-3 $\frac{1}{2}$ lines long. About Pullman Washington.

Var. Oregana Hack. Beal l. c. 599. Stems slender, 2-3 feet high: leaves of sterile shoots 4-6 inches long, panicle thin, 2-4 inches long, its branches solitary, the longest 1-2 inches long: spikelets 2-6-flowered; second glume linear, subulate, 3 lines long: flowering glumes linear, 3 lines long, palea a little longer than the glumes. Eastern Oregon.

F. amethystina L. Sp. 74. A tufted perennial: stems rather slender, 2-3 feet high, with 2-3 nodes: sheaths shorter than the internodes: ligules a mere ciliolate ring: leaves of sterile shoots flaccid, conduplicate, 5-15 inches long: those of the stem 2-3, the upper 3-5 inches long: panicle simple; secund, narrow or spreading, 4-8 inches long, the lower branches usually in pairs, scabrous, the longer 4-5 inches long: spikelets linear-lanceolate or oval 3-7-flowered, about 3 $\frac{1}{2}$ lines long: first empty glumes lanceolate, 1 $\frac{1}{4}$ line long, the second linear-lanceolate, about 2 lines long: flowering glumes scarious, lanceolate-oblong, 2-3 lines long: involute, awnless or with an awn $\frac{1}{2}$ -1 line long: palea linear, 2-toothed, scabrous on the keels. Oregon to California, also in Europe.

F. scabrella Torr. Hook. Fl. ii, 252, t. 233. An erect tufted perennial 2-4 feet high: sheaths smooth: ligules acute, 1-5 lines long: leaves of sterile shoots numerous, smooth or scabrous, involute, those of the stem usually 2, rigid, scabrous above, 3-5 inches long: panicle thin, 5-7 inches long, its branches mostly in pairs, 3-5 inches long: spikelets 3-7-flowered, 4-7 lines long: empty glumes chartaceous, ovate-lanceolate, the first 1-nerved, 2-3 lines long, the second 3-nerved 2-3 $\frac{1}{2}$ lines long: flowering glumes oblong, scabrous, 5-nerved, 3-4 lines long, sometimes with a stout awn about $\frac{1}{2}$ line long. Eastern Washington to Alaska and Iowa.

F. rubra L. Sp. 74. A densely tufted perennial: stems ascending, geniculate at base, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ feet high, from running rootstocks, sheaths usually shorter than the internodes, ligules very short, truncate: basal leaves involute-filiform: 3-6 inches long, those of the stem erect, flat or involute: panicle 2-5 inches long, sometimes red, open in flower, contracted in fruit: spikelets 3-10-flowered, 4-6 lines long: empty glumes acute, the first 1-nerved, shorter than the 3-nerved second one: flowering glumes about 3 lines long: obscurely 5-nerved, sometimes scabrous, bearing awns of less than their own length. Oregon to Alaska and Labrador.

Var. fallax Hack. Fest. Eu. 142. Densely caespitose, glaucous, strongly tinged with purple. 20-30 inches high: panicle 3-4 inches long: spikelets elliptical-lanceolate, 2-7-flowered: flowering glumes 2-3 lines long, rather abruptly pointed with a very short awn. Oregon and Washington to the Rocky Mountains.

Var. trichophylla Hack. l. c. 141. Stems slender, about 30 inches high, ascending from creeping rootstocks: lower sheaths shredded: panicle linear-oblong 3-5 inches long, flowering glumes linear-lanceolate, glabrous, bearing a short awn. Oregon and Euro; e.

Var. pubescens Vasey, Beal l. c. 607. Stems loosely tufted, 2-3

feet high: panicle 5-7 inches long, interrupted, more or less pubescent throughout: spikelets 5-8-flowered: second glume oblong, abruptly acute, flowering glumes oval, acute: paleas linear, acute, longer than the glumes. Oregon.

Var. littoralis Vasey, Beal l. c. Smooth and glaucous: stems 5-10 inches high, from creeping rootstocks: panicle dense, secund, 2-3 inches long: spikelets usually 5-flowered, the second glume ovate-lanceolate, 3-nerved, flowering glumes oval, acute: awns $\frac{1}{4}$ -1 line long. On sand banks along the coast of Oregon.

F. heterophylla Lam. Fl. Fr. ed. 1, 600. A densely caespitose perennial: stems slender, 2-3 feet high: sheaths smooth: leaves smooth, soft, convolute, those of the stem usually 3, flat: panicle 3-8 inches long, lax, nodding its branches in twos or threes: spikelets linear-oblong, 3-6-flowered: empty glumes unequal, very acute, the second subulate-lanceolate, 3-nerved; the lateral nerves short: flowering glumes linear-lanceolate, 3-4 lines long, very acute: awns half as long as the glumes or longer: paleas linear-oblong. Washington to Brit. Columbia and Michigan.

49 BROMUS L. Sp. 76.

Annual or perennial grasses with flat leaves and numerous spikelets in terminal panicles, the pedicels thickened at the summit. Spikelets few to many-flowered, the two lower glumes empty, unequal, acute: flowering glumes rounded on the back, or sometimes compressed-keeled, 5-9-nerved, the apex usually 2-toothed, generally bearing an awn just below the summit. Palea shorter than the glumes. 2-keeled. Stamens usually 3. Stigmas sessile, plumose, inserted below a hairy cushion-like appendage at the top of the ovary. Grain adherent to the palea.

§ 1 EUBROMUS Annuals or biennials with empty glumes rather broad and flowering glumes broadly elliptic to oblong-elliptic. All introduced from Europe.

B. SECALINUS L. Sp. 76. Stems 1-3 feet high, erect, smooth: sheaths usually shorter than the internodes: ligules $\frac{1}{2}$ line long, erose leaves 2-6 inches long, 1-3 lines wide, sometimes rough or hairy: panicle open, its branches ascending or drooping: spikelets turgid, glabrous, 6-10-flowered: empty glumes scabrous toward the apex, the first 3-nerved, acute, second longer and broader, 7-nerved, obtuse: flowering glumes 3-4 lines long, broad, obtuse, rough toward the apex, awnless or bearing a straight awn between the obtuse teeth: paleas about equalling the glumes. Common in fields everywhere.

B. RACEMOSUS L. Sp. ed. 2, 144. Stems erect. 1-3 feet high, smooth, or sparingly pubescent below the panicle: sheaths shorter than the internodes: ligules 1 line long: leaves 1-9 inches long, $\frac{1}{2}$ -4 lines wide, pubescent: panicle 1-10 inches long, its branches erect or ascending: spikelets erect, 5-11-flowered: empty glumes acute, the first 3-nerved, the second longer and broader, 5-9-nerved; flowering glumes broad, $3\frac{1}{2}$ -4 $\frac{1}{2}$ lines long, obtuse, smooth and shining, the nerves prominent: awns straight, 3-4 lines long: paleas shorter than the glumes. Common in meadows and waste places.

VAR. COMMUTATUS Hook. f. Steud. Fl. Brit. 1sl. 451. Panicle rather broader: spikelets larger. Common in waste places.

B. HORDEACEOUS L. Sp. 77. *B. mollis* L. Stems 8-36 inches long, erect, often slender, usually pubescent below the panicle: sheaths shorter than the internodes, mostly pubescent: ligules $\frac{1}{2}$ line long: leaves 1-7 inches long, 1-3 lines wide, pubescent: panicle generally contracted, its branches erect or

ascending, 1-3 inches long: spikelets appressed-pubescent: empty glumes acute, the first 3-nerved, the second longer, 5-7-nerved: flowering glumes broad, obtuse, $3\frac{1}{2}$ - $4\frac{1}{2}$ lines long. In fields and waste places.

VAR. *GLABRESCENS* Shear U. S. Dept. Agr. Div. Agrost. Bull. 23, 20. Spikelets glabrous or only scabrous throughout. In fields and waste places.

B. BRIZÆFORMIS F. & M. Ind. Sem. Hort. Petrop. iii, 30. Stems 8-24 inches high, erect, glabrous; sheaths shorter than the internodes: the lower pubescent with soft villous hairs: ligules 1 line long, erose-truncate: leaves pubescent: panicle 1-8 inches long, open, the branches ascending or often drooping: spikelets few, $\frac{1}{2}$ -1 inch long, compressed: empty glumes very obtuse, the first 3-5-nerved, the second larger, 5-9-nerved: flowering glumes, 3-4 lines long, very broad, obtuse, 6-nerved, not awned. In fields and waste places.

§ 2 *STENOBROMUS* Griseb. Annuals or biennials with mostly narrow glumes and rather long awns.

B. MADRITENSIS L. Cent. Pl. i, 5. A tufted annual: stems erect, or somewhat geniculate at base, smooth, 1-2 feet high, sheaths smooth, or the lower slightly pubescent: ligules about 1 line long, subtruncate and acerate: leaves 2-7 inches long, 1-2 lines wide: panicle erect, 2-6 inches long, oblong-ovoid, the lower branches somewhat spreading, 6-12 lines long: spikelets $1\frac{1}{2}$ -2 inches long, nearly smooth to scabrous, 7-11-flowered: empty glumes lanceolate, acuminate, the first 1-nerved, 5-7 lines long, the second 3-nerved, 7-8 lines long: flowering glumes linear-lanceolate 7-9 lines long, distinctly 3- or faintly 5-7-nerved, with 2 acute, hyaline teeth, bearing a long rough somewhat curved awn. Southern Oregon to California, naturalized from Europe.

B. GUSSONI Parl. Rar. Pl. Sic. 2, 8. An erect annual, 6-30 inches high: sheaths pilose-pubescent: ligules 1-2 lines long, rounded above: leaves pilose both sides: panicle lax, 4-8 inches long, the upper part somewhat drooping: spikelets usually 3-7-flowered, 4-6 lines long: empty glumes smooth, lanceolate acuminate, the first 8-10 lines long, strongly 1-nerved, the second broader and longer, prominently 3-nerved: flowering glumes 5-nerved, 10-12 lines long: awn stout, 2-2 $\frac{1}{2}$ inches long, very rough. In waste places, Washington to California and Arizona.

B. RUBENS L. Cent. Pl. i, 5. A tufted annual: stems about 10 inches high, erect, pubescent toward the top: sheaths pubescent: ligules $\frac{1}{2}$ -1 line long, lacinate-dentate: leaves 2-7 inches long, pubescent both sides: panicle erect, compact, ovoid, usually purplish, 2-4 inches long: spikelets mostly 7-11-flowered, 1-1 $\frac{1}{4}$ inch long: empty glumes acuminate, smooth to scabrous, the first narrow, 1-nerved, 3-5 lines long; the second broader and longer, 3-nerved; flowering glumes 7-8 lines long, lanceolate, acute, 5-nerved, scabrous, deeply cleft at the apex into 2 long-acuminate hyaline teeth: awns straight, 8-12 lines long. In waste places: introduced from Europe.

B. STERILIS L. Sp. 77. Stems $1\frac{1}{2}$ -3 feet high, erect, smooth, from an annual or biennial root: sheaths usually shorter than the internodes, the lower sometimes pubescent: ligules 1 line long: leaves 3-9 inches long, 1-3 lines wide, usually more or less pubescent: panicle 5-10 inches long, its branches ascending, or often widely spreading, not one-sided, stiff: spikelets few, 5-10-flowered, spreading or pendulous: empty glumes acuminate, glabrous, the first 1-nerved, the second longer, 3-nerved; flowering glumes 6-8 lines long, acuminate, 7-nerved, scabrous on the nerves: awns 7-12 lines long. In waste places; introduced from Europe.

B. TECTORUM L. Sp. 77. Stems 6-24 inches high, erect, from an annual root, simple, smooth: sheaths usually exceeding the internodes, at least

the lower ones softly pubescent: ligules 1-2 lines long: leaves 1-4 inches long, 1-2 lines wide, softly pubescent: panicle 2-6 inches long, open, its branches slender and drooping, somewhat one-sided: spikelets numerous, 5-8-flowered, on capillary recurved slender pedicels: empty glumes acuminate, usually rough or hirsute; the first 1-nerved, the second longer, 3-nerved; flowering glumes 4-6 lines long, acuminate, 7-nerved, usually rough or hirsute: awns 6-8 lines long. In fields and waste places: naturalized from Europe.

§ 2 ZERNA Panz. Short-lived perennials, usually with a weak drooping panicle and more or less pubescent flowering glumes.

B. Pacificus Shear U. S. Dept. Agr. Div. Agrost. Bull. 23, 38. Stems stout, leafy, pubescent at the nodes, 3-6 feet high: sheaths mostly retrorsely pilose: ligules $1\frac{1}{2}$ -2 lines long rounded above, somewhat lacerate-dentate: leaves 8-14 inches long, 4-7 lines wide, sparingly pilose above, scabrous beneath: panicle dense, drooping, its lower branches secund: spikelets $1\frac{1}{4}$ inch long, 7-11-flowered, coarsely pubescent throughout: empty glumes acute, the first 1-nerved, or rarely with 2 short lateral nerves, 3-4 lines long, the second broader and 3-5-nerved; flowering glumes inconspicuously 7-nerved, broadly lanceolate, emarginate, 6-7 lines long: awn straight, 2-3 lines long. In moist thickets near the sea, Clatsop County, Oregon.

B. Orcuttianus Vasey Bot. Gaz. x, 223. An erect perennial! 2-5 feet high, sheaths pubescent: ligules $\frac{1}{2}$ line long: leaves nearly smooth, 5-10 inches long, 3-9 lines wide: panicle erect, thin, 5-7 inches long, its branches in twos and threes, bearing 2-3 spikelets each, spreading: spikelets 4-8-flowered the first empty glume linear, acute, 1-3-nerved: 4 lines long, the second linear, almost acute, 3-nerved, 5-6 lines long, flowering glumes, scabrous, rounded on the back, lance-elliptical, 5-7-nerved, 6-7 lines long, obtuse: awn 2-6 lines long: palets linear. On the high mountains Washington to lower California.

B. vulgaris Shear l. c. 43. Stems slender, erect, 30-40 inches high, pubescent below the nodes, which are retrorsely bearded: sheaths pilose, with spreading or reflexed hairs: ligules truncate, 1-2 $\frac{1}{2}$ lines long: leaves 7-12 inches long, 2-6 lines wide, thinly pilose above, glabrous or sparsely pilose beneath: spikelets covered with a short coarse pubescence, the first narrow, very acute 3-4 lines long: 1-nerved, the second much broader and longer, 3-nerved, scabrous on the back: flowering glumes about 6 lines long, sparsely pubescent, 5-nerved, awns slender, 5-6 lines long. In open woods. California to Brit. Columbia and Montana.

Var. eximius Shear l. c. 44. More erect and robust: sheaths and leaves glabrous: flowering glumes pubescent only on the midnerve and near the base. Eastern Oregon and Washington.

V. robustus Shear l. c. 44. Tall and leafy: sheaths and leaves sparingly pilose: panicle larger. Along the coast, Oregon to Brit. Columbia.

B. lævipis Shear l. c. 45. Stems 30-40 inches high, from short creeping rootstocks, pubescent just below the nodes: sheaths glabrous: ligules $1\frac{1}{2}$ -2 lines long, truncate, entire or lacerate-dentate: leaves 6-12 inches long, 2-4 lines wide: panicle lax, drooping, 7-10 inches long: spikelets drooping, narrow, terete, 5-9-flowered: empty glumes smooth, the first acute, 3-nerved, 3-6 lines long, the second broader, 5-nerved, 5-7 lines long: flowering glumes obtuse, 7-nerved, 6-8 lines long, densely pubescent on the margins and on the back at the base, hyaline and usually brownish-yellow at the apex: awn straight $2\frac{1}{2}$ -3 lines long: palets about 1 line long, shorter than the glumes. In thickets, Washington to California in the Coast and Cascade Mountains.

B. Suksdorfii Vasey Bot. Gaz. x, 223. An erect coarse tufted per-

ennial: stems smooth: or pubescent just below the nodes, 2-3 feet high: sheaths smooth: ligules about $\frac{1}{2}$ line long, truncate, dentate: leaves usually 5 or 6, 4-8 inches long, 5-6 lines wide, rather abruptly acuminate, firm and smooth; panicle narrow, erect, rather dense, 3-8 inches long, its branches erect, or ascending, the longest 1-2 inches long: spikelets 5-9-flowered, 1- $1\frac{1}{2}$ inches long, terete at first: empty glumes glabrous, or scabrous on the nerves the first acuminate-lanceolate, 1-nerved, or sometimes with a pair of short lateral nerves, 5-6 lines long; the second broader, subacute, 3-nerved, 6-7 lines long: flowering glumes oblong-lanceolate subacute, 7-8 lines long, 5 or 7-nerved, appressed-pubescent near the base, emarginate at the apex: awn 1-2 lines long: paleas about $\frac{3}{4}$ as long as the glumes. In open places on the high mountains, Washington to California.

B. INERMIS Leyss. Fl. Hal. 16. An erect smooth perennial: stems rather stout, smooth, 2-3 feet high: sheaths smooth: ligules $\frac{1}{2}$ -1 line long, subtruncate, somewhat lacerate: leaves smooth or minutely scabrous, 6-10 lines long, 2-6 lines wide: panicle, 5-10 inches long: spikelets narrow, terete, 1- $1\frac{1}{4}$ inches long; empty glumes smooth, the first narrow, acute, 1-nerved 2- $2\frac{1}{2}$ lines long; the second subacuminate, 3-nerved, 3-4 lines long: flowering glumes obtuse, emarginate, 5-nerved, 6-7 lines long: glabrous, with or without a short awn: palea equalling the glumes. In fields and waste places: introduced from Europe.

§ 3 **CERATOCLOA** Beauv. as genus. Spikelets large, strongly compressed and more or less keeled.

B. marginatus Nees in Steud. Syn. Pl. Gram. 322. *B. breviaristatus* Buckley. A densely tufted coarse perennial: stems erect; 2-4 feet high, mostly pubescent or puberulent: sheaths pilose-pubescent: ligules $1\frac{1}{2}$ -2 lines long, lacinate: leaves somewhat sparsely pilose throughout, rather rough 6-12 inches long, 3-6 lines wide: panicle erect, rather narrow, usually 4-8 inches long, the lower branches somewhat spreading in flower, 1- $3\frac{1}{2}$ inches long: bearing 2 spikelets: spikelets 1-2 inches long, lateral compressed, usually 7-9-flowered, erect or ascending: empty glume rather broad, scabrous, the first subacute, 3- or 5-nerved, 4-6 lines long, the second broader, obtuse, 6-7 lines long, 5-7-nerved, the lateral nerves broad: flowering glumes ovate-lanceolate, acute, coarsely pubescent, 6-8 lines long, 7-nerved, with short hyaline, teeth at the apex: and a stout straight awn 2-3 lines long: paleas almost equalling the glumes. Common from California to Alaska and the Rocky Mountains.

Var. latior Shear. l. c. 55. Larger and stouter: panicle larger with the lower branches 2-10 inches long, with the type.

Var. seminudus Shear l. c. 55. More leafy and less pubescent or nearly smooth, throughout: empty glumes glabrous or scabrous on the nerves. With the type.

B. polyanthus Scribn. & Shear l. c. 56. A rather stout erect perennial: stems erect, smooth, or puberulent at the nodes, 2-3 feet high: sheaths smooth, or sparsely pilose: ligules about 1 line long, rounded: leaves mostly scabrous: panicle elongated, erect, its branches usually short and erect or slightly spreading: spikelets $1\frac{1}{2}$ -2 inches long, 7-11-flowered: empty glumes broad, smooth or somewhat scabrous, the first 3-nerved, 3-4 lines long, the second 4-7-nerved, obtuse, 6- $6\frac{1}{2}$ lines long: flowering glumes 7-nerved, 6-9 lines long, smooth or scabrous, obtuse, emarginate, with broad hyaline margins: awn 2-4 lines long. Washington to California and Wyoming.

B. Sitchensis Bong. Veg. Sitc. 173. Stems stout, leafy, smooth, 4-6 feet high; from a perennial root: sheaths shorter than the internodes, smooth: ligules large, rounded, entire or somewhat lacerate, $1\frac{1}{2}$ - $2\frac{1}{2}$ lines long: leaves 8-16 inches long, 5-7 lines wide, sparingly pilose above, smooth beneath: panicle large, lax, drooping, 10-14 inches long: its lower

SCRIBNERIA

branches 8-12 inches long, weak, spreading, usually bearing 1-3 spikelets on very slender pedicels: spikelets 1-3 inches long: empty glumes acute, smooth, or scabrous on the nerves, 4-6 lines long; the second 5-7 nerved, 6-7 lines long: flowering glumes broadly lanceolate, acute, 7-8 lines long, 7-nerved, shortly bidentate at the apex, with an awn 3-5 lines long: palea shorter than the glumes. Washington to Alaska, near the coast.

B. carinatus H. & A. Bot. Beech. 403. Stems 20-30 inches high, slightly pubescent at the nodes: sheaths mostly shorter than the internodes, retrorsely soft-pilose: ligules $1\frac{1}{2}$ -2 lines long, sublacinate: leaves mostly narrow 4-10 inches long, $1\frac{1}{2}$ -3 lines wide thinly pilose both sides: panicle pyramidal, somewhat drooping: spikelets $1\frac{1}{4}$ inches long, 5-9-flowered: empty glumes lanceolate, acute, glabrous to slightly scabrous; the first distinctly 3-nerved, or sometimes obscurely 5-nerved, 4-5 lines long, the second 5-nerved, 5-7 lines long, flowering glumes 7-nerved, puberulent or short-pubescent, 7-8 lines long, bifid at the apex and tapering into an awn 4-5 lines long; palea nearly equalling the glumes. Washington to California and Nevada.

B. Hookerianus Thunber Bot. Wilkes, ii, 493. An erect tufted perennial 20-30 inches high: sheaths smooth to densely hairy, ciliate at the throat: ligules $\frac{1}{2}$ -1 line long, leaves 7-12 inches long: 2-3 lines wide: panicle 7-15 inches long: spikelets 6-10-flowered: empty glumes smooth, compressed, acute; the first 5-nerved, 6-8 lines long, the second 7-8-nerved, 7-8 lines long: flowering glumes oval-lanceolate, scabrous or pubescent, 9-nerved, 7-8 lines long; awn 3-7 lines long. Brit. Columbia to California.

Tribe 8 Hordeæ Spikelets one-to several-flowered, usually hermaphrodite, sessile along the common rachis, forming a simple or compound spike. Glumes awned or awnless.

50 SCRIBNERIA Hack. Bot. Gaz. xiii, 105.

Annual grasses with slender stems and very slender spikes. Spikelets one-flowered, sessile and half embedded in the alternate notches of a more or less articulated usually simple spike. Rachella very short, articulated above the lower glume, extended as a short hairy awn beside the floret. Empty glumes 2, flowering glumes a third shorter than the first, membranous, keeled, bearing an awn between the teeth. Palea longer than the glumes. Stamens 1. Stigmas sessile, feathery. Grain free, linear, laterally compressed, with a groove.

S. Bolanderi Hack. Bot. Gaz. xiii, 105. Stems slender, tufted, often geniculate and with a few branches from the base, 2-12 inches high: sheaths loose, scarious-margined: ligules a line or more long, acute: leaves 3-10 lines long, convolute, mucronate: spike 1-4 inches long: very slender, spikelets 2-3 lines long, solitary or sometimes 2 at each joint; glumes very thick, except the first, 3-nerved, scarious-margined; the second slightly shorter and 2-3-nerved: flowering glumes indistinctly 5-nerved, smooth and shining below, scabrous near the irregularly 2-toothed apex, the mid-nerve excurrent as an awn nearly as long as the glume. Along roadsides, southern Oregon to California.

51 LOLIUM L. Sp. 83.

Annual or perennial grasses with flat leaves and terminal spikes. Spikelets several-flowered, solitary, sessile, alternate in the notches of the usually continuous rachis, compressed, the edge of the spikelets turned toward the rachis: glumes rigid, the lower one

empty in the lateral spikelets and the two lower ones empty in the terminal one: flowering glumes rounded on the back, 5-7-nerved: palets 2-keeled. Stamens 3. Styles distinct, very short, with plumose stigmas. Grain adherent to the palets.

L. PERENNE L. Sp. 83. Stems 6-30 inches high, erect, simple, smooth, from a perennial root: sheaths shorter than the internodes: ligules very short: leaves 2-5 inches long: 1-2 lines wide, spike 3-8 inches long: spikelets 5-10 flowered, 4-6 lines long, empty glumes shorter than the spikelets, strongly nerved; flowering glumes 2-3 lines long, obscurely nerved, acuminate or awned, the awn sometimes nearly as long as the glume. Common in waste places: naturalized from Europe.

L. TEMULENTUM L. Sp. 83. Glabrous throughout: stems 2-4 feet high, erect, simple, from an annual root: sheaths longer than the internodes: ligules a line long or less: leaves 4-10 inches long, 1-3 lines wide, smooth beneath, rough above: spike 4-12 inches long: spikelets 4-8-flowered, 5-9 lines long, the strongly nerved empty glumes equalling or exceeding the obscurely nerved flowering ones. In fields: naturalized from Europe.

52 AGROPYRON J. Gärtn. Nov. Comm. Petrop. xiv, pt. 1, 539.

Annual or perennial grasses with flat or involute leaves and terminal spikes. Spikelets 3- to several-flowered, sessile, solitary and alternate at each notch of the usually continuous rachis, the side of the spikelet turned toward the rachis. Glumes rounded on the back, the two lower empty: flowering glumes rigid, rough on the back, 5-7-nerved, usually acute or awned at the apex. Palets 2-keeled. Stamens 3. Styles very short, distinct. Stigmas plumose. Grain pubescent at the apex, usually adherent to the palet.

A. divergens Nees in Steud. Syn. Pl. Gram. 347. A slender densely tufted glaucous perennial 1-3 feet high: lower sheaths longer than the internodes, upper ones shorter: ligules very short: basal leaves numerous, 4-12 inches long: those of the stem 2-4 inches long, all more or less convolute and setaceous, nearly smooth: spikelets 3-8 inches long, slender: spikelets 3-6-flowered; first empty glumes 3 lines long, 3-nerved, the margins scabrous; the second 4 lines long, 5-nerved, with the midrib at one side, awnless; flowering glumes, 4-5 lines long, plainly 5-nerved above: awn stout, diverging or recurved, longer than the glumes. Common on dry plains east of the Cascade range. Brit. Columbia to California and the Rocky Mountains.

Var. inermis Scribn. & Smith U. S. Dept. Agr. Div. Agrost. Bull. 4, 27. Empty glumes unequal, narrowly lanceolate, acute, 4-6 lines long; flowering glumes 5-6 lines long, smooth: acute, or acuminate, awnless or with a straight or spreading awn shorter than the glume. Eastern Washington to Brit. Columbia and Idaho.

Var. tenuispicatum Scribn. & Smith l. c. Stems 2-3 feet high: leaves very narrow, spikes slender, flexuous, 3-6 inches long: spikelets 5-7 lines long: awns 5-9 lines long, slender, straight, curved or divergent. On high dry plains, eastern Oregon to Brit. Columbia, Montana and Wyoming.

A. Vaseyi Scribn. & Sm. l. c. Stems rigid, erect, wiry, 1-1½ feet high, glabrous, or glaucous: sheaths glaucous, shorter than the internodes: ligules very short, leaves minutely strigose-pubescent above, rigid, 1-6 inches long, 1 line or less wide: spikes very slender, 2-4 inches long: spikelets 4-5 lines long, 3-5-flowered: empty glumes oblanceolate, acute

or acuminate, slightly unequal, scarious along the margins 3-4 lines long: flowering glumes 4 lines long, lanceolate, acute, tipped with a stout divergent awn 4-5 lines long. On dry plains, eastern Oregon and Washington to the Rocky Mountains.

A. caninum Beauv. Agrost. 102. Stems 1-3 feet high, erect, smooth: sheaths usually shorter than the internodes, smooth, or the lower sometimes pubescent: ligules short: leaves 3-9 inches long, 1-3 lines wide, smooth beneath rough above: spikes 3-8 inches long, sometimes one-sided, often nodding at the top: spikelets 3-6-flowered: empty glumes $4\frac{1}{2}$ -6 lines long, 3-5-nerved, acuminate, awn-pointed or bearing an awn. 1-3 lines long; flowering glumes 4-5 lines long, usually scabrous toward the apex, acuminate into an awn sometimes twice their own length. Eastern Oregon to Brit. Columbia, New Brunswick and North Carolina: also in Europe.

A. tenerum Vasey Bot. Gaz. x, 258. Stems 1-3 feet high, erect, often slender, glabrous: sheaths usually shorter than the internodes, glabrous: ligules very short: leaves 3-10 inches long 1-2 lines wide, flat, or involute, rough: spike 3-7 inches long, usually narrow and slender: spikelets 3-5-flowered: empty glumes 4-6 lines long: acuminate or short-awned, 3-5-nerved, scabrous, on the margins: flowering glumes 5-6 lines long, 5-nerved, awn-pointed or short-awned, scarious-margined, often rough toward the apex. On dry plains, eastern Oregon to Brit. Columbia and Minnesota.

Var. longifolium Scribn. & Smith l. c. 30. Stems 3-4 feet high, smooth, and shining, rigid: leaves involute, nearly as long as the stems, long attenuate-pointed: spike slender, cylindrical, 9-10 inches long: glumes all short-awned. Northwestern California to Brit. Columbia.

A. brevifolium Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11, 55. Stems slender, densely cespitose, 12-16 inches high, usually geniculate at the lower nodes, smooth: lower sheaths scabrous and somewhat purplish, smooth: ligules short: leaves $1\frac{1}{2}$ - $3\frac{1}{2}$ inches long, 1-2 lines wide, very acute, strigose, scabrous above, very smooth beneath: spikelets approximate, usually 3-flowered, empty glumes narrowly lanceolate, 2-3-nerved, scabrous on the keel, short-awned; flowering glumes 6 lines long, 5-nerved, scabrous on the back, short-awned. On mountain sides, eastern Wash.

A. violaceum Vasey Spec. Rep. U. S. Dept. Agr. 45. Stems 6-24 inches high, erect, smooth: sheaths usually shorter than the internodes: ligules very short: leaves 2-6 inches long, 1-3 lines wide, flat or involute, rough, or sometimes smooth beneath, spikes 1-6 inches long, 2-3 lines broad: spikelets 3-6-flowered: empty glumes broad: usually purplish, scabrous-margined, 5-7-nerved, 4-6 lines long, acute, or acuminate, sometimes awn-pointed or long-awned: flowering glumes often purplish, 5-7-nerved, scabrous-margined, 4-6 lines long, acuminate or short-awned. Idaho to Alaska and Ontario: also in Europe and Asia.

A. Scribneri Vasey Bull. Torr. Bot. Club x, 128. Stems densely tufted, geniculate near the base, slender, 16-30 inches high, sheaths longer than the internodes: ligules obsolete: leaves 1-3 inches long, involute, narrow and rigid: spikes 2-4 inches long: spikelets 3-6-flowered: empty glumes 3-4 lines long, linear-lanceolate, 3-5-nerved, acuminate into a long point: flowering glumes oblong-lanceolate, 4 lines long, smooth, the mid-nerve extended into a strong spreading or recurved awn. On high mountains Washington to California and the Rocky Mountains.

A. Smithii Rydb. *A. glaucum* of American Authors, not of R. & S. Glabrous: stems rigid, erect, 1-4 feet high: sheaths smooth, shorter than the internodes: ligules very short: leaves rigid, bluish-green, smooth or slightly scabrous beneath, rough-scabrous on the margins, becoming in-

volute, 4-7 inches long, 2-3 lines wide, those of sterile shoots narrower and sometimes half as long as the stems: spikes 3-7 inches long; spikelets 6-12 lines long, 7-13-flowered: empty glumes lanceolate, acuminate or awn-pointed, scabrous on the nerves: flowering glumes 4-6 lines long, narrowly lanceolate, acute to awn-pointed, rounded on the back; smooth or thinly pubescent. In meadows, Oregon to Brit. Columbia and Minnesota.

Var. molle Scribn. & Smith l. c. Glumes and rachis more or less villous-pubescent. Washington to the Saskatchewan and New Mexico.

A. Elmeri Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11, 54. Stems erect 3-5 feet high, from strong creeping rootstocks: sheaths smooth, the lower ones longer than the internodes ligules short, minutely fringed along the edge: leaves 6-12 inches long, 2-6 lines wide, strigose, scabrous above, smooth beneath, long attenuate-pointed spikelets 6-10-flowered: empty glumes lanceolate, very acute or subaristate, rigid, about 1 line long, 3-nerved, scabrous on the nerves: flowering glumes broadly lanceolate, sharply acuminate, 5-nerved, short-pubescent on the back. On sandy banks of Snake river, Washington.

A. dasystachyum var. subvillosum Scribn. & Smith l. c. 33. More or less glabrous: stems slender 2-4 feet high: sheaths nearly as long as the internodes: ligules a mere ring: leaves of sterile shoots $\frac{1}{4}$ - $\frac{1}{2}$ as long as the stems: spikes 5-7-flowered: empty glumes ovate-lanceolate acute to acuminate: flowering glumes 3-5 lines long, pubescent to lanate. Eastern Washington to Montana and Colorado.

A. lanceolatum Scribn. & Smith l. c. 34. Pale yellowish-green or glaucous: stems 2-3 feet high: sheaths somewhat inflated, shorter than the internodes: ligules very short; leaves 6-12 inches long, about 2 lines wide, scabrous beneath and on the margins; pubescent to thinly hirsute above; spikes 4-6 inches long; spikelets 5-10 lines long, 4-7-flowered; empty glumes unequal, narrowly lanceolate, or oblanceolate, acuminate, 3-4 lines long, 3-5-nerved; scabrous on the nerves; flowering glumes 4-7 lines long, broadly lanceolate, acute, mucronate, truncate or bidentate, rounded on the back, more or less pubescent, 3-nerved and scabrous toward the apex. Eastern Oregon and Washington to Idaho.

A. pseudorepens Scribn. & Smith l. c. 34. Stems 1-3 feet high, erect or ascending from a geniculate base: sheaths glabrous, shorter than the internodes: ligules 1 line long or less; leaves scabrous throughout, 4-8 inches long, 1-3 lines wide; spikes 3-8 inches long: spikelets 3-7 flowered, 8-9 lines long, erect, and appressed: empty glumes linear-lanceolate acuminate or awn-pointed, 5-nerved, scabrous on the nerves and scarious-margined: flowering glumes linear-oblong, acuminate, rounded on the back, 5-nerved, scabrous. Washington to Brit. Columbia, Nebraska and Texas.

Var. magnum Scribn. & Smith l. c. 35. Robust, 3-4 feet high: leaves 8-22 inches long: spikes 6-8 inches long, one-side; spikelets crowded, acute, an inch long. Idaho to Montana and Colorado.

A. REPENS Beauv. Agrost. 146. Stems 1-4 feet high, from long running jointed rootstocks: sheaths usually shorter than the internodes, glabrous: leaves 3-12 inches long, 1-5 lines wide, smooth beneath, scabrous above: spikes 2-8 inches long, strict: spikelets 3-7-flowered: empty glumes strongly 5-7-nerved, usually acute, or awn-pointed: flowering glumes acute or short-awned. Naturalized from Europe.

53 HORDEUM L. Sp. 84.

Annual or perennial grasses with flat leaves and terminal cylindrical spikes. Spikelets 1-flowered, usually in threes at each joint of the rachis, the lateral generally imperfect. Rachilla

produced beyond the flower, the lower empty glumes often reduced to awns and forming an apparent involucre around the spikelets. Empty glumes rigid: the flowering ones rounded on the back, 5-nerved at the apex, awned. Palets about equalling the glumes, 2 keeled. Stamens 3. Styles very short, distinct. Grain usually adherent to the glume, hairy at the summit.

H. jubatum L. Sp. 85. Stems 10-30 inches high, erect, usually slender smooth, sheaths usually shorter than the internodes: smooth: ligules $\frac{1}{2}$ line long, or less: leaves 1-5 inches long, 1-2 lines wide, erect, rough: spikes 2-4 inches long: spikelets usually in threes, the central one, containing a perfect flower; lateral ones imperfect: empty glumes consisting of slender rough awns 1-2 $\frac{1}{2}$ inches long: flowering glumes of the central spikelets 3-4 lines long: scabrous at the apex, bearing a slender rough awn 1-2 $\frac{1}{2}$ inches long, the corresponding glume of the lateral spikelets short-awned. On dry soil eastern Oregon to California, Pennsylvania and Labrador.

H. MARITIMUM With. Arrang. 172. A smooth somewhat glaucous annual: stems 6-18 inches long: sheaths about as long as the internodes, the upper one inflated: ligules a mere ring: leaves 1-3 inches long, mostly involute: spike subterete, scarcely exerted, 1-2 inches long, the rachis breaking up when mature: spikelets an inch long, including the stiff awns: empty glumes all lanceolate, not ciliate, one of each lateral spikelet a little broader. Southwestern Oregon to California: introduced from Europe.

H. GUSSENEANUM Parl. Pl. Palerm. 244. Stems smooth often decumbent, 10-16 inches long: leaves thin, flat, finely pubescent, 1-3 inches long, about 1 line wide: spikes subterete, exerted, 1-2 inches long, breaking up when mature, empty glumes reduced to mere bristles, 6-8 lines long, except the inner one to each lateral spikelet is twice as wide as the others: flowering glumes oval, rough, 5-nerved, the awn 8 lines long. Oregon to California, introduced from Europe.

H. MURINUM L. Sp. 85. A coarse decumbent annual: sheaths about equalling the internodes: ligules very short: leaves 1 $\frac{1}{2}$ -3 inches long, often hairy: spike 2-4 inches long: often partly included in the upper sheath slightly compressed, soon breaking up when mature: spikelets, including the awns, 1-2 inches long, empty glumes of the middle spikelets lanceolate, with ciliate margins: flowering glumes scabrous above, flat on the back, 8-10 lines long. In waste places, introduced from Europe.

H. pusillum Nutt. Gen. i, 87. Stems 4-16 inches high, smooth: sheaths loose, usually shorter, than the internodes, smooth, the upper often enclosing the base of the spike: ligules very short: leaves 1 $\frac{1}{2}$ -3 inches long: $\frac{3}{4}$ -2 lines wide, smooth beneath, rough above: spike 1-3 inches long, spikelets usually in threes: glumes awned, the empty ones scabrous: flowering glumes smooth, that of the central spikelets 3-4 lines long: short-awned that of the lateral spikelets smaller. In dry soil California to Brit. Columbia Nebraska and Texas.

H. nodosum L. Sp. ed 2, 126. *H. pratense* Huds. Stems 1-4 feet high, often geniculate below, simple, smooth: sheaths shorter than the internodes: ligules $\frac{1}{4}$ line long, truncate: leaves 1 $\frac{1}{2}$ -6 inches long, 1-3 lines wide, flat, rough: spike 1-4 inches long, flat, often arcuate: empty glumes awn-like: flowering glumes of the central spikelets 3-4 lines long, bearing an awn 3-6 lines long; that of the lateral spikelets much smaller. Common in meadows, California to Alaska, Indiana and Texas also in Europe and Asia.

H. boreale Scribn. & Smith l. c. 24. Stems slender, erect, smooth: sheaths shorter than the internodes the lower ones pubescent: ligules very

short, leaves 4-6 inches long, 2-4 lines wide, scabrous: empty glumes awn-like 7-9 lines long, those of the lateral spikelets exceeding the other; flowering glume of the central spikelets 5 lines long, broadly lanceolate, scabrous toward the apex, bearing an awn about 5 lines long, that of the lateral spikelets smaller, subulate-pointed or short-awned. California to Alaska.

54 ELYMUS L. Sp. 93.

Tall grasses with flat or involute leaves and dense terminal spikes. Spikelets 2- to several-flowered, sessile, usually in pairs, sometimes 3 or more in the alternate notches of the continuous or jointed rachis, the empty glumes forming an apparent involucre to the clusters. Two lower glumes empty, narrow, acute or awned: flowering glumes shorter, rounded on the back, 5-nerved, usually bearing an awn. Paleas a little shorter than the glumes 2-keeled. Stamens 3. Styles very short distinct, with plumose stigmas. Grain sparsely hairy at the summit, adherent to the palea.

E. saxicolus Scribn. & Smith U. S. Dept. Agr. Div. Agrost. Bull. 11, 56. A rather slender wiry densely caespitose perennial: stems 3-5 inches high, pubescent: sheaths pubescent: ligules very short: leaves 3-10 inches long, 1-2 lines wide, pubescent on both sides, attenuate-pointed spikelets 2-5-flowered, about 9 lines long: empty glumes narrowly lanceolate, 1-3-nerved, about 3 lines long: awns divergent, 10-12 lines long: flowering glumes 6 lines long, smooth or slightly scabrous near the apex, rather broadly lanceolate and gradually tapering into a slender more or less divergent awn an inch long. Among boulders and rocky crevasses, summit of Mount Chapaca.

E. arenarius L. Sp. 83. Stems $1\frac{1}{2}$ -8 feet high, simple, usually softly pubescent at the summit: sheaths smooth, often glaucous, the lower longer and the upper shorter than the internodes: ligules very short: leaves 3-12 inches long, $1\frac{1}{2}$ -5 lines wide, flat or becoming involute, smooth beneath, rough above: spikes 3-10 inches long, usually strict: spikelets 3-9-flowered; empty glumes 8-14 lines long, 3-5-nerved, acuminate, more or less villous; flowering glumes 8-10 lines long, acute or awn-pointed, 5-7-nerved, usually very villous. On shores, California to Alaska and across the continent: also in Europe and Asia.

E. arenicolus Scribn. & Smith l. c. Cir. 9, 7. A stout erect glaucous perennial: stems simple, glabrous, 2-5 feet high; sheaths smooth or the upper ones strigose-pubescent, nearly as long as the internodes; ligules about $\frac{1}{2}$ line long, coarsely fimbriate: leaves rigid, deeply furrowed on both sides, strongly scabrous on the nerves, $1\frac{1}{2}$ -2 feet long, 1-4 lines wide, strongly involute and pungently pointed: spikes rather slender, 6-10 inches long, interrupted below: empty glumes subulate or narrowly lanceolate, rigid, scabrous above, 4-6 lines long: flowering glumes rounded on the back, acute, sparsely hirsute toward the base, 5-nerved, about 6 lines long. On sand-dunes along the Columbia river near the Dalles.

E. mollis Trin. Spreng. N. Endt. ii, 172. Stems stout, 3-7 feet high: sheaths smooth or more or less pubescent: ligules very short: leaves 16-20 inches long, 6-8 lines wide, strict and pungent: spike erect, 10-16 inches long: spikelets 5-8-flowered, more or less soft-pubescent: empty glumes 1- $1\frac{1}{2}$ inches long, 5-7-nerved: flowering glumes 8-10 lines long, 7-nerved. Along the coast, Washington to Alaska, and Maine to Nova Scotia.

E. flavescens Scribn. & Smith l. c. Bull. 8, 8. Stems stout, 2-4 feet high, usually pubescent just below the nodes: sheaths smooth, often somewhat glaucous, the lowest becoming loose and fibrous: ligules very short:

leaves 10-20 inches long, 2-4 lines wide, smooth beneath, scabrous above, gradually tapering into very acute pungent tips: spikes linear, sometimes branching and paniced: spikelets 3-6-flowered, 6-12 lines long, villous with long whitish or yellowish hairs: empty glumes lanceolate, subaristate-pointed: flowering glumes broadly lanceolate, very acute, densely silky-villous on the back: flowering glumes 6-7 lines long. On sand dunes along the Columbia river near the Dalles.

E. dasystachys Trin. Ledeb. Fl. Alt. i, 120. Stems stout, smooth, 2-3 feet high, from stout creeping rootstocks: sheaths smooth or scabrous, shorter than the internodes: ligules very short: leaves rigid, more or less involute, pungent-pointed, 4-18 inches long, 2-4 lines wide: spike strict, 3-6 inches long: spikelets 2 at each joint, 10-12 lines long, closely imbricated, 4-7-flowered: empty glumes, equal, 7-8 lines long, more or less ciliate, short-awned, narrowly lanceolate 3-nerved: flowering glumes, more or less pubescent, slightly ciliate, 10-12 lines long, short-awned. Washington to Alaska and Montana.

E. littoralis Turcz. Stems rather stout and somewhat rigid, erect, 3-4 feet high, glabrous: sheaths glabrous, the lower ones scarious, loose and sometimes bladeless: ligules very short, minutely ciliate: leaves 10-20 inches long, 2-3 lines wide, glabrous beneath, strongly strigose-pubescent above, very long acuminate-pointed, becoming involute: spikes 10-12 inches long, rather loosely flowered, often branched: spikelets 5-9-flowered: empty glumes narrowly lanceolate, scabrous on the keel, especially toward the rigid subulate apex: flowering glumes 7-9 lines long, lanceolate, very acute, or subaristate-pointed, 5-nerved, scarious margined rather densely pubescent on the back below, the upper third glabrous. Eastern Washington to Idaho.

E. condensatus Presl Rel. Hænk. i, 265. Stems erect, smooth, 2-10 feet high: sheaths glabrous, the upper ones shorter than the internodes: ligules 2-3 lines long, truncate: leaves 6-20 inches long, 3-11 lines wide, scabrous above: spike 4-16 inches long, usually stout, strict, often interrupted below, sometimes branched at the base: spikelets 3-6-flowered: empty glumes subulate, $4\frac{1}{2}$ -6 lines long, 1-nerved, usually rough: flowering glumes 4-5 lines long, generally awn-pointed, usually scabrous. Common from eastern Oregon and Washington to Brit. Columbia, Nebraska, Arizona and California.

E. triticoides Buckl. Proc. Acad. Phila. 99. Stems rather slender, 2-4 feet high: ligules very short: leaves 7-12 inches long, narrow, often involute, the upper equalling or exceeding the stem: spikes 3-8 inches long, erect: spikelets 4-8-flowered, sometimes glaucous: empty glumes linear-lanceolate, rigid, long-pointed, 4-6 lines long: flowering glumes firm, lanceolate, acuminate or short-awned, 7-nerved. Washington to California and the Rocky Mountains.

E. glaucus Buckl. l. c. *E. Americanus* Vasey & Scribn. Stems erect, 2-5 feet high, smooth: sheaths often shorter than the internodes, usually glabrous: ligules 1 line long or less: leaves 4-12 inches long, 2-8 lines wide, smooth beneath, sometimes scabrous above: spike 5-8 inches long, slender: spikelets appressed to the rachis, 3-6 flowered: empty glumes narrowly lanceolate, 4-6 lines long, acuminate or awn-pointed, rigid, 3-5-nerved: flowering glumes smooth or slightly scabrous, 5-6 lines long: bearing a slender straight awn 6-9 lines long. In moist soil California to Brit. Columbia, Ontario, Michigan and Arizona.

E. Canadensis L. Sp. 83. Stems erect, 2-5 feet high, smooth: sheaths usually shorter than the internodes: ligules very short: leaves 4-12 inches long, 5-10 lines wide, scabrous, sometimes glaucous: spike 4-12 inches long, stout, often nodding: spikelets spreading, 3-5-flowered: empty glumes narrowly lanceolate, or subulate, rigid, 3-5-nerved, 4-8 lines long,

tapering into an awn as long or longer than the body: flowering glumes 4-7 lines long, nearly smooth to hirsute, bearing a slender scabrous awn, 1-2 inches long. On river banks and bars, Oregon to Nova Scotia, Georgia and Texas.

E. CAPUT-MEDUSÆ L. Sp. 84. Stems slender 12-20 inches long, geniculate below: sheaths about equalling the internodes: ligules very short: leaves 2-3 inches long, involute: spike stout, $1\frac{1}{2}$ -2 inches long, dense: spikelets 1-2-flowered: empty glumes narrow, rough, spreading, about an inch long: flowering glumes hispid, 3-4 lines long, gradually tapering into an awn $2-2\frac{1}{2}$ inches long. On dry prairies, southwestern Oregon: introduced from Europe.

55 SITANION Raf.

Tall annual or perennial grasses with usually flat leaves and terminal spikes. Spikelets 1- to several-flowered, sessile, usually in pairs in alternate notches of the pointed rachis. Empty glumes forming an apparent involucre to the cluster: glumes very long, often 2-parted to the base, the divisions unequal, 2-cleft and long-awned: flowering glumes long-awned, 2-toothed or 3-awned. Palets a little shorter than the glumes, 2-keeled. Stamens 3. Styles very short, distinct, with plumose stigmas. Grain sparsely hairy at the summit, adherent to the palet.

S. elymoides Raf. Journ. Phys. lxxxix, 103. *Elymus Sitanion* Shultes. Stems simple smooth, 6-24 inches high: sheaths smooth to rough or hirsute, usually shorter than the internodes, the upper ones often inflated and enclosing the base of the spike: ligules short: leaves 2-7 inches long, $\frac{1}{2}$ -2 lines wide, usually scabrous, sometimes hirsute, flat or involute: spike 2-6 inches long: spikelets 1-5-flowered: empty glumes entire or divided, often to the base, the divisions subulate and bearing long unequal slender awns: flowering glumes 3-5 lines long, 5-nerved, scabrous toward the apex, bearing a long slender divergent awn 1-3 inches long. In dry soil, California to Brit. Columbia and Kansas.

S. glaber J. G. Smith. Stems stout, erect, densely cespitose, 12-20 inches high: sheaths loose, longer than the internodes, glabrous: leaves 2-6 inches long, glabrous beneath: spikes 2-4 inches long, barely exserted: awns of the flowering glumes $2-2\frac{1}{2}$ inches long. Washington to California.

S. villosum J. G. Smith. Stems stout, mostly erect, 10-15 inches high: sheaths densely hirsute: leaves short, flat, strigose-pubescent and somewhat hirsute: spike 3-4 inches long, enclosed in the upper sheath: empty glumes 3-8-parted, each part bearing a slender awn 2-4 inches long: flowering glume lanceolate, 3-awned, the middle awn stout, 4-5 inches long, the lateral ones slender and usually shorter. Common in dry ground about Pullman, Washington.

S. Leckenbyi Piper Fl. Palouse Reg. 32. Stems stout, erect, $2\frac{1}{2}$ -3 feet high: sheaths glabrous or on sterile shoots ciliate: leaves stiff, erect, 2-7 inches long, involute glabrous beneath, strigose above, sharply acuminate: spike 5-7 inches long, slender, usually erect, long-exserted: empty glumes 4, equal, $2\frac{1}{2}$ -3 lines long, entire, setaceous: flowering glumes lanceolate, 5-6 lines long, smooth, at base, scabrous above, bifid at the apex and tipped with a straight awn $1\frac{1}{2}$ -2 inches long. Bars of Snake river at Wawawai, Washington.

S. flexuosum Piper l. c. Stems tufted $1\frac{1}{2}$ -3 feet high, erect: sheaths glabrous or on sterile shoots villous: leaves 2-6 inches long, involute, strigose-pubescent on both sides, or the upper nearly smooth: spike slender, erect, 4 inches long, long-exserted: empty glumes subulate-setaceous, 1-2

lines long, tipped with an awn 5-6 lines long, sometimes with 2 very short lateral awns: flowering glumes lanceolate, smooth at the base, scabrous above, bifid, bearing a divergent awn $1\frac{1}{2}$ -2 inches long. Bars of Snake river at Wawawai, Washington.

S. Brodiei Piper l. c. Stems erect, $1\frac{1}{2}$ -2 feet high: leaves stiff, smooth on both sides, involute, 5-7 inches long: spike pale green, long-exserted, erect, $2\frac{1}{2}$ - $3\frac{1}{2}$ inches long: empty glumes subulate, entire, 4 lines long, bearing an awn 6 lines long: flowering glumes lanceolate, densely appressed-pubescent, 6 lines long, rarely with 2 short lateral awns. Bishop's Bar, Snake river, Washington.

CLASS 2, GYMNOSPERMÆ.

Monœcious or dicecious trees or shrubs, mostly evergreen, with usually rigid needle-like, subulate, or scale-like leaves. Ovules naked upon a scale, bract or disk, or within a more or less open perianth.

SYNOPTICAL KEY.

110 Taxaceæ Dicecious evergreens: flowers solitary and axillary: ovule solitary, in fruit a bony seed within a fleshy envelope or cup-shaped disk.

111 Pinaceæ Mostly monœcious and evergreen trees or shrubs: staminate flowers in aments: pistillate flowers in scaly aments becoming cones or berry-like, ovules 2 or more at the base of each scale.

ORDER 110 TAXACEÆ Lindl. Nat. Syst. ed. 2, 316.

Springly resinous trees or shrubs with scattered, in ours evergreen, linear leaves spreading in 2 ranks and dicecious axillary and solitary flowers achlamydeous and naked or surrounded by the imbricated and usually decussate bud-scales. Staminate flowers with the filaments monadelphous in a column, each filament surmounted by several more or less united pendent anther-cells, dehiscing longitudinally on the lower side, Pollen globose. Pistillate flowers of a solitary orthotropous ovule which in fruit becomes a bony-coated seed raised upon or more or less surrounded by or consolidated with a fleshy disk, cup or other coating. Embryo axile, in fleshy or farinaceous albumen. Cotyledons only 2, semiterete.

1 TAXUS L. Sp. 1040.

Trees or shrubs with evergreen spirally arranged short-pointed linear flat mucronate leaves, spreading so as to appear 2-ranked, and axillary and solitary sessile or subsessile very small aments. Staminate aments consisting of a few scaly bracts and 5-8 stamens, their filaments united to the middle: anthers 4-6-celled. Ovules solitary, axillary, erect, subtended by a fleshy annular disk, which is bracted at the base. Fruit consisting of the fleshy disk which becomes cup-shaped, red and nearly encloses the bony seed.

T. brevifolia Nutt. Sylva iii, 86 t. 108. A tree 20-90 feet high, by

1-3 feet in diameter, with slender spreading, or drooping branches: leaves 6-12 lines long, acuminate, and cuspidate, the margins somewhat revolute, bright green above, glaucous beneath, abruptly narrowed at the base into a short slender petiole: staminate aments $1\frac{1}{2}$ lines broad: fruit amber-red 3-6 lines in diameter, much flattened: seeds broadly ovate and somewhat flattened, acute: ovary 2 lines long. Common from western Brit. Columbia to California.

ORDER 111 PINACEÆ Lindl. Nat. Syst. ed. 2, 313.

Resinous trees or shrubs, mostly with evergreen narrow or scale like entire leaves and monoecious or rarely dioecious flowers. Staminate flowers reduced to the stamens only which are indefinite in number and often numerous, the filaments upon a central axis with the 2 or more anthers either adnate to the back of the connective or suspended from the under side of its scale-like or peltate summit, the cells dehiscing variously. Pistillate aments consisting of few to many scales, becoming a dry cone in fruit or fleshy and berry-like. Ovules naked, two or more at or on the base of each scale, adnate or free, erect or inverted. Seeds naked or winged, with chartaceous or crustaceous or sometimes bony testa. Embryo straight, axile, in fleshy oily albumen. Cotyledons two to several in a whorl.

TRIBE I CUPRESSINEÆ Scales of the fertile aments few, decussately opposite, apparently single, becoming a small cone or connate into a drupe-like globulus.

* Leaves opposite or in three's, never 2-ranked: flowers dioecious: fruit drupe-like, with bony ovate seeds.

1 **Juniperus** Ovules in pairs or solitary at the base of the fleshy scales: seeds 1-5 or more: fruit globose, ripening the second season.

** Leaves opposite: flowers monoecious: fruit a dry cone.

+ Cone subglobose, of spreading, peltate or cuneate scales: seeds one or more to each scale, angled or narrowly winged.

2 **Chamæcyparis** Leaves and branches more or less 2-ranked: seeds one or two to each scale.

+ + Leaves 2-ranked: cone oblong, of imbricated or valvate oblong scales: seeds 2 or more to each scale, maturing the first year.

3 **Thuja** Scales 8-12, rather thin, imbricated: seeds equally 2-winged.

4 **Libocedrus** Scales thick-coriaceous, valvate, only the middle pair fertile: seeds unequally 2-winged.

TRIBE II, TAXODINEÆ Scales of the fertile aments more numerous and spirally arranged, in fruit forming a woody cone.

5 **Sequoia** Large trees with short-linear to ovate-lanceolate acute carinate leaves and ovate cones with cuneate spreading scales.

TRIBE III, ABIETINEÆ Scales of the fertile aments numerous, spirally imbricated, carpellary, each in the axil of a thin distinct persistent bract, in fruit becoming coriaceous or ligneous and forming a strobile or cone.

* Leaves not in sheaths, mostly entire: flowers on last years branchlets: cones maturing the first year.

+ Branchlets smooth, the leaf-scars not raised.

+ + Leaves in fascicles at the ends of small branchlets, deciduous.

6 **Larix** Cones pendant at the ends of short branchlets, with thin persistent scale: seeds without resin vesicles.

+ + + Leaves solitary and scattered along the branchlets, persistent.

7 **Abies** Leaves sessile, leaving circular scars: cones erect, their scales and bracts deciduous from the central axis: seeds with resin vesicles.

8 **Pseudotsuga** Leaves petioled, the scars transversely oval: cones pendulous, their scales and bracts persistent on the central axis: seeds without resin vesicles.

+ + Branchlets rough from the prominent persistent leaf-bases: cones pendulous, their scales and bracts persistent on the central axis.

9 **Tsuga** Leaves petioled, with a single dorsal duct: seeds with resin vesicles.

10 **Picea** Leaves sessile, keeled on both sides, with 2 lateral complete or incomplete ducts: seeds without resin vesicles.

* * Cones maturing in the second year their bracts becoming corky and thickened: leaves of the perfect plant in bundles of 1-5, from the axil of scarious bracts, their bases surrounded by a sheath of scabrous bud-scales, usually serrulate.

11 **Pinus** Leaves needle-shape, the resin-ducts inconstant in number and variously placed.

Tribe 1, Cupressinæ. Cupressinæ and Juniperæ Endl. Syn. Conif. 6. Leaves decussately opposite or ternate, often dimorphous, usually scale-like and mostly adnate, the earlier ones free and subulate: leaf-buds not scaly. Anther-cells 2-8, introrse on the lower part of the face of the peltate connective-scale. Pollen-grains simple. Scales of the fertile aments few, decussately opposite, apparently single, becoming a small cone or connate into a drupe-like fruit. Ovules erect, solitary or rarely 2 to each scale. Cotyledons usually 2.

1 JUNIPERUS L. Sp. 1038.

Shrubs or trees with opposite or verticillate subulate or scale-like sessile evergreen leaves, usually of 2 kinds, and dioecious or sometimes monoecious small globose axillary or terminal aments. Staminate aments oblong or ovoid. Anther-cells 4-8 under each shield-shaped scale. Fertile aments of 2 or 3 series of fleshy scales, with 2 erect ovules to each scale, in fruit becoming united into a blue-black or reddish drupe, ripening the second season. Seeds 1-12, ovate, bony.

§ 1 **OXYCEDRUS** Spach Ann. Sc. Nat. 2nd. Ser. xvi, 289. Leaves ternate, free and jointed at the base, linear-subulate, pungent, channelled and white-glaucous above, not glandular-pitted.

J. communis L. Sp. 1040. A low tree or erect shrub 1-25 feet high: with shreddy bark, the branches spreading or drooping: leaves all subulate, rigid, spreading or some of the lower reflexed, mostly straight, verticillate

in threes, often with smaller ones in their axils, 5-10 lines long less than 1 line wide, channelled and commonly whitened on the upper surface: berry-like cones sessile or nearly so, dark blue, 3-4 lines in diameter. On dry hills, northern Washington to Brit. Columbia and Pennsylvania.

J. nana Willd. Sp. Pl. iv. 854. A depressed rigid shrub seldom over 18 inches high, forming irregular patches often 10 feet in diameter: leaves lanceolate, acute and cuspidate, 4-6 lines long, channelled and white above, dark green and carinate beneath, mostly incurved: aments axillary: berry-like cones blue, 3-5 lines in diameter. Common in the high mountains and along the coast. California to Alaska and across the continent: also in Europe and Asia.

§ 2 **SABINA** Spach l. c. 291. Leaves ternate or opposite, of 2 forms, mostly adnate and scale-like, closely appressed and crowded upon the branches and often glandular-pitted, occasionally more distinct, free and subulate.

J. occidentalis Hook. Fl. ii, 166. A rather small tree 20-50 feet high and 1-2 feet in diameter: leaves in threes scale-like, closely imbricated and appressed, ovate, acute, convex on the back: usually very resinous fruit on short branchlets, solitary, numerous, globose or obovoid, 3-4 lines in diameter, blue-black, resinous: seeds 1-3, deeply pitted. On very dry plains and banks, eastern Oregon to Brit. Columbia and Idaho.

J. scopulorum Sargent. *J. Virginiana* of authors as to the western tree. A tree 10-50 feet high, 1-2 feet in diameter: leaves mostly opposite; all those of young plants and commonly some of those of twigs of older trees subulate, spiny-tipped, 2-4 lines long, those of the mature branches scale-like, acute or subacute, closely appressed and imbricated, 4-ranked, causing the twigs to appear quadrangular: aments terminal: berry-like cones light blue, glaucous, about 3 lines in diameter, borne on straight peduncle-like branchlets of less than their own length, 1-2-seeded. In dry soil, eastern Washington to Brit. Columbia.

2 CHAMÆCYPARIS Spach Hist. Veg. ii, 329. (1842.)

Trees with minute opposite appressed 4 ranked scale-like evergreen leaves and small monœcious terminal aments. Staminate aments globose, with opposite 2-4-celled anthers, the cells globose, 2-valved. Fertile aments globose, with few peltate opposite scales each bearing 2-5 erect seeds, closed until mature, each with a central point or knob. Seeds winged, maturing the first year.

C. Lawsoniana Parlat. DC. Prodr. xvi, 464. A tall tree 100-200 feet high and 2-6 feet in diameter, with slender spreading or drooping branches: leaves small, deep green with a glaucous margin when young, acute or acutish, more or less glandular-pitted: cones 4 lines in diameter glaucous when young, of 8-10 scales with the flattened summit crossed by a narrow transverse ridge: seeds 2-4 to each scale, wing-margined, 2 lines long. Along streams in the coast mountains, southern Oregon and northern California.

C. Nootkatensis Spach Hist. Veg. xi. 333. A slender tree 50-150 feet high and 1-3 feet in diameter at the base, with slender drooping branches and terete branchlets: leaves small, very acute, dark green, obscurely glandular: cones globose, 5-6 lines in diameter, of 4-6 thick green scales with very prominent central bosses: seeds 2-4 to each scale, thick and narrowly winged. On the highest parts of the Cascade Mountains, Oregon to Alaska.

3 THUJA L. Sp. 1002

Trees with thin fibrous bark, scattered branches and distichous evergreen foliage. Leaves opposite, adnate and imbricated in 4 rows, oblong, with free acute tips somewhat dimorphous. Flowers monœcious. Aments terminal, of few scales decussately imbricated in pairs. Staminate flowers numerous, very small, with 3 or 4 anthers under each of the 4 or 6 subpeltate broadly ovate pointed scales. Pollen grains simple. Fertile aments terminating stouter branchlets, of 8-12 erect scales, with 2 or more erect ovules at the base of each. Cones soon strongly reflexed, maturing the first season, small, the thin-coriaceous scales ovate, the lowest and uppermost pairs sterile. Seeds lanceolate and somewhat compressed, nearly equally winged.

T. plicata Don Hort. Cantab. ed. 6, 249. *T. gigantea* Nutt. A tall graceful tree 100-250 feet high and 2-12 feet in diameter at base: foliage light green and shining: leaves ovate, acuminate and subpungent: cones 5-8 lines long, ovate, cinnamon-colored, somewhat clustered at the ends of branchlets, the ovate scales with a thin acute usually appressed mucro, the lowest and uppermost pairs sterile, the others with 2-6 ovules: seeds a little shorter than the wings which are 3 lines long, distinct and slightly unequal. Frequent in forests California to Alaska and Idaho.

4 LIBOCEDRUS Endl. Syn. Conif. 42. (1847.)

Evergreen trees with smooth or fissured bark, scale-like leaves and monœcious or dicecious flowers. Leaves decussately opposite, imbricated by fours and dissimilar, the facial ones smaller, flat and appressed, the marginal ones bract-like and keeled. Aments solitary, terminal: the staminate ones with subpeltate scales, each with 3-4 longitudinally dehiscent anthers on the dorsal side. Fertile aments bracteate, with 4-6 decussately opposite erect scales, the lower pair usually sterile, the third when present connate into a longitudinal septum. Ovules 2 to each scale, flask-shaped. Cone ripening the first year, its scales subwoody, mucronate below the apex, erect, at length spreading. Seeds in pairs or solitary. Cotyledons two.

L. decurrens Torr. Pl. Fremont 7, t 3. A tall tree 100-150 feet high by 3-7 feet in diameter, with lax scattered spreading branches: leaves bright green, in 2 decussate pairs at each joint, closely adnate except the short acute tip, the lateral without glands and nearly covering the flattened obscurely pitted inner ones: staminate flowers ovate, of 12-16 scales: cones 9-12 lines long, scaly-bracted at base, oblong, the lower scales very short, the upper connate into a longitudinal septum, the middle pair convex, obtuse at the tip, all with a short acute somewhat incurved mucro: seeds oblong-lanceolate, 3-6 lines long, the narrow outer wing scarcely longer; the inner one broad and nearly equalling the scale. On dry hillsides, Oregon to California and Nevada.

Tribe 2 Taxodineæ. Leaves alternate. Scales of the fertile aments more numerous and spirally arranged, in fruit becoming a woody cone. Ovules erect: in some genera inverted.

5 SEQUOIA Endl. Syn. Conif. 198.

Tall trees with straight columnar trunks, short spreading bran-

ches, linear leaves and monoecious flowers. Aments terminal and axillary upon young shoots, of rather numerous spirally arranged scales. Staminate flowers small, involucrate with scale-like leaves, with 3-5 anthers under each subpeltate scale. Pollen grains simple. Fertile aments oblong-ovate, erect, with 3-7 inverted ovules at the base of each scale. Cones maturing the second year, woody, oval, the scales divergent at right angles from the axis, thick and wedge-shaped with a rhomboidal rugose umbilicate apex, setaceous-mucronate. Seeds compressed, oblong-obovate, with thick spreading margins. Cotyledons 4-6.

S. simpervirens Endl. Syn. Conif. 198. Erect evergreen trees 100-350 feet high by 4-20 feet in diameter, with thick fibrous spongy bark, comparatively short spreading branches and linear 2-ranked leaves: leaves bright green above, glaucous beneath, spreading distichously, those of the main branches appressed, acute, or acuminate and mostly pungent, 6-12 lines long, about 1 line wide: staminate aments about 2 lines long: cones oblong, 9-12 lines long by 6 lines thick, of about 20 scales: seeds brown, 2-2½ lines long. Near the coast, extreme southern Oregon and California.

Tribe 3 Abietinæ Endl. Syn. Conif. 79. Leaf-buds scaly. Leaves scattered or fascicled, from linear to acicular. Staminate flowers spirally arranged and subtended by involucreal scales: anther-cells extrorse, parallel and contiguous upon the sides of a very narrow connective which is often surmounted by a scarious dilated inflexed tip. Scales of the fertile aments numerous, spirally imbricated, carpellary, each in the axil of a thin distinct bract, in fruit becoming coriaceous or woody and forming a cone. Ovules in pairs, adnate to the inner face of each scale near the base, inverted. Seeds separating from the scale at maturity, conspicuously winged. Cotyledons 3-16.

6. LARIX Adans. Fam. Pl. ii, 480. (1763.)

Tall trees with horizontal or ascending branches and small narrowly linear deciduous leaves without sheaths in fascicles on short lateral scaly bud-like branchlets. Aments short, lateral, monoecious; the staminate from leafless buds; the fertile buds commonly leafy at base and the aments red. Pollen grains simple. Cones ovoid or cylindric, small, erect, their scales thin, spirally arranged, obtuse, persistent.

L. occidentalis Nutt. Sylva iii, 143, t. 120. A large tree 100-200 feet high and 1-6 feet in diameter, with thick reddish longitudinally fissured bark: branches short, horizontal, with glabrous branchlets: leaves narrowly linear, 1-2 inches long, in alternate fascicles of 12-18, promptly deciduous: cones ovate-cylindric, 1-1½ inches long, its scales broadly oblong, truncate, ciliate-fringed when young: bracts scarious, dilated at base, the narrow terminal part exserted. In the mountains of eastern Oregon and Washington to Idaho.

L. Lyallii Parlat. Enum. Sem. Reg. Fl. 259. A rather small tree 50-100 feet high with horizontal or ascending branches, the branchlets and bud-scales densely pubescent with whitish hairs: leaves narrowly linear,

1-2 inches long, deciduous: cones oblong, $1\frac{1}{2}$ -2 inches long, promptly deciduous. In the Cascade Mountains of Washington.

7 ABIES Juss. Gen. 414. (1789.)

Evergreen trees with linear flat scattered leaves and monoecious flowers. Leaves sessile, often spreading so as to appear 2-ranked, but in reality spirally arranged, not jointed to a persistent base but leaving circular flat scars on the naked twigs. Staminate aments from the axils of the previous years leaves. Anthers 2-celled, the cells transversely dehiscent; the connective prolonged into a short knob or point. Pollen grains compound. Fertile aments lateral, erect. Ovules 2 to each scale. Cones erect, cylindrical to ovoid, their broad obtuse scales deciduous from the persistent central axis.

A. grandis Lindl. Penny Cyc. 130. A tall straight tree 100-300 feet high and 2-6 feet in diameter, with smooth brownish blotched with white bark and spreading branches: leaves flat, dark glossy green and channelled above, glossy with two pale or white stripes beneath, 1-2 inches long: cones cylindrical, retuse, 2-6 inches long, $1-1\frac{1}{2}$ inch thick, with scales nearly twice as broad as long: the quite short obovate or 2-lobed bracts with or without a short point: wing of the seed very oblique, 2-4 lines long. Common in moist places in forests, Brit. Columbia to California and Idaho.

A. Lowiana Murr. Syn. Var. Conif. 27. A tall graceful tree 100-200 feet high and 2-3 feet in diameter, with, when mature, dark-colored fissured bark and spreading branches: leaves 2-ranked, 1-2 inches long, green above, green with two white stripes beneath: cones cylindrical, 2-4 inches long, with scales nearly twice as broad as long; bracts not exerted: wing of the seed oblique. In the Siskiyou Mountains and southward.

A. concolor Lindl. Journ. Hort. Soc. v, 210. A large tree 100-200 feet high and 2-4 feet in diameter, with rough grayish bark and spreading branches: leaves mostly obtuse, pale green, those of younger trees and lower branches elongated, 2-3 inches long, 2-ranked, often slightly channelled, those of old trees and of upper branches shorter broader and thicker, convex above and often falcate, covering the upper side of the branchlets: cones oblong-cylindrical, 3-5 inches long $1\frac{1}{4}$ - $1\frac{3}{4}$ inch in diameter, pale green to dull purplish: scales 12-15 lines wide, nearly twice as wide as long: bracts truncate, not exerted: wing of the seed oblique, as long as wide. In the mountains at 3000-4000 feet elevation, southern Oregon to California.

A. lasiocarpa Nutt. Sylva, iii, 138. A small tree 50-75 feet high and 7-12 inches in diameter, with smooth whitish bark and drooping branches; leaves of the main branches $1-2\frac{1}{2}$ inches long, erect, acute and pungently pointed, those of the branchlets more or less spreading or curved upward, rigid and more or less pungent: cones cylindrical, usually purple, 2-3 inches long, $\frac{2}{3}$ -1 inch thick: scales broader than long: bracts not exerted. On the highest peaks of the Cascade Mountains.

A. amabilis Forbes Pinetum Wob. 125, t. 44. A slender tree 100-150 feet high and 1-3 feet in diameter, with smooth whitish bark and spreading branches: leaves rigid, acute or obtuse, 1-2 inches long, on the lower branches and on young trees 2-ranked, on the upper parts of mature trees shorter and curved upward: cones dark purple, 2-4 inches long, 2-3 inches

in diameter: scales nearly twice as broad as long: bracts not exerted. On the higher parts of the Cascade Mountains.

A. nobilis Lindl. Penny Cyc. i, 30. A very large tree 200-300 feet high and 3-6 feet in diameter, with spreading branches and somewhat rough dark gray or blackish bark: leaves rigid, acute or obtuse, 1-2 inches long, on the lowest branches and on young trees somewhat 2-ranked, flattish and slightly grooved; on the upper branchlets curved upward and covering the upper side, glaucous and keeled on both sides: cones cylindrical-oblong, 5-9 inches long, 2-4 inches in diameter, almost covered by the exerted and reflexed cuneate cuspidate-pointed bracts: scales 12-18 lines wide by 12-15 lines long: seed slender, with a cuneate somewhat retuse wing nearly as long as the scale: cotyledons 7 or 8. Common in the high mountains at 4000-6000 feet elevation, Washington to California.

8 PSEUDOTSUGA Carr. Conif. ed. 2, 256.

Large trees with rough dark brown or whitish bark, flat distinctly petioled evergreen leaves, that are stomatose only on the lower side, with 2 lateral resin-ducts close to the epidermis of the lower side, leaving on the branchlets scarcely prominent transversely oval raised scars. Flowers monoecious, from the axils of the previous year's leaves. Staminate flower an oblong or subcylindric column surrounded and partly enclosed by numerous conspicuous orbicular bud-scales: commissure of the anthers terminating in a short spur; the cells opening obliquely by one continuous slit: pollen grains ovate-subglobose. Pistillate flowers with the scales much shorter than the broadly linear acutely 2-lobed long-pointed or aristate bracts. Cones maturing the first year, with persistent scales and exerted bracts. Seeds without resin-vesicles. Cotyledons 6-10.

P. Douglasii Carr. l. c. A large tree 100-300 feet high and 2-15 feet in diameter: leaves linear, mostly obtuse, 8-18 lines long, but slightly if at all 2-ranked, glossy green above, white with a green midnerve beneath: staminate aments oblong-cylindrical, 5-10 lines long: cones oblong to cylindrical, 1-4 inches long: scales 10-14 lines wide, broader than long: bracts 2-3 lines wide, more or less exerted, acutely 2-toothed or lacerate at the apex, the prominent midnerve prolonged into a long subulate awn: seed triangular, convex and reddish-brown on the upper side, flat and white on the lower side, about 3 lines long, with an oblong usually obtuse wing 3-5 lines long. Common from Alaska to Mexico and the Rocky Mountains.

9 TSUGA Carr. Conif. 185.

Large evergreen trees with slender often drooping terminal branchlets and monoecious flowers. Leaves flat or somewhat angled, with a single dorsal resin-duct, conspicuously petioled, articulated upon a prominent and at length ligneous persistent base. Staminate flowers a subglobose cluster of stamens in the axils of last years leaves, the long stipe surrounded by numerous bud-scales: commissure of the anthers terminating in a short spur or knob: anther-cells opening transversely by a continuous slit. Pistillate aments terminal on the previous year's branchlets: bracts somewhat shorter than the scales. Cones maturing the first year, pendulous, the scales and enclosed bracts persistent on

the axis. Seeds with resin-vesicles on the surface, winged.

T. heterophylla Sargent. *Abies heterophylla* Raf. *Tsuga Mertensiana* of authors not of Carr. A very large tree 100-200 feet high and 2-6 feet in diameter, with rough rather thick bark: ultimate branchlets very slender, roughish and when young long-hairy: leaves linear, 4-9 lines long, abruptly petioled, entire or usually spinulose-serrate toward the rounded apex, shining above, when young with 2 white stripes beneath: staminate flowers 2-3 lines in diameter, shorter than the stipe: cones oblong-cylindrical, acute, 4-9 lines long, slightly pubescent: scales longer than wide: bracts truncate: seeds about 1 line, long, the wing twice as long: cotyledons 2 or 4. In moist places in forests California to Alaska.

T. Mertensiana Carr. Conif. ed. 2, 250. *T. Pattoniana* Engelm. A large tree 100-200 feet high and 1-4 feet in diameter, with rough dark brown bark, slender pubescent branchlets and dark green foliage: leaves 6-12 line, long, angular, acutish, attenuate at the base, often curved, stomatose and keeled both sides, unequal and appearing as if in fascicles: staminate flowers about 2 lines thick, on a very slender stipe: cones cylindrical-oblong, 2-3 inches long, 6-8 lines in diameter: seeds $2\frac{1}{2}$ lines long, with an obliquely obovate wing about 4 lines long. On the high mountains California to Alaska.

10 PICEA Link Abh. Akad. Wiss. Berlin 1727, 179.

Large evergreen trees with reddish flaky bark and spreading branches. Leaves keeled above and beneath, more or less quadrangular, articulated on a prominent, at last ligneous, persistent rhombic base, spirally arranged all around the branchlets, sometimes by a twist of the base somewhat 2-ranked: resin-ducts irregular. Staminate flowers axillary and terminal on the previous year's branchlets, with an oblong or cylindrical staminal column, its short stipe surrounded by numerous bud-scales: the commissure of the anthers expanding into a broad nearly circular erect crest: anther-cells opening longitudinally. Pollen-grains large, with 2 air-sacs. Pistillate aments borne at the ends of short or longer branchlets, the scales much longer than the bracts. Cones maturing the first year, pendulous: scales and enclosed bracts persistent upon the axis. Seeds without resin-vesicles, imbedded in the membranous base of the wing which leaves its under side nearly free and permits it to fall out. Cotyledons 4-8.

P. Breweriana Watson Proc. Am. Acad. xx, 378. A slender tree 100-150 feet high and 2-4 feet in diameter, with spreading or ascending branches and puberulent pendent branchlets, these sometimes 6-8 feet long and not more than 4 lines in diameter: leaves 5-12 lines long, strictly sessile upon the slender base, obtuse, smooth and rounded or slightly carinate above, stomatose beneath on each side of the slightly prominent midnerve: cones 2-4 inches long, 8-10 $\frac{1}{2}$ lines in diameter, narrowly cylindrical, attenuate at base: bracts linear-oblong, 2 lines long: scales thick, puberulent, obovate, with slightly thickened rounded summit, entire, 6-8 lines long: seeds $1\frac{1}{2}$ lines long, the wing 4 lines long, $2\frac{1}{2}$ lines wide. On dry rocky ridges in the Siskiyou and Coast Mountains of southern Oregon and adjacent California.

P. Engelmanni Engelm. Trans. St. Louis Acad. ii, 212. A tree 100-150 feet high and 2-5 feet in diameter with cinnamon colored bark and spreading branches with pubescent branchlets: leaves soft and flexible, standing out in all directions from all sides of the branchlets, tetragonal, acute, with callus

tips slender, nearly straight on sterile branchlets, incurved and stouter on fertile ones, 1-1¼ inch long, dark blue-green at maturity: staminate flowers oblong-cylindrical, about 7 lines long, 4 lines thick, the stipe about 4 lines long: anthers dark purple: cones oblong-cylindrical to ovate, 1-3 inches long, gradually narrowed to each end: scales thin, straight, usually erose-dentate: seed black, about half as long as the broad very oblique wing. In wet places on the high mountains, Oregon to Brit. Columbia and the Rocky Mountains.

P. Sitchensis Carr. Conif. 260 A very large tree, 200-300 feet high and 4-12 feet in diameter with thin scaly red-brown bark: branchlets thick, rough with the prominent persistent leaf bases, glabrous: leaves 5-8 lines long, about 1 line wide, flattened, short-pointed or obtuse to acute, stomatose and when young white on the upper surface: cones cylindrical-oval, 1½-3 inches long, an inch thick or less: bracts lanceolate, rigid ⅓-½ as long as the scales: scales yellowish, oblong soft, rounded and denticulate at the apex, 9-12 lines long: seeds slender 1¼-1½ lines long, the wing 4-5 lines long by 1-1½ lines wide, narrowly oblong or slightly oblique. Along the coast California to Alaska.

11 PINUS L. Sp. 1000.

Evergreen trees of various sizes and aspect, with flaky bark and monoecious flowers. Primary leaves only on young plants and shoots, flat, subulate and serrulate: the secondary in bundles of 1-5, from the axils of bud-scales and surrounded at base by a more or less persistent sheath of membranous scales, needle-shaped, terete, semiterete or triangular according as bundles are of 1 or more, mostly delicately serrulate, with stomata on all sides: resin-ducts various in situation and number. Staminate aments an oblong or cylindrical often much elongated staminal column surrounded by a somewhat definite number of calyx-like bud-scales, the outer ones lateral and strongly keeled, from the axils of scales and crowded into a capitate or spicate inflorescence around the base of the same springs growth: anther-cells opening longitudinally, the connective terminating in a knob or semi-circular erect crest. Pollen-grains rather small, 2-lobed, with 2 air-sacs. Pistillate aments axillary or subterminal, solitary or several together, the scales much larger than the bracts. Cones maturing the second year. scales more or less thickened and corky, the free exposed portion bearing a terminal or dorsal unarmed or prickly protuberance (umbo). Seeds without resin-vesicles, usually surrounded by the rim-like base of the wing which often spreads partly over the outer side of the seeds. Colytedoss 5-15.

§ 1 Leaves in fives with peripheral resin-ducts, their sheaths loose and deciduous. Cones subterminal. Scales comparatively thin at the free exposed apex, with a terminal unarmed umbo. Anthers terminating in a knob or a few teeth, or in a short incomplete crest.

P. Lambertiana Dougl. Linn. Trans. xv, 500. A large tree 100-300 feet high and 5-20 feet in diameter, with light brown smoothish bark and spreading branches: leaves 3-4 inches long, rigid, with 5 or 6 lines of stomata

on each of the 3 sides, serrulate: staminate aments oval, 6 lines long, with 10-15 involucre scales: anthers denticulate-crested: cones bright brown, 6-18 inches long, 3-4 inches in diameter, on peduncles 2-3 inches long: seeds smooth, black, 4-6 lines long: the obtuse wing not quite twice as long: cotyledons 13-15. On dry hillsides Oregon to California.

P. monticola D. Don, Lambert Pinus 111. A slender tree 100-200 feet high and 1-6 feet in diameter and rather slender spreading or somewhat drooping branches: bark of young trees light gray, on fully grown trees divided into nearly square plates covered by small closely appressed purple scales: leaves in fives, blue-green and glaucous, $1\frac{1}{2}$ -4 inches long, with brown or white soon deciduous sheaths: staminate flowers oval, 4-5 lines long, the stamens terminating in short crests or knobs, surrounded by 8 bracts: pistillate flowers oblong-cylindric, with thin scales raised upon stout peduncles: cones 4-11 inches long, pendulous, 1-2 inches thick: scales thin, oblong-ovate, $1-1\frac{1}{2}$ inches long, slightly thickened and smooth toward the apex, tipped with a small dark umbo: seeds narrowed at both ends, 4 lines long. On the high mountains, California to Brit. Columbia.

P. flexilis James Long's Exped. ii, 34. A stout tree usually 40-80 feet high with a short massive trunk 1-5 feet in diameter: with short stout flexible spreading or somewhat ascending branches and whitish or on old trees dark brown bark: leaves stout and rigid, sharp-pointed with callous tips, dark green, about 2 inches long, with light brown or white soon deciduous sheaths: staminate flowers oval, about 6 lines long, the reddish anthers tipped with short crests, surrounded by 8 or 9 scales: cones oval to subcylindrical, 3-10 inches long, about $1\frac{1}{2}$ inch thick: scales rounded at the broad or somewhat narrowed apex, tipped with a dark thickened umbo: seeds oval, 4-6 lines long. On the high mountains, eastern Oregon to California and the Rocky Mountains.

P. albicaulis Engelm. Trans. Acad. St. Louis ii, 209. A stout tree 20-60 feet high and 1-3 feet in diameter with smooth light-colored bark: leaves slender, $1\frac{1}{2}$ -3 inches long, with few rows of stomata on the inside, entire or nearly so: staminate aments short: anthers tipped with a spur: cones oval to globular, $1\frac{1}{2}$ -3 inches long, $1\frac{1}{2}$ -3 inches thick, purplish-brown: scales thick and somewhat fleshy, at length deciduous from the central axis: seeds oval, turgid, 4-6 lines long. On the highest peaks of the Cascade Mountains.

§ 2 Apophysis with a mucronate or blunt protuberance on the back. Anthers terminating in a semiorbicular or almost orbicular crest.

* Leaves serrulate, with stomata upon all sides: sheaths persistent.

+ Leaves in threes.

P. ponderosa Dougl. Lawson's Man. 354. A large tree 100-300 feet high and 2-12 feet in diameter with very thick red-brown bark, deeply furrowed and split into large flakes: the branches rather close spreading or slightly drooping: leaves on stout branchlets in the axils of strongly fringed somewhat persistent bracts, 5-11 inches long, the thin sheaths at first 9-10 lines long: staminate anthers cylindric, flexuous, $1\frac{1}{2}$ -2 inches long: involucre of 10-12 scales: anthers with a large semicircular scarcely dentate crest: cones oval, 3-5 inches in diameter often 3-5 together, sessile or nearly so, of a rich brown color: scales thick at the apex: umbo high, with a short stout triangular straight or incurved prickle: seeds dark brown, 3-4 lines long: wing 10-12 lines long, widest above the middle: cotyledons 6-9. Common in the dry regions, California to Brit. Columbia and Nebraska.

P. Jefferyi Oregon Com. A rather slender tree 100-200 feet high and

2-4 feet in diameter with dark brown to nearly black bark and rather sparsely branched with spreading or drooping usually crooked branches: leaves 4-10 inches long: staminate aments 1-1¼ inch long, the stamens with a large semicircular crest: cones 5-12 inches long, dark brown, pendent, on peduncles 1-2 inches long apophyses rather thin, with a prominent umbo and stout triangular recurved prickle 5-6 lines long: cotyledons 7-11. On dry stony ridges southern Oregon.

P. attenuata Lemmon Mining and Scientific Press, Jan. 16th, 1891. A small tree 10-40 feet high and 3-18 inches in diameter with rough dark-colored bark and short, ascending branches: leaves in threes, with thin close sheaths, slender, acute, with callous tips coarsely and remotely serrate firm and rigid, pale yellow or bluish-green, 3-7 inches long: staminate flowers in elongated spikes, cylindrical, 6 lines long: anthers terminating in irregular toothed broad crests, surrounded by 9 bracts: cones elongated-conical, pointed, very oblique at base, strongly reflexed, 3-6 inches long, 1¾-2 inches thick, remaining closed for many years: scales flat, rounded at the apex, those of the outside being enlarged into prominent knobs armed with thick flattened incurved spines. On dry mountain sides southern Oregon to California.

+ + Leaves in twos.

P. contorta Loudon Arb. Brit. iv, 2292. A small tree 10-30 feet high with a short trunk 6-12 inches in diameter: leaves 1-1½ inches long, acute, with short callous tips, finely and sharply serrulate: staminate aments cylindrical, about 6 lines long, with orange-red anthers terminating in semi-orbicular nearly entire crests, surrounded by 6 scales: cones oval or sub-cylindrical 1-2 inches long, tapering toward the apex, very oblique at the base: scales thin, rounded at the apex which is transversely keeled and slightly thickened into narrow oblong dark umbos, armed with slender often recurved prickles, often remaining closed several years. Common on the coast and on the mountains California to Alaska and the Rocky Mountains.

P. Murrayana Oregon Com. A small slender tree 50-120 feet high and 4-12 inches in diameter, with very thin light grayish-brown bark and spreading or ascending branches: leaves 1-3 inches long, light green, delicately serrulate: staminate aments cylindrical, surrounded by 6-8 scales: cones oblong-cylindrical, 1-2 inches long, slightly oblique at base, tapering toward the apex often opening at maturity and deciduous: seeds black, the wings 6-8 lines long. On the high mountains California to Brit. Columbia and the Rocky Mountains east of the Cascade Range.

INDEX

ABAMA	665	retorsa	402	Plantago-aquatica	678
Californica	665	tomentosa	401	ALLIONIA	566
ABIES	787	AGRIMONIA	171	linearis	566
amabilis	787	Eupatoria	171	ALLIUM	639
concolor	787	AGROPYRON	774	acuminatum	640
grandis	787	brevifolium	775	anceps	642
Lowiana	787	dasystachyum var.		attenuifolium	641
lasiocarpa	787	subvillosum	776	Bolanderi	640
nobilis	788	divergens	774	cernuum	639
ABUTILON	103	Var. inermis	774	collinum	640
Avicennae	103	Var. tenuispica-		crenulatum	642
ABRONIA	566	tum	774	Cusickii	642
fragrans	567	Elmeri	776	Douglasii	640
latifolia	566	caninum	775	falcifolium	642
mellifera	566	lanceolatum	776	Geyeri	640
umbellata	566	pseudorepens	776	macrum	641
ACERACEAE	116	Var. magnum	776	madidum	640
ACER	116	repens	776	Var. cuspidatum	640
circinatum	117	Scribneri	775	Nevii	641
glabrum	117	Smithii	775	pleianthum	642
macrophyllum	117	Var. molle	776	tribracteatum	641
ACHILLEA	361	tenuum	775	Schoenoprasum	639
Millefolium	361	Var. longifolium	775	scilloides	640
ACHYLS	28	Vaseyi	774	serratum	641
triphylla	29	violaceum	775	simillimum	643
ACHYRACHAENA	351	AGROSTEMMA	80	Tolmiei	642
mollis	351	Githago	80	validum	639
ACONITUM	25	AGROSTIS	725	Watsoni	642
bulbiferum	25	alba	725	ALLOCARYA	481
Columbianum	25	asperifolia	725	bracteata	481
ACTAEA	26	attenuata	727	Californica	482
arguta	26	canina	727	Chorisiana	482
rubra	26	densiflora	726	Cusickii	481
ACTINELLA	358	Diegoensis	727	echinoglochis	481
Richardsoni	358	equivalvis	725	Hendersoni	482
ADENOCAULON	332	exarata	725	hirta	482
bicolor	332	geminata	727	hispidula	481
ADENOSTEGIA	536	grandis	726	mollis	483
capitata	537	Hallii	727	plebia	481
ramosa	537	Howellii	728	Scouleri	482
viscida	537	humilis	728	ALLOTROPA	427
AGASTACHE	552	Idahoensis	728	virgata	427
urticifolia	553	microphylla	726	ALNUS	614
occidentalis	553	Oregonensis	728	Oregana	614
AGOSERIS	400	Pringlei	726	rhombifolia	615
alpestris	400	scabra	728	serrulata	615
apargioides	402	Scouleri	727	sinuata	615
aurantiaca	401	tenuiculmis	726	tenuifolia	615
barbellulata	400	varians	728	ALOPECURUS	740
elata	401	verticillata	726	agrestis	740
gracilentata	401	virescens	728	Californicus	741
grandiflora	402	AIRA	745	geniculatus	741
heterophylla	402	caryophyllea	745	Var. robustus	741
Var. glabra	402	praecox	745	Howellii	742
hirsuta	402	ALCHEMILLA	171	occidentalis	742
laciniata	402	arvensis	171	palescens	741
parviflora	401	ALISMACEAE	678	pratensis	741
purpurea	401	ALISMA	678	ALSINE	81

INDEX

aculeata	85	Var. bracteosa	490	APETALAE	563
arctica	87	AMYGDALACEAE	160	APOCYNACEAE	439
Baicalensis	82	ANACARDIACEAE	118	APOCYNUM	439
brachypetala	82	ANAGALLIS	437	androsaemifolium	439
Burkei	85	arvensis	437	Var. pumilum	440
Californica	86	ANAPHALIS	330	cannabinum	440
capillaris	84	margaritacea	330	APHYLLON	541
congesta	85	ANDROMEDA	418	AQUILEGIA	21
Douglasii	86	polifolia	418	flavescens	22
Fendleri	85	ANDROSACE	435	formosa	21
formosa	85	filiformis	435	leptosera	22
Franklinii	85	septentrionalis	435	truncata	21
graminea	92	ANEMONE	7, 9	ARABIS	42
Howellii	86	deltoides	10	arcuata	46
lateriflora	84	Drummondii	10	atrubens	43
longifolia	82	multifida	10	Bolanderi	43
longipes	82	narcissiflora	11	Breweri	44
macrophylla	84	occidentalis	10	canescens	46
media	81	Oregana	10	Columbiana	46
nitens	81	Lyallii	10	Cusickii	44
Nuttallii	87	Tetonensis	10	furcata	43
uliginosa	82	trifolia	11	hirsuta	42
paludicola	86	ANGELICA	247	Howellii	45
peplodes	84	arguta	248	Koehleri	44
physodes	84	Canbyi	248	Lemmoni	44
propinqua	87	genuflexa	247	Lyallii	44
pusilla	86	Hendersoni	248	microphylla	44
serpyllifolia	84	Lyallii	248	Nuttallii	42
Sajanensis	87	ANISOCARPUS	345	perfoliata	42
Sitchensis	94	madioides	346	platysperma	45
stricta	87	ANOGRA	230	purpurascens	43
tenella	86	pallida	230	retrofracta	45
ALSINELLA	87	trichocalyx	230	secunda	45
occidentalis	87	ANTHEMIS	361	sparsiflora	43
crassicaulis	88	arvensis	361	subpinnatifida	46
saginoides	98	Cotula	361	suffrutescens	45
AMARANTH- ACEAE	589	ANTHOXANTHUM	721	Suksdorfii	43
AMARANTHUS	589	odoratum	721	ARACEAE	667
blitoides	589	ANTIRRHINUM	504	ARALIACEAE	270
Californicus	590	Kingii	505	ARALIA	270
carneus	590	leptaleum	504	Californica	270
graecizans	589	ANTENNARIA	327	Var. acuminata	271
hybridus	589	argentea	328	ARBUTUS	414
AMBROSIA	336	dimorpha	327	Menziesii	414
artemisiaefolia	336	flagellaris	327	ARCEUTHOBIUM	609
AMELANCHIER	164	Geyeri	327	ARCTIUM	381
alnifolia	165	Howellii	329	lappa	381
florida	165	lanata	328	ARCTOSTAPYLOS	415
pallida	165	luzuloides	328	bracteata	417
AMMANNIA	216	media	328	cinerea	416
humilis	216	pedicellata	329	hispidula	415
latifolia	216	racemosa	329	intermedia	415
AMMODIA	297	rosea	328	intricata	416
Oregana	297	stenophylla	327	Manzanita	416
AMSINCKIA	489	suffrutescens	329	Nevadensis	415
intermedia	489	umbrinella	329	oblongifolia	416
lycopsoides	489	APARGIDIUM	394	parvifolia	416
		boreale	394	pulchella	416

INDEX

strigosa	417	ASCLEPIAS	440	leucocystis	148
tormentosa	417	cryptoceras	441	iodanthus	147
Uva-ursi	415	Mexicana	441	Lyallii	144
viscida	416	speciosa	441	malacus	146
ARISTIDA	739	ASTER	307	microcystis	150
fasciculata	740	Burkei	310	misellus	147
oligantha	739	campestris	308	miser	153
purpurea	739	Chamissonis	308	Mortoni	144
ARISTOLO-		commutatus	308	multiflorus	153
CHIACEAE	606	conspicuous	307	obscurus	146
ARMERIACEAE	430	Cusickii	310	Pacificus	144
ARMERIA	430	Var. Lyallii	310	Palousensis	151
vulgaris	430	Douglasii	309	Purshii	148
ARRHENATH-		Eatoni	310	racemosus	147
ERUM	746	Fremonti	309	reventus	151
elatus	746	foliaceus	309	salinus	143
ARNICA	372	Var. frondeus	310	sclerocarpus	152
alpina	374	Var. apricus	310	serotinus	153
amplexicaulis	373	Geyeri	308	Spaldingii	144
cernuua	373	Hallii	309	speirocarpus	152
Chamissonis	373	Hendersoni	311	Var. falciformis	152
cordifolia	373	integrifolius	307	succumbens	146
var. eradiata	373	intermedius	309	Suksdorfii	149
discoidea	372	Menziesii	308	tegetarius	153
foliosa	374	militarius	310	Tweedyi	152
latifolia	373	modestus	308	umbaticus	145
longifolia	374	occidentalis	309	Utahensis	149
parviflora	372	Oreganus	309	ATHYSANUS	65
Parryi	374	radulinus	307	pusillus	65
spathulata	372	ASTRAGALUS	143	ATRIPLEX	594
viscosa	374	accidens	144	argentea	595
ARTEMISIA	364	adsurgens	145	confertifolia	596
arbuscula	367	allanaris	143	Nuttallii	596
biennis	365	araneosus	143	patula	595
Canadensis	365	arrectus	146	pusilla	595
Groenlandica	365	Beckwithii	147	truncata	595
discolor	366	Bourgovii	153	zosteraefolia	595
dracunculoides	365	Californicus	152	AUDIBERTIA	551
frigida	365	Catalinensis	145	incana	552
heterophylla	366	lentiginosus	143	AVENA	743
incompta	366	ceramicus	150	fatua	743
Lindleyana	366	Chamaeleuce	150	Var. glabrescens	743
Ludoviciana	366	collinus	152	Smithii	744
Richardsoniana	366	conjunctus	151	AZALEA	421
rigida	367	Cusickii	150	occidentalis	422
spinescens	364	diaphanus	143	AZALEASTRUM	421
tridentata	367	diurnus	149	albiflorum	421
Var. angustifolia	367	dorycnoides	143	BACCHARIS	322
trifida	367	drepanolobus	143	3AHIA	355
pedatifida	365	filipes	153	nudicaulis	356
Prescottiana	366	Geyeri	150	oppositifolia	356
ARUNCUS	188	Gibbsii	152	BAERIA	354
vulgaris	188	glareosus	147	aristosa	354
ASARUM	606	Hoodianus	151	BALSAMINACEAE	110
caudatum	607	Hookerianus	149	BALSAMORRHIZA	339
Hartwegi	607	Howellii	147	Careyana	339
ASCLEPIAD-		hypoglottis	145	deltoidea	339
ACEAE	440	inflexus	148	Hookeri	340

INDEX

hirsuta	340	BORAGINACEAE	474	Tritelia	644
incana	340	BOUTELOUA	735	BRUNELLA	556
sagittata	339	oligostachya	735	vulgaris	556
terebinthacea	340	BOYKINIA	196	BRYANTHUS	419
BARBAREA	41	major	196	empetriformis	420
stricta	41	occidentalis	196	BUPLEURUM	265
vulgaris	41	BRASSICA	60	Americanum	266
BATRACHIUM	7, 12	campestris	61	BURSA	61
aquatile	13	nigra	61	Bursa-pastoris	61
Lobbii	13	BRACHYACTIS	314	CACALIOPSIS	369
trichophyllum	13	frondosa	314	Nardosmia	369
BECKMANNIA	735	BRASENIA	29	CACTACEAE	241
erucaeformis	735	Schreberi	29	CACTUS	242
BELLIS	305	BRAYA	59	viviparus	242
perennis	305	humilis	59	CALAMAGROSTIS	730
BERBERIDACEAE	27	BREVOORTIA	645	Aleutica	731
BERBERIS	27	Ida-Maia	645	crassiglumis	734
Aquifolium	28	BRIZA	765	Canadensis	732
nana	28	minor	765	Var. acuminata	732
nervosa	28	BROMUS	769	Cusickii	733
pumila	27	brizaeformis	770	Howellii	730
repens	28	carinatus	773	hyperborea	733
BERGIA	98	Orcuttianus	771	Var. elongata	734
Texana	99	Gussoni	770	Var. Americana	734
BETULACEAE	613	Hookerianus	773	inexpansa	733
BETULA	614	hordeaceous	769	Var. cuprea	733
Hallii	614	Var. glabrescens	770	Var. barbulate	733
occidentalis	614	inermis	772	lactea	732
BICUCULLA	33	laevipes	771	Langsdorffii	732
Cucullaria	34	marginatus	772	Macouniana	732
formosa	33	Var. latior	772	neglecta	733
pauciflora	34	Var. seminudus	772	purpurascens	730
uniflora	34	Madritensis	770	rubescens	731
BIDENS	344	Pacificus	771	Scribneri	732
Beckii	344	polyanthus	772	Suksdorffii	732
cernua	344	racemosus	769	Var. luxurians	732
frondosa	344	Var. commutatus	769	Tweedyi	731
BLEPHARIPAP-		rubens	770	Vaseyi	731
PUS	345	secalinus	769	CALAMOVILFA	734
laevis	345	Sitchensis	772	longifolia	734
scaber	345	sterilis	770	CALANDRINIA	93
BLITUM	593	Suksdorffii	771	caulescens	92
capitatum	594	tectorum	770	micrantha	93
BOISDUVALIA	235	vulgaris	771	CALLITRICHE	218
Douglasii	236	Var. eximius	771	autumnalis	219
glabella	236	Var. robustus	771	Bolanderi	219
Torreyi	236	BRODIAEA	643	heterophylla	218
BOLANDRA	197	Bridgesii	644	marginata	218
Californica	197	Calliprora	644	sepulta	218
Oregona	197	capitata	644	verna	218
BOLELIA	407	congesta	643	CALOCHORTUS	652
elegans	407	Douglasii	644	apiculatus	654
pluchella	407	grandiflora	643	elegans	653
BOLTONIA	305	Hendersoni	645	Howellii	655
occidentalis	305	minor	643	Lobbii	653
BOSCHNIAKIA	542	Howellii	644	longibarbatus	655
Hookeri	542	lactea	644	Lyallii	653
strobilacea	542	multiflora	644	macrocarpus	655

INDEX

Maweanus	653	Pennsylvanica	50	Hallii	700
Var. roseus	653	pratensis	50	Hendersonii	704
nitidus	654	CARDUUS	381	heteroneura	698
Nuttallii	654	Americanus	382	Hoodii	708
pavonaceus	655	Andersoni	383	Var. nervosa	708
Purdyi	654	arvensis	382	Howellii	702
Tolmiei	654	Breweri	384	inops	706
uniflorus	654	Drummondii	383	interrupta	701
ALTHA	19	edulis	383	invisa	700
biflora	20	foliosus	384	Jonesii	708
leptosepala	20	Hallii	383	Kelloggii	699
palustris	20	lanceolatus	382	laciniata	700
CALYCADENIA	349	occidentalis	383	lanuginosa	697
multiglandulosa	349	Var. megace-		lenticularis	701
truncata	349	phalus	384	leporina	712
CALYPTRIDIMUM	97	remotifolius	382	leptalea	707
roseum	98	undulatus	384	limosa	703
CALYPSO	626	CAREX	695	livida	704
borealis	626	acutina	702	luzulaefolia	703
CAMASSIA	646	Var. tenuior	702	macrocephala	709
azurea	646	alpina	698	marcida	709
Cusickii	646	amplifolia	696	Var. debilis	709
esculenta	646	aquatilis	701	Mertensii	698
Howellii	647	aristata	697	monile	696
Leichtlinii	646	arcta	711	multicaulis	707
CAMPANUL-		athrostachya	713	nardina	711
ACEAE	407	aurea	705	Nebraskensis	701
CAMPANULA	409	Var. celsa	705	nigricans	707
Piperi	409	Barbarae	702	nudata	700
prenanthoides	410	bovina	702	Var. angustifolia	700
rotundifolia	409	Breweri	708	Var. anomala	700
scabrella	409	brunnescens	711	Oregonensis	697
Scouleri	409	canescens	711	pauciflora	695
CAMELINA	60	Var. Oregana	711	pratensis	712
sativa	60	capillaris	703	Pyrenaica	707
CANBYA	32	cinnamomea	704	Raynoldsii	698
aurea	32	comosa	696	retrorsa	696
CANTUA	452	cryptocarpa	702	Richardsonii	705
pungens	452	decidua	699	riparia	697
Var. Hookeri	453	deflexa	706	siccata	712
Var. squarrosa	453	Var. media	706	Sitchensis	702
JAPNOREA	472	Deweyana	712	spretia	699
nana	473	Douglasii	710	sterilis	711
pumila	473	Var. Bolanderi	712	stipata	709
JAPPARIDACEAE	66	exsiccata	696	straminiformis	712
JAPRIFOLIUM	282	Var. globosa	696	stricta	701
Californicum	283	festiva	713	stylosa	699
ciliolum	283	Var. gracilis	713	tenella	710
hispidulum	283	Var. stricta	713	teretiuscula	709
CARDAMINE	49	Var. pachystachya	713	Var. prairea	709
angulata	50	feta	712	Var. amplia	710
bellidifolia	49	filifolia	705	Tolmiei	699
Brewerii	50	frigida	703	Var. nigella	699
callosicrenata	49	fusca	698	Var. sessilis	699
Lyallii	49	Gayana	709	Var. angusta	699
occidentalis	50	Geyeri	707	umbellata	706
oligosperma	50	globosa	706	utriculata	695
parviflora	50	Gmelini	698	valicola	710

INDEX

vernacula	708	laevigatus	114	occidentalis	39
vespertina	705	prostratus	115	turritoides	38
vicaria	710	pumilis	115	CHELONE	508
Var. costata	710	sanguineus	114	nemorosa	509
viridula	704	thyrsiflorus	114	CHENOPO-	
CARUM	268	velutinus	114	DIACEAE	590
Gairdneri	268	CELASTRACEAE	111	CHENOPODIUM	592
Oregana	268	CELTIS	601	album	592
CARYOPHYLL-		occidentalis	601	anthelminticum	593
ACEAE	73	reticulata	602	Botrys	593
CASSIOPE	418	CENTAUREA	385	humilis	593
lycopodioides	418	calcitrapa	385	hybridum	592
Mertensiana	419	Cyanus	385	leptophyllum	593
Stelleriana	418	Melitenis	385	murale	592
tetragona	419	CENTROMADIA	350	rubrum	593
CASTALIA	30	Fitchii	350	CHIMAPHILA	426
Leibergi	30	CENTUNCULUS	438	Menziesii	426
CASTANOPSIS	612	minimum	438	umbellata	426
chrysophylla	612	CEPHALAN-		CHIONOPHILA	517
CASTILLEIA	528	Thera	631	Tweedyi	517
angustifolia	529	Oregana	631	CHLOROGALUM	647
Var. Whitedii	530	CERASUS	161	pomeridianum	648
Applegatei	530	emarginata	161	CHORIZANTHE	575
Bradburii	530	demissa	162	membranacea	575
camporum	532	mollis	162	Watsoni	576
Covilleana	531	CERASTIUM	80	CHRYSAMPHORA	30
Cusickii	532	alpinum	81	Californica	31
Elmeri	531	arvense	81	CHRYSANTHE-	
hispidula	530	longipedunculatum	80	MUM	362
levisecta	532	pilosum	80	Leucanthemum	362
linearifolia	529	viscosum	80	CHRYSOPSIS	296
lutescens	532	vulgatum	80	hirsuta	296
lutea	531	CERCOCARPUS	172	villosa	296
miniata	531	betulaefolius	172	CHRYSOSPLEN-	
minor	528	ledifolius	172	IUM	204
oreopola	529	intricatus	172	glechomaefolia	204
Var. subintegra	529	CERATOPHYLL-		CHRYSOTHAM-	
pallescens	532	ACEAE	215	NUS	302
pilosa	532	CERATOPHYL-		Bloomeri	303
pinetorum	530	LUM	215	nanus	302
pruinosa	530	dumersum	215	puberulus	302
rubida	533	CHAENATIS	357	pumilus	302
rupicola	529	Cusickii	357	resinosus	303
rustica	533	Douglasii	358	speciosus	302
Suksdorfii	531	Var. alpina	358	var. albicaulis	302
CATABROSA	752	Nevii	357	viscidiflorus	302
aquatica	752	stevioides	357	CHYLISMA	233
CAUCALIS	247	CHAETOCHOLA	720	cruciformis	233
microcarpa	247	viridis	720	scapoidea	233
CAULANTHUS	47	CHAMAECYPARIS	784	CICHORACEAE	386
crassicaulis	48	ILLECEBRACEAE	89	CICHORIUM	388
hastatus	47	Lawsoniana	784	intybus	388
pilosus	48	Nootkatensis	784	CICUTA	269
CEANOTHUS	113	CHEIRANTHUS	38	purpurata	269
Californicus	114	arenicola	39	occidentalis	269
cordulatus	115	capitatus	39	vagans	269
cuneatus	115	elatus	39	CIMICIFUGA	26
divaricatus	114	inconspicuus	39	elata	26

INDEX

laciniata	26	Torreyi	506	Suecica	272
CINNA	729	COLLOMIA	453	CORONOPUS	61
pendula	729	debilis	454	didymus	62
CIRCAEA	237	glutinosa	454	Ruellii	62
Pacifica	238	grandiflora	453	CORYDALIS	34
alpina	238	heterophylla	454	aurea	35
CLADOTHAMNUS	423	linearis	453	Cusickii	34
campanulatus	423	Var. subulata	4	montana	35
CLARKIA	236	Mazama	454	Scouleri	34
pulchella	236	tinctoria	453	CORYLACEAE	612
rhomboidea	236	COLOPTERA	250	CORYLUS	613
CLAYTONIA	93	Parryi	250	Californica	613
lanceolata	93	COMANDRA	607	rostrata	613
Megarrhiza	94	umbellata	607	COTYLEDON	214
umbellata	94	pallida	608	Oregonensis	214
CLEMATIS	7, 8	COMARUM	174	farinosa	214
brevifolia	8	palustre	174	COTULA	363
Columbiana	9	COMPOSITAE	290	australis	363
Douglasii	9	CONANTHUS	572	coronopifolia	363
ligusticifolia	8	aretioides	472	CRANTZIA	262
ochotensis	9	CONVOLVU-		liniata	262
Scottii	8	LACEAE	493	CRASSULACEAE	211
Suksdorffi	9	CONVOLVULUS	493	CRATAEGUS	163
verticillaris	9	arvensis	495	Columbiana	163
CLEOME	67	nyctagineus	494	Douglasii	163
lutea	67	occidentalis	494	CREPIS	397
platycarpa	68	polymorphus	494	acuminata	398
serrulata	67	sepium	494	Andersoni	397
CLINTONIA	660	Soldanella	494	barbigera	399
uniflora	660	CONVALLARI-		intermedia	398
Andrewsiana	660	ACEAE	655	monticola	398
CNICUS	385	COPTIS	20	nana	397
benedictus	386	asplenifolia	21	occidentalis	398
COCHLEARIA	55	laciniata	21	platyphylla	398
Anglica	55	occidentalis	21	scopulorum	398
COELOPLEURUM	261	trifolia	20	subcarnosa	398
Gmelini	261	venosa	21	rostrata	399
maritimum	261	CORALLORHIZA	626	runcinata	397
COLEANTHUS	722	innata	627	Var. hispidulosa	397
subtilis	722	Mertensiana	626	virens	397
COLDENIA	476	multiflora	626	CROCIDIUM	370
Nuttallii	476	striata	627	multicaule	370
COLEOSANTHUS	292	CORDYLANTHUS	536	CRUCIFERAE	35
Californicus	293	COREOPSIS	343	CRYPTANTHE	486
grandiflorus	293	Atkinsoniana	343	affinis	488
Greenei	292	CORIANDRUM	247	ambigua	488
linifolius	292	sativum	247	barbigera	488
microphyllus	293	CORISPERMUM	597	Fendleri	487
oblongifolius	292	hyssopifolium	597	flaccida	487
COLLINSIA	505	CORNACEAE	271	leiocarpa	488
glandulosa	506	CORNUS	271	multicaule	487
grandiflora	505	Baileyi	272	muriculata	488
linearis	507	Canadensis	271	pterocarya	489
multiflora	506	glabrata	273	rostellata	487
parviflora	506	Nuttallii	272	Torreyana	488
pusilla	506	pubescens	272	ORYZOPSIS	738
Rattani	507	sessilis	272	exigua	739
sparsiflora	506	stolonifera	272	cuspidata	738

INDEX

Hendersoni	739	DENTARIA	48	Lemmoni	51
CUCURBITACEAE	238	Californica	49	lutea	54
CUSCUTA	495	gemmata	49	micrantha	53
arvensis	495	pulcherrima	48	nemorosa	54
Californica	496	quercetorum	48	stenoloba	54
Cephalanthi	495	sinuata	48	tenosa	54
salina	496	tenella	48	DRACOCEPHA-	
CYMOPTERUS	258	DESCHAMPSIA	745	LUM	554
glaucus	258	caespitosa	745	parviflorum	554
terebinthinus	258	calycina	746	DROSERACEAE	214
CYNOGLOSSUM	478	elongata	746	DROSERA	215
grande	478	atropurpurea	746	Anglica	215
occidentale	478	DIGITALIS	528	rotundifolia	215
CYTISUS	131	purpurea	528	DULICHIMUM	688
scoparius	131	DIMERESIA	332	spathaceum	688
CYPERACEAE	686	Howellii	332	EATONIA	748
CYPERUS	687	DIPLACUS	517	obtusata	749
acuminatus	687	glutinosus	518	Pennsylvanica	749
erythrorhizos	688	DIPSACACEAE	289	ECHINOPANAX	271
esculentus	688	DIPSACUS	289	horridum	271
Houghtoni	688	Sylvestris	290	ECHINOSPERUM	479
inflexus	687	DISPORUM	658	ELAEAGNACEAE	600
CYPRIPEDIUM	632	Hookeri	659	ELATINACEAE	98
Californicum	632	Menziesii	658	ELATINE	98
fasciculatum	632	Oreganum	659	Americana	98
montanum	632	parvifolium	659	Californica	98
parviflorum	632	trachycarpum	659	ELEUSINE	736
DACTYLIS	748	trachyandrum	659	Indica	736
glomerata	748	DISTICHLIS	751	ELEOCHARIS	693
DANTHONIA	742	maritima	752	acicularis	693
Americana	743	DODECATHEON	432	ovata	693
Californica	742	alpinum	433	palustris	693
intermedia	742	campestrum	432	Var. glaucescens	693
Var. Cusickii	743	conjugens	433	rostellata	694
unispicata	743	Cusickii	434	ELYMUS	778
DATURA	499	dentatum	432	areharius	778
stramonium	499	Hendersoni	433	arenicolus	778
DAUCUS	246	Jeffreyi	433	Canadensis	779
Carota	246	pauciflorum	433	Caput-Medusae	780
pusillus	246	tetrandrum	433	condensatus	779
DELPHINIUM	22	viviparum	432	dasystachys	779
Andersoni	23	DONDIA	598	flavescens	778
bicolor	23	depressa	599	glaucus	779
Burkei	24	diffusa	599	littoralis	779
Columbianum	23	intermedia	599	mollis	778
distichum	23	occidentalis	599	triticoides	779
depauperatum	24	DOUGLASIA	435	saxicolus	778
glaucum	24	dentata	435	EMMENANTHE	471
leucophaeum	23	laevigata	435	parviflora	471
Menziesii	22	DOWNINGIA	407	lutea	471
nudicaule	24	DRABA	53	pusilla	471
Nuttallianum	23	aureola	55	EMPETRACEAE	606
occidentale	24	brachycarpa	53	EMPETRUM	606
Oreganus	22	Caroliniana	53	nigrum	606
pauperculum	22	densifolia	55	ENDOGENAE	623
scopulorum	24	Douglasii	55	EPIPACTIS	631
simplex	23	glabella	55	gigantea	631
trollifolium	24	Howellii	54		
		laevipes	54		

INDEX

EPILOBIUM	222	cervinus	316	pauciflorum	573
adenocaulon	225	Chrysopsidis	318	pendulum	571
Var. occidentale	225	compositus	318	Piperi	568
Var. (?) perplexans	225	Var. discoideus	318	pyrolaeifolium	568
alpinum	228	concinus	317	Var. coryphaeum	569
anagallidifolium	228	confinis	320	sphaerocephalum	569
Bongardi	227	corymbosus	320	stellatum	570
brevistylum	226	decumbens	320	Var. bahiaeforme	570
clavatum	228	divergens	321	strictum	574
coloratum	225	filifolius	319	tenuis	569
Davuricum	224	glaucus	316	ternatum	570
delicatum	225	grandiflorus	315	thymoides	569
Franciscanum	225	Howellii	316	Tolmianum	570
glaberrimum	227	inornatus	320	umbellatum	569
Var. latifolium	227	lanatus	315	vimineum	575
glandulosum	226	nudatus	320	vineum	572
Halleanum	226	ochroleucus	319	virgatum	574
Hammondi	224	Oreganus	320	ERIOPHYLLUM	354
Hornemanni	227	Pacificus	319	achillaeoides	355
jucundum	224	peregrinus	316	caespitosum	355
latifolium	222	peucephyllus	319	gracile	355
luteum	223	Philadelphicus	321	integrifolium	355
leptocarpum	226	poliospermus	318	leucophyllum	355
Var. (?) Macounii	227	radicatus	318	lanceolatum	355
minutum	224	ramosus	321	staechadifolium	354
Oreganum	227	salsuginosus	316	ERITRICHUM	480
Oregonense	228	spatulifolius	317	aretiodes	480
Var. (?) gracillimum	228	speciosus	317	Howardi	480
palustre	224	uniflorus	315	ERODIUM	107
paniculatum	223	ERICARPUM	297	cicutarium	107
rigidum	223	grindelloides	297	macrophyllum	107
spicatum	222	ERIODICTYON	473	moschatum	107
Var. canescens	223	glutiniosum	474	EROPHILA	53
suffruticosum	223	ERIOGONUM	568	vulgaris	53
ursinum	226	acaule	571	ERYNGIUM	262
Var. subfalcatum	226	androsaceum	568	articulatum	263
ERAGROSTIS	764	angulosum	572	Harknessii	263
reptans	764	annuum	572	Vaseyi	262
lutescens	765	Baileyi	575	ERYSIMUM	56
EREMOCARYA	483	caespitosum	569	officinale	56
micrantha	483	campanulatum	574	ERYTHRAEA	443
EREMOCARPUS	604	cernuum	571	curvistamenea	443
setigerus	604	compositum	571	Douglasii	443
ERICACEAE	413	corymbosum	574	minima	443
EREMOSEMIUM	596	croceum	570	Muhlenbergii	443
spinosa	597	dichotomum	573	Nuttallii	443
ERIGERON	315	Douglasii	569	ERYTHRONIUM	651
acris	322	elatum	573	citrinum	652
Var. Droebachensis	322	flavum	568	giganteum	652
	322	heracleoides	570	grandiflorum	651
Var. debilis	322	microthecum	574	Var. parviflorum	651
Alicea	317	minimum	571	Hendersoni	652
amplifolius	317	montanum	570	Howellii	652
annuus	321	multiceps	573	montanum	652
Bloomeri	319	niveum	573	revolvatum	651
Canadensis	322	nudum	573	ESCHSCHOLTZIA	32
		ovalifolium	572	Douglasii	33
		Var. proliferum	572	hypocoides	33

INDEX

EUCEPHALUS	311	Var. Oregana	768	triflorum	285
Covillei	312	pubescens	768	GAMOPETALAE	275
elegans	311	rubra		GARRYACEAE	273
Engelmanni	311	Var. tricophylla		GARRYA	273
glabratius	312	Var. pubesceus		buxifolia	274
glaucescens	312	Var. littoralis	769	elliptica	273
ledophyllus	312	scabrella	768	Fremontii	273
paucicapitatus	312	FICOIDEAE	241	GASTRIDIMUM	729
serrulatus	311	FILIPENDULA	185	australe	729
tomentellus	312	occidentalis	185	GAULTHERIA	417
EULOPHUS	265	FLOERKEA	109	Myrsinites	417
Bolanderi	265	proserpinacoides	109	ovatifolia	417
EUNANUS	518	FORSELLESIA	117	Shallon	418
Breweri	519	spinescens	113	GAURA	237
Bigelovii	518	FRAGARIA	174	parviflora	237
Cusickii	518	Californica	174	GAYOPHYTUM	229
Douglasii	518	cunefolia	174	diffusum	229
Tolmiei	518	FRASERA	447	eriospermum	229
EUONYMUS	111	albicaulis	449	lasiospermum	229
occidentalis	111	Cusickii	448	pumilum	230
EUPATORIUM	291	nitida	448	racemosum	229
occidentale	292	speciosa	448	ramosissimum	229
EUPHORBIAEAE	603	thyrsiflora	448	GERANIACEAE	105
EUPHORBIA	604	FRAXINUS	439	GERANIUM	105
dictyosperma	605	Oregana	439	Carolinianum	105
crenulata	605	ERIOPHORUM	691	dissectum	105
glyptosperma	605	gracile	692	Fremonti	106
Greenii	604	polystachyon	692	incisum	106
Var. consan-		russeolum	692	molle	105
guinea	604	Scheuchzeri	692	Oreganum	106
Lathyrus	605	vaginatum	691	pusillum	106
maculata	605	FRITILLARIA	649	Richardsoni	106
serpyllifolia	604	atropurpurea	649	GEUM	173
EUROTIA	596	glauc	650	macrophyllum	173
lanata	596	lanceolata	650	strictum	173
EUTHAMIA	304	pudica	650	triflorum	173
occidentalis	304	recurva	650	GENTIANACEAE	442
FAGACEAE	609	FUMARIACEAE	33	GENTIANA	443
FESTUCA	765	GAERTNERIA	336	Var. holopetala	444
amethystina	768	acanthocarpa	336	acuta	444
brevifolia	767	bipinnatifida	337	affinis	447
Californica	766	Chamissonis	337	anisosepala	447
confinis	766	GAILLARDIA	359	bisetata	445
denticulata	766	aristata	360	calycosa	445
elator	767	GALIUM	284	Douglasiana	445
fallax	768	Andrewsii	286	Gormani	446
Var. trichophylla	768	Aparine	284	Menziesii	446
heterophylla	769	asperrimum	285	Newberryi	445
Howellii	766	bifolium	284	Oregana	447
Jonesii	767	Bolanderi	285	Orfordii	446
microstachya	765	boreale	284	Parryi	446
Var. ciliata	765	multiflorum	285	sceptrum	446
Var. pauciflora	765	Var. Watsoni	285	serrata	444
Myurus	766	Nuttallii	285	Var. holspetala	443
octoflora	766	Oreganum	284	simplex	444
ovina	767	spurium	284	stricta	445
Var. duriuscula	767	trifidum	285	tenella	444
Var. ingrata	767			GILIA	458
Var. Columbiana	768			achillaefolia	459

INDEX

aggregata	458	discoidea	296	HETERANTHERA	666
capillaris	460	Hendersoni	295	Dubia	667
capitata	459	integrifolia	295	HETEROCODON	408
congesta	458	nana	296	rariflorum	409
filiformis	460	Oregana	296	HETERODRABA	65
gracilis	459	GYMNOSPERMAE	781	unilateralis	65
hispidula	460	GYROSTACHYS	629	HETEROGAURA	237
inconspicua	459	porrifolia	629	Californica	237
Var. sinuata	459	Romanzoffiana	629	HEUCHERA	202
leptomeria	459	HABENARIA	627	cuneata	203
linearifolia	461	aggregata	628	cylindrica	203
micromeria	460	dilatata	628	glabella	204
minutiflora	460	elegans	627	glabra	203
tenerrima	469	gracilis	628	micrantha	203
GITHOPSIS	408	hyperborea	628	parvifolia	203
specularioides	408	leucostachys	628	pilosissima	203
GLAUX	437	orbiculata	629	ovalifolia	204
maritima	437	Unalaskensis	628	HIERACIUM	394
GLECHOMA	553	HALORAGEAE	217	albiflorum	395
hederacea	554	HARPAECARPUS	348	amplum	396
GLYCERIA	752	madarioides	348	barbigerum	396
GLYCOSMA	266	HASTINGSIA	647	Bolanderi	396
ambiguum	267	alba	647	Canadense	394
glauca	267	bracteosa	647	cinereum	396
occidentalis	267	HEDYSARUM	164	cynoglossoides	396
GLYCYRRHIZA	154	flavescens	155	gracile	395
glutinosa	154	Mackenzii	155	Howellii	396
lepidota	154	HELENIUM	359	longiberbe	395
GNAPHALIUM	330	autumnale	359	Scouleri	395
decurrens	330	Var. grandiflorum	359	triste	395
microcephalum	330	Bigelovii	359	HIEROCHLOE	722
palustre	331	Hoopsii	359	borealis	722
purpureum	331	HELIANTHELLA	341	macrophylla	722
Sprengelii	330	Douglasii	342	HIPPURIS	217
uliginosum	331	uniflora	341	montana	218
GODETIA	234	HELIANTHUS	342	tetraphyllum	218
albescens	234	annuus	342	vulgaris	217
amoena	235	Cusickii	343	Var. fluviatilis	218
Arnottii	234	exilis	342	HOLCUS	746
epilobioides	235	Nuttallii	343	lanatus	747
decumbens	234	petiolaris	342	HEMIEVA	197
hispidula	235	tuberosa	343	ranunculifolia	197
lepida	234	HELIOTROPIUM	477	violacea	198
purpurea	234	Curassavicum	477	HOLIDISCUS	184
quadrivulnera	235	HEMICARPHA	692	ariaefolia	184
tenella	235	intermedia	693	discolor	184
viminea	235	occidentalis	692	HOMALOCENCH-	
GOMPHOCARPUS	441	subsquarrosa	692	RUS	720
cordifolius	441	HEMIZONELLA	348	oryzoides	720
GOODYERA	630	Durandii	348	HOOKERA	643
GRAMINEAE	713	HEMIZONIA	348	HORDEUM	776
GRAPHEPHORUM	752	Clevelandi	349	boreale	777
Wolfii	752	luzulaefolia	349	Gussoneanum	777
GRATIOLA	523	HERACLEUM	249	jubatum	777
ebracteata	523	lanatum	249	maritimum	777
Virginiana	523	HESPEREVAX	326	murinum	777
GRAYAI	596	brevifolia	326	nodosum	777
GRINDELIA	295	HESPEROCHIRON	472	pusillum	777

INDEX

HORKELIA	179	Douglasiana	634	Var. uniflorus	683
capitata	180	longipetala	634	xiphioides	686
caruifolia	181	Missouriensis	634	JUNCOIDES	679
congesta	180	tenax	634	campestre	681
fusca	179	tenuis	634	comosum	680
Hendersoni	180	ISOPYRUM	25	Var. congestum	681
Howellii	181	Hallii	25	Var. macranthum	681
parviflora	180	stipitatum	25	Var. subsessile	681
pseudocapitata	180	IVA	335	divaricatum	681
sericata	181	axillaris	335	parviflorum	680
tenella	179	xanthifolia	335	Var. melanocar-	
tridentata	181	IVESIA	181	pum	680
HOWELLIA	406	alpicola	182	Var. subcongs-	
aquatilis	406	Baileyi	181	tum	680
HUGELIA	458	Pickeringii	181	pilosum	680
floccosa	458	JACKSONIA	67	spadiceum	680
HULSEA	358	trachysperma	67	spicatum	680
nana	358	JAUMEA	353	JUNIPERUS	783
HUTCHINSIA	61	carnosa	353	communis	783
procumbens	61	JUNCEAE	679	nana	784
HYDRANGE-		JUNCUS	681	occidentalis	784
ACEAE	205	Balticus	681	scopulorum	784
HYDROCOTYLE	263	Bolanderi	685	KALMIA	420
ranunculoides	270	brachyphyllus	685	glauca	420
HYDROPHYLL-		bufonius	683	Var. microphylla	420
ACEAE	463	castaneus	682	KELLOGGIA	286
HYDROPHYLLUM	464	confusus	683	galioides	286
capitatum	465	Drummondii	682	KOELERIA	748
occidentale	465	dubius	684	cristata	748
Var. Fendleri	465	effusus	682	KOCHIA	591
Virginicum	565	Var. Brunneus	682	Americana	592
HYMENOPAPPUS	356	ensifolius	686	KUNZIA	171
filifolius	356	falcatus	684	tridentata	172
HYPERICACEAE	99	filiform's	682	LABIATAE	544
HYPERICUM	99	latifolius	685	LACTUCA	403
anagaloides	99	Leseurii	681	Canadensis	404
perforatum	99	longistylis	684	pulchella	404
Scouleri	99	Mertensianus	686	sagittifolia	404
HYPOCHOERIS	390	Nevadensis	685	sativa	404
radicata	390	nodosus	684	scariola	404
HYPOPITYS	429	occidentalis	683	spicata	404
fimbriata	429	Oreganus	685	LAGOPHYLLA	350
lutea	429	oxymerys	686	ramosissima	350
ILYSANTHES	523	Parryi	682	LAMIUM	558
gratioloides	524	patens	682	amplexicaule	558
IMPATIENS	110	Richardsonianus	684	LAPSANA	388
pallida	111	Suksdorffii	685	communis	388
IMPERATA	718	tenuis	683	LAPPULA	479
Hookeri	718	Torreyi	685	ciliata	479
INULA	331	triformis	683	diffusa	479
Helenium	331	Var. brachystylus	683	floribunda	479
IONACTIS	313			Fremontii	480
alpina	313			hispidia	479
stenomeris	312			myosotis	479
IRIDACEAE	633			Texana	480
IRIS	633				
bracteata	634				
chrysophylla	633				

INDEX

LARIX	786	nitidum	63	Harknessii	455
Lyallii	786	occidentale	63	nudicaule	456
occidentalis	786	Oreganum	64	pharnaceoides	455
LASTHENIA	353	oxycarpum	64	LINARIA	504
glaberrima	354	reticulatum	64	Canadensis	504
LATHYRUS	157	LEPTARRHENA	189	vulgaris	504
bijugatus	160	pyrolifolia	189	LINNAEA	280
Bolanderi	158	LEPTAXIS	198	borealis	280
coriaceus	158	Menziesii	198	longiflora	280
Cusickii	159	LEPTOTAENIA	250	LINACEAE	103
decaphyllus	159	Californica	251	LINUM	104
lanceolatus	158	dissecta	250	digynum	104
littoralis	160	minor	251	micranthum	104
maritimus	157	multifida	251	Lewisii	
Nevadensis	159	purpurea	251	LISTERA	630
Nuttallii	158	Watsoni	251	caurina	631
ochroleucus	157	LESQUERELLA	51	convallarioides	630
Oregonensis	159	Douglasii	52	cordata	630
parvifolius	159	occidentalis	51	LITHOPHRAGMA	199
pauciflorus	158	LEUCOCRINUM	645	campanulata	200
polyphyllus	157	montanum	645	parviflora	200
rigidus	159	LEWISIA	91	rupicola	200
Sandbergi	160	rediviva	91	tenella	200
sulphureus	157	LIBOCDRUS	785	LITHOSPERMUM	492
Torreyi	160	decurrens	785	Californicum	492
vestitus	158	LIGULIFLORAE	291	pilosum	493
LAURACEAE	600	LIGUSTICUM	259	LLOYDIA	650
LAURENTIA	406	apiifolium	260	serotina	651
carnosula	406	Grayi	260	LOASACEAE	239
LEGOUZIA	408	Scoticum	260	LOBELIACEAE	405
perfoliata	408	scopulorum	260	LOBELIA	406
LAYIA	350	tenuifolium	260	Dortmanna	406
Douglasii	351	verticillatum	261	LOLIUM	773
glandulosa	351	LILAEA	672	perenne	774
LEDUM	422	subulata	673	temulentum	774
glandulosum	423	LILIACEAE	637	LOPHANTHUS	552
Groenlandicum	423	LILIUM	648	LORANTHACEAE	608
LEGUMINOSAE	113	Washingtonianum	648	LOTUS	138
LEIBERGIA	266	rubescens	648	Americanus	138
orogenioides	266	Bolanderi	648	denticulatus	139
LEMNACAE	669	parvum	649	Douglasii	140
LEMNA	669	pardalinum	649	crassifolius	140
trisulca	669	Columbianum	649	formosissimus	140
minor	669	Purdyi	649	Hosackia	140
LEONURUS	557	LIMNANTHACEAE	108	humistratus	139
Cardiaca	557	LIMNANTHES	103	micranthus	139
LENTIBULAR-		Douglasii	108	pinnatus	140
IACEAE	543	floccosa	108	Torreyi	141
LEPIDIUM	62	gracilis	108	Wrangellanus	139
acutidens	64	pumila	108	LUDWIGIA	221
apetalum	63	rosea	108	palustris	221
campestre	62	LIMOSELLA	524	LUETKEA	187
dictyotum	64	aquatica	524	Hendersoni	187
integrifolia	62	LINANTHUS	454	sibbaldioides	187
lasiocarpum	63	bicolor	455	LUINA	369
medium	63	Bolanderi	455	hypoleuca	369
Menziesii	63	ciliatus	456	LUPINUS	122
montanum	62	filipes	455	albicaulis	125

INDEX

arcticus	125	THRA	313	MENTHA	548
argenteus	128	attenuata	314	Canadensis	548
aridus	128	eradiata	314	MENYANTHES	449
Burkei	124	Shastensis	314	trifoliata	449
bicolor	128	MACRONEMA	301	MENZIESIA	420
Breweri	128	Greenei	301	ferruginea	421
brevicaulis	130	molle	301	glabella	421
canescens	126	suffruticosa	301	MENTZELIA	239
carnosulus	129	MADIA	346	albicaulis	240
cespitosus	128	capitata	347	Brandegei	240
Cusickii	128	citriodora	347	congesta	240
flexuosus	128	dissitiflora	347	dispersa	240
holosericeus	123	glomerata	347	gracilenta	240
latifolius	124	racemosa	347	laevicaulis	240
laxiflorus	127	sativa	347	pumila	241
Var. montanus	127	MADARIA	346	MERTENSIA	490
lepidus	127	corymbosa	346	nutans	491
leucophyllus	126	elegans	346	oblongifolia	490
ligulatus	124	MAIANTHEMUM	657	paniculata	490
littoralis	125	MALACOTHRIX	393	platyphylla	491
Lobbii	128	glabrata	393	longiflora	490
longipes	124	Torreyi	394	Sibirica	490
luteolus	130	MALUS	164	MICROCALA	442
Lyallii	129	rivularis	164	quadrangularis	443
micranthus	126	MALVACEAE	100	MICROMERIA	550
microcarpus	130	MALVA	100	Douglasii	550
minimus	128	rotundifolia	101	MICROSERIS	390
mucronulatus	125	MARAH	238	Bigelovii	391
Nootkatensis	123	Oregana	239	Douglasii	391
ornatus	126	MARRUBIUM	557	MIMULUS	519
parviflorus	127	vulgare	557	alsinoides	521
polypphyllus	124	MATRICARIA	362	breviflorus	521
proninquus	123	discoidea	362	cardinalis	519
pusillus	130	MEDICAGO	131	dentatus	519
Sabinii	125	denticulata	131	floribundus	522
saxosus	126	lupulina	131	grandiflorus	520
sericeus	126	sativa	131	hirsutus	520
sulphureus	126	MELAMPYRUM	540	Langsdorffii	520
trifidus	129	lineare	540	Lewisii	519
Wyethii	124	MELANTHACEAE	661	microphyllus	521
LYCHNIS		MELICA	749	moschatus	522
Drummondii	79	acuminata	751	nasutus	521
Coronaria	79	aristata	751	peduncularis	521
LUZULA	679	bromoides	750	pilosellus	522
LYCOPUS	548	bulbosa	750	pilosus	523
Americanus	549	fugax	750	primuloides	522
lucidus	549	Harfordii	750	Pulsiferae	521
rubellus	549	Var. Howellii	750	rubellus	522
Virginicus	548	Howellii	750	Scouleri	520
LYGODESMIA	399	interrupta	749	Suksdorffii	522
spinosa	400	scabrata	751	MIRABILIS	565
juncea	400	spectabilis	751	Greenei	565
LYSICHTON	667	stricta	749	MICROPUS	324
Kamtschatcensis	667	MELILOTUS	131	Californicus	324
LYTHRACEAE	216	alba	132	MITELLA	200
LYTHRUM	217	Indica	132	Breweri	201
adsurgens	217	MELISSA	551	ovalis	201
MACHAERAN-		officinalis	551	pentandra	201

INDEX

trifida	201	minimus	12	Suksdorfii	393
MITELLA STRA	201	sessilis	12	troximoides	393
caulescens	201	MYRICACEAE	615	NYCTAGINACEAE	565
MOLLUGO	241	MYRICA	615	NYMPHAEACEAE	29
verticillata	241	Californica	616	NYMPHAEA	29
MONARDA	552	Gale	616	advena	30
scabra	552	MYRIOPHYLLUM	219	polysepala	30
MONARDELLA	549	hippuroides	219	OENANTHE	262
discolor	550	pinnatum	220	sarmentosa	262
odoratissima	550	spicatum	219	OLEACEAE	438
purpurea	550	verticillatum	219	ONAGRACEAE	220
reflexa	549	NABALUS	399	ONAGRA	230
villosa	549	alatus	399	Hookeri	230
MONESSES	425	NAIADACEAE	670	OPUNTIA	242
uniflora	426	NAIAS	671	polyacantha	242
MONOLEPIS	594	flexilis	671	Var. platycarpa	242
chenopodioides	594	Gaudalupensis	671	Var. borealis	243
pusilla	594	NAMA	473	OREASTRUM	312
spatulata	594	demissum	473	alpigenum	313
MONOTROP-		NARTHECIUM	665	Andersoni	313
ACEAE	426	NASTURTIIUM	39	OREOBROMA	91
MONOTROPA	428	officinale	40	Columbiana	91
uniflora	428	NAUMBURGIA	437	Cotyledon	91
MONTIA	94	thyrsiflora	437	Howellii	92
arenicola	96	NAVARETIA	456	Nevadensis	92
asarifolia	96	atractyloides	457	Leana	91
bulbifera	97	Breweri	457	oppositifolia	92
Chamissonis	95	divaricata	457	pygmaea	92
dichotoma	94	intertexta	457	triphylla	92
diffusa	95	leucocephala	457	Tweedyi	92
Hallii	94	minima	457	OREOCARYA	486
Howellii	94	squarrosa	456	glomerata	486
humifusa	96	stricta	456	leucophaea	486
linearis	95	Suksdorfii	457	sericea	486
minor	94	NEILLIA	185	ORCHIDACEAE	624
parviflora	95	capitata	185	OROGENIA	261
parvifolia	95	malvacea	185	fusiformis	261
perfoliata	95	Torreyl	185	Var. Leibergi	262
rubra	96	NEPETA	553	linearifolia	261
Sibirica	97	Cataria	553	OROBANCHACEAE	540
spathulata	96	NEMOPHILA	465	OROBANCHE	541
tenuifolia	96	breviflora	466	Californica	541
MUHLENBERGIA	729	densa	466	comosa	541
comata	730	Menziesii	465	pinetorum	541
glomerata	729	parviflora	466	ORTHOCARPUS	533
sylvatica	730	pedunculata	466	attenuatus	533
Var. setigulumis	730	NEWBERRYA	430	bracteosus	535
MUNROA	747	congesta	430	castilleoides	534
squarrosa	747	NICOTIANA	499	cuspidatus	534
MUSENIUM	265	attenuata	500	erianthus	536
divaricatum	265	Bigelovii	500	hispidus	536
MYOSOTIS	491	quadrivalvis	500	imbricatus	535
alpestris	492	Var. multivalvis	500	lacerus	536
macrosperma	492	NITROPHILA	591	lithospermoides	536
palustris	492	occidentalis	591	luteus	535
MYOSURUS	7, 12	NOTHOCALAIS	393	purpurascens	534
apetalus	12	cuspidata	393	pusillus	536
lepturus	12			tenuifolius	534

INDEX

Tolmiei	535	PELTIPHYLLUM	190	Menziesii	537
OSMARONIA	162	peltatum	190	ornithorhyncha	538
cerasiformis	162	PENTSTEMON	509	parviflora	539
OSMORHIZA	266	acuminatus	512	racemosa	538
nuda	265	Adamsianus	511	PETALOSTEMON	142
OXALIDACEAE	109	attenuatus	513	ornatus	142
OXALIS	109	azureus	516	PETASITES	368
Oregana	110	Barrettae	511	nivalis	369
Suksdorffii	110	Cardwellii	510	palmata	368
trilliifolia	110	confertus	513	sagittata	368
OXYCOCCUS	412	Var. globosus	513	PEUCEDANUM	251
palustris	413	Cusickii	516	ambiguum	253
Var. intermedium	413	deustus	514	Var. leptocarpum	253
OXYRIA	588	Davidsonii	510	bicolor	256
digyna	588	Dayanus	511	Brandegei	257
OXYTHECA	575	Douglasii	510	Canbyi	252
dendroidea	575	diffusus	515	circumdatum	253
OXYTROPIS	154	Gairdneri	514	Cous	253
viscida	154	Var. hians	514	Cusickii	256
PACHYLOPHUS	233	glaber	511	Donnelli	254
Nuttallia	233	glandulosus	515	eurycarpum	253
PAEONIA	26	gracilentus	516	evittatum	252
Brownii	27	heterophyllus	517	farinosum	252
PACHYSTIMA	112	humilis	513	Geyeri	252
Myrsinites	112	Kingii	516	Gormanii	252
PANICACEAE	718	laricifolius	515	Grayi	253
PANICUM	718	Lewisii	509	Hallii	255
capillare	719	Lyallii	510	Hendersonii	252
Crus-galli	720	Menziesii	509	Howellii	257
dichotomum	719	miser	512	laevigatum	257
pubescens	719	Oreganus	515	leiocarpum	257
sanguinale	719	paniculatus	513	macrocarpum	254
Scoparium	719	procerus	513	Martindalei	255
Scribnerianum	719	pruinosis	512	Var. angustatum	255
PAPAVERACEAE	31	pulchellus	513	microcarpum	255
PANICULARIA	752	ovatus	512	Nevadense	254
Americana	753	Rattani	514	Nuttallii	257
borealis	753	Var. minor	514	Oreganum	254
fluitans	753	Richardsonii	515	Sandbergii	254
nervata	753	Roezli	516	simplex	256
pallida	753	rupicola	510	Suksdorffii	257
pauciflora	753	Scouleri	510	triternatum	256
PARIETARIA	603	stenosepalus	514	Var. macrocarpum	256
debilis	603	triphyllus	516	Var. brevifolium	256
Pennsylvanica	603	venustus	515	Var. alatum	256
PARNASSIA	204	Whitedii	512	utriculatum	255
Californica	205	PENTACAENA	89	villosum	254
fimbriata	205	ramosissima	89	Watsonii	252
PARRYA	38	PERAPHYLLUM	165	PHACELIA	467
Menziesii	38	ramosissimum	165	bicolor	471
PASPALUM	718	PERAMIUM	630	Bolanderi	469
distichum	718	Menziesii	630	ciliata	469
PASTINACA	250	PEDICULARIS	537	Franklinii	470
sativa	250	bracteosa	539	heterophylla	468
PECTOCARYA	477	contorta	538	humilis	468
penicillata	478	densiflora	539	Ivesiana	470
pusilla	478	Groenlandica	538	leucophylla	468
setosa	478	Howellii	538	malvaeflora	468

INDEX

Menziesii	470	CACEAE	588	Oreganum	32
mutabilis	467	PHYTOLACCA	588	PLECTRITIS	288
nemoralis	467	decandra	589	anomala	288
Pringlei	467	PICEA	789	aphanoptera	288
procera	469	Breweriana	789	congesta	288
ramosissima	469	Engelmanni	789	macrocera	288
Rattani	468	Sitchensis	790	samolifolia	289
sericea	470	PIMPINELLA	264	PLEURISCOS-	
verna	470	apiodora	264	PORA	429
virgata	468	Var. nudicaulis	265	fimbriolata	429
PHALARIS	721	PINACEAE	782	longipetala	429
amethystina	721	PINGUICULA	544	PNEUMARIA	491
arundinaceae	721	vulgaris	544	maritima	491
Canariensis	721	PINUS	790	POACEAE	720
Caroliniana	721	albicaulis	791	POA	755
PHELLOPTERUS	259	attenuata	792	acutiglumis	759
littoralis	259	contortta	792	annua	756
PHLOX	450	flexilis	791	argentea	755
adsurgens	452	Jeffreyi	791	Bolanderi	758
caespitosa	451	Lambertiana	790	Buckleyana	764
diffusa	451	monticola	791	Var. stenophylla	764
Douglasii	451	Murrayana	792	Canbyi	764
Var. andicola	451	ponderosa	791	compressa	759
Hoodii	451	PIPTOCALYX	483	confinis	760
linearifolia	451	circumscissus	483	Cusickii	756
longifolia	452	PLEUROPOGON	754	epilis	759
speciosa	452	refractum	755	Fendleriana	762
Var. Sabini	452	Californicum	755	flava	760
Stansburyi	452	PLAGIOBOTHRYS	483	glauca	760
PHILADELPHUS	205	asper	484	gracillima	761
Lewisii	206	campestris	484	Howeii	758
PHILOTRIA	670	canescens	485	Idahoensis	757
Canadensis	670	colorans	485	incurva	757
PHLEUM	740	hispidus	485	invaginata	761
pratense	740	nothofulyus	485	Kelloggii	758
alpinum	740	Shastensis	485	laevigata	763
PHORADENDRON	608	tenellus	484	lixa	760
juniperinum	608	PLANTAGIN-		Leckenbyi	762
Libocedri	608	ACEAE	561	Leibergii	763
villosum	608	PLANTAGO	561	Lettermani	763
PHRAGMITES	747	Asiatica	561	longiligula	763
communis	747	aristata	562	lucida	762
PHYLLODOCE	419	Bigelovii	563	macrantha	756
glanduliflora	419	elongata	563	memoralis	760
PHYLLOSPADIX	672	eriopoda	561	nervosa	757
Scouleri	672	macrocarpa	561	Nevadensis	762
PHYSARIA	52	major	561	occidentalis	758
didymocarpa	52	maritima	562	pratensis	759
Geyeri	52	lanceolata	562	Pringlei	763
Oregona	52	Purshii	562	purpurascens	758
PHYSOSTEGIA	556	spinulosa	562	reflexa	757
parviflora	557	tetrantha	563	Sandbergii	757
PHYSALIS	498	PLATYSTEMON	31	saxatilis	761
ixocarpa	498	Californica	31	subaristata	756
lanceolata	498	PLATYSPERMUM	51	Suksdorffi	761
pruinosa	498	scapigerum	51	Vaseyochloa	761
PHYTOLAC-		PLATYSTIGMA	32	Wheeleri	759
		lineare	32	POGOGYNE	551

INDEX

Douglasii	551	Shastensis	581	Pacifica	179
POLEMONIACEAE	449	spergulariae-		reflexa	176
POLEMONIUM	461	forme	583	rhomboidea	176
amoenum	463	viviparum	577	rivalis	177
carneum	462	Watsoni	584	villosa	173
confertum	463	POLYPOGON	724	Wrangelliana	176
elegans	461	littoralis	725	PRIMULACEAE	431
foliosissimum	462	Monspeliensis	724	PRIMULA	434
humile	461	POMACEAE	163	Broadheadae	434
luteum	463	PONTEDE-		Var. minor	434
micrantha	461	IACEAE	666	Cusickiana	434
occidentale	462	POPULUS	622	PROSARTES	658
pectinatum	462	alba	622	PRUNUS	161
pulchellum	462	angustifolia	622	Oregana	161
POLYGALEAE	72	balsamifera	622	subcordata	161
POLYGALA	73	deltoides	623	PSEUDOCYMOP-	
Californica	73	tremuloides	623	TERUS	258
POLYGONACEAE	567	trichocarpa	622	anisatus	258
POLYGONUM	576	PORTULACACEAE	90	PSEUDOTSUGA	788
alpinum	577	PORTULACA	90	Douglasii	788
Var. foliosum	577	oleracea	91	PSORALEA	141
Var. Alaskanum	578	POTAMOGETON	674	lanceolata	141
amphibium	578	alpinus	674	melilotoides	142
Austinae	583	amplifolius	674	physodes	141
aviculare	581	foliosus	676	Purshii	141
bistortoides	577	Var. Californicus	676	PSILOCARPHUS	325
Californicum	584	heterophyllus	675	brevissimus	326
convolvulus	585	lonchites	675	elatior	326
Davisiae	578	natans	674	tenellus	326
Douglasii	582	Nuttalli	674	Oreganus	326
dumetorum	585	pectinatus	676	PSILONEMA	52
Engelmanni	582	perfoliatus	675	calycinum	52
erectum	581	Var. Richardsonii	675	PTEROSPORA	427
Greenei	584	praelongus	675	Andromedea	428
Hartwrightii	579	pulcher	674	PTEROSTEGIA	576
Howellii	582	pusillus	676	drymarioides	576
Hydropiper	580	Robbinsii	676	PTILOCALAIS	390
hydropiperoides	580	zosteraefolius	675	major	390
Kelloggii	583	POTENTILLA	175	nutans	390
Japathifolium	579	Anserina	179	PTILORIA	388
Var. incanum	579	brevifolia	178	paniculata	389
lineare	583	ciliata	175	exigua	389
littorale	581	Drummondii	177	tenuifolia	389
majus	583	fissa	176	virgata	389
minimum	581	flabelliformis	178	PUCCINELLIA	754
montanum	582	flabellifolia	178	angustata	754
Muhlenbergii	579	fruticosa	179	distans	754
Newberryi	578	gracilis	178	Lemmoni	754
nodosum	579	glandulosa	176	maritima	754
Nuttallii	583	glutinosa	175	PYROLACEAE	423
paronychia	580	lateriflora	177	PYROLA	424
Parryi	584	millegrana	177	aphylla	425
Pennsylvanicum	579	ramosissimum	582	Var. paucifolia	425
Persicaria	580	Sawatchense	582	bracteata	425
phytolaccaefolium	578			chlorantha	424
polygaloides	584			elliptica	425
ramosissimum	582			minor	424
Sawatchense	582	Newberryi	177	picta	425

INDEX

rotundifolia	425	occidentalis	17	Marshallii	211
Var. incarnata	425	Oreganus	19	Menziesii	211
secunda	424	orthorhynchus	19	molle	209
PYRROCOMA	297	parviflorus	18	montanum	210
arguta	299	Pennsylvanicus	18	oxyacanthoides	210
glomerata	299	Populago	15	sanguineum	208
carthamoides	298	Rattani	17	tenuiflorum	207
congesta	299	repens	19	velutinum	210
Cusickii	298	reptans	14	viscosissimum	207
Hallii	299	samolifolius	14	RIGIOPAPPUS	356
hirta	299	septentrionalis	19	leptocladus	357
Howellii	299	Suksdorffi	16	ROMANZOFFIA	472
lanceolata	299	triternatus	16	Sitchensis	472
paniculata	298	Unalaschcensis	14	ROSACEAE	166
racemosa	298	RAPHANUS	66	ROSA	168
radiata	298	sativus	66	blanda	168
tenuicaulis	300	RAZOUMOFSKYA	609	Californica	169
QUERCUS	610	Americana	609	Fendleri	169
chrysolepis	611	Douglasii	609	gymnocarpa	169
densiflora	612	Var. abietinum	609	Nutkana	168
Garryana	610	occidentalis	609	pisocarpa	169
Jacobi	610	Var. abietinum	609	spithamaea	169
Kelloggii	611	robusta	609	rubiginosa	170
OErstediana	611	RHAMNACEAE	112	RORIPA	40
Sadleriana	611	RHAMNUS	112	Columbiae	40
vaccinifolia	611	alnifolia	112	curvisiliqua	41
RAFINESQUIA	403	Californicus	113	lyrata	41
Californica	403	occidentalis	113	Pacifica	40
RAILLARDELLA	371	Purshiana	113	palustris	40
argentea	372	RHINANTHUS	539	polymorpha	41
Pringlei	372	Crista-Galli	539	sinuata	40
RAINIERIA	369	RHODODENDRON	422	sphaerocarpa	40
stricta	370	Californicum	422	tenerrima	41
RANUNCULACEAE	7	macrophyllum	422	RUPPIA	673
RANUNCULUS	7, 13	RHUS	118	maritima	673
alismellus	15	diversiloba	119	RUBIACEAE	283
Bolanderi	15	glabra	118	RUBUS	182
Californicus	18	Toxicodendron	118	arcticus	183
cardiophyllum		trilobata	119	lasiococcus	183
cilius	17	RIBESACEAE	206	leucodermis	183
Cymbalaria	14	RIBES	207	nivalis	183
delphinifolius	14	ambiguum	210	parviflorus	182
digitatus	16	amicum	211	pedatus	183
Douglasii	18	aureum	207	spectabilis	182
ellipticus	15	bracteosum	209	Var. Menziesii	183
Eiseni	17	cereum	208	strigosus	183
eremogenes	17	ciliusum	208	ursinus	184
Eschscholtzii	16	cognatum	210	RUDBECKIA	338
eximius	16	divaricatum	210	Californica	338
glaberrimus	15	erythrocarpum	208	occidentalis	338
Gormanii	15	gracile	210	RUMEX	585
Greenii	18	Hudsonianum	209	acetosa	586
Howellii	17	lacustre	209	acetosella	585
limosus	14	laxiflorum	208	confinis	586
Macounii	18	Lobbii	211	conglomeratus	587
maximus	19	crispus	587	occidentalis	586
microlonchus	14	hesperius	587	paucifolius	585
muricatus	19	obtusifolius	587	persicarioides	588

INDEX

pulcher	587	bipinnata	264	lacustris	690
salicifolius	587	bipinnatifida	264	lineatus	691
venosus	586	Howellii	263	microcarpus	690
RYNCHOSPORA	694	laciniata	264	nanus	689
alba	694	Menziesii	263	Nevadensis	689
SALICACEAE	616	Nevadensis	264	Olneyi	690
SALIX	616	SANGUISORBA	170	pauciflorus	689
amygdaloides	617	annua	170	riparius	689
argophylla	618	media	170	robustus	690
Barclayi	620	officinalis	170	subterminalis	689
bella	619	Sitchensis	170	SCORZONELLA	391
congesta	617	SANTALACEAE	607	Bolanderi	392
cordata	620	SAPONARIA	74	Howellii	392
Var. angustata	620	officinale	75	laciniata	391
Var. Mackenziana	620	Vaccaria	75	leptosepala	392
exigua	618	SARCOBATUS	598	pratensis	391
Fendleriana	617	vermiculatus	598	procera	391
fluviatilis	618	SARCODES	428	SCOLIOPIS	660
Var. tenerrima	618	sanguinea	428	Hallii	660
Geyeriana	619	SARRACENIACEAE	30	SCROPHULARI-	
glaucops	621	SAUSSUREA	380	ACEAE	500
glauca var. villosa	621	Americana	381	SCROPHULARIA	508
Hookeriana	619	SAXIFRAGACEAE	188	Californica	508
lasiandra	617	SAXIFRAGA	190	Marylandica	508
lasiolopsis	620	bronchialis	190	occidentalis	508
Lemmoni	621	caespitosa	191	SCRIBNERIA	773
macrostacha	619	Californica	192	Bolanderi	773
myrtilloides	620	cherlerioides	191	SCUTELLARIA	554
nigra	617	claytoniaefolia	193	angustifolia	555
pellita	621	fragosa	192	antirrhinoides	555
petrophila	621	Howellii	195	galericulata	555
rostrata	619	integrifolia	193	lateriflora	555
saximontana	622	Lyallii	191	nana	555
Scouleriana	619	Var. laxa	192	siphocampyloides	555
sessilifolia	618	Marshallii	192	tuberosa	555
Sitchensis	620	Mertensiana	192	SEDUM	212
tenera	621	nidifica	193	ciliosum	214
vestita	622	Nutkana	194	debile	213
SAGITTARIA	678	Nuttallii	195	divaricatum	213
arifolia	678	occidentalis	194	divergens	213
Var. stricta	679	Oregona	194	Douglasii	213
cuneata	679	parvifolia	194	Oreganum	213
esculenta	679	plantaginea	193	pumilum	214
SALICORNIA	597	reflexa	194	Rhodiola	212
ambigua	598	Tolmaei	190	spathulifolium	213
herbacea	598	tricuspidata	191	stenopetalum	214
SALSOLA	599	SAXIFRAGOPSIS	195	uniflorum	213
tragus	599	fragarioides	195	SELINUM	248
SAMBUCUS	279	SCHUECHZER		Benthami	249
arborescens	279	IACEAE	676	capitellatum	248
glauca	279	SCHUECHZERIA	677	Dawsoni	249
leiosperma	279	palustris	677	Hookeri	249
melanocarpa	279	SCHOENOCRAMBE	57	Kingii	249
pubens	279	linifolia	57	SENECIO	374
SAMOLUS	438	SCIRPUS	689	Adamsi	379
floribundus	438	Americanus	690	aureus	378
SANICULA	263	atrovirens	691	Balsamitae	378
arctopoides	263	criniger	691		

INDEX

Bolanderi	379	Macounii	78	SOLIVA	362
Columbianus	377	macrocalyx	78	sessilis	363
condensatus	379	Menziesii	76	SONCHUS	404
cordatus	377	monantha	78	asper	405
elongatus	379	montana	77	oleraceus	405
exaltatus	377	multicaule	79	SOPHIA	56
fastigiatus	378	Oregana	77	Hartwegiara	56
foetidus	377	scaposa	79	longipedicellata	56
Fremontii	375	Scouleri	79	incisa	56
Gibbonsii	376	Spauldingii	79	pinnata	56
hesperis	375	Suksdorfii	77	SORBUS	164
hydrophyllus	376	SILYBUM	384	occidentalis	164
megacephalus	375	Marianum	384	sambucifolia	164
occidentalis	375	SISYRINCHIUM	635	SPARGANIUM	668
Oreganus	377	angustifolium	635	androcladum	668
Purshianus	378	bellum	635	eurycarpum	668
serra	376	Californicum	636	simplex	668
Var. integriscu-		grandiflorum	636	minimum	668
lus	37	Idahoense	636	Var. angustifol-	
streptanthifolius	375	occidentale	636	ium	668
subnudus	378	sarmentosa	636	SPARTINA	734
subvestitus	376	segetum	635	cynosuroides	735
triangularis	376	septentrionale	636	gracilis	735
valerianella	377	SITANION	780	SPECULARIA	408
vulgaris	379	Brodiei	781	SPERGULA	88
SEQUOIA	785	elymoides	780	arvensis	88
sempervirens	786	flexuosum	780	SPHAEROSTIGMA	231
SERICOCARPUS	306	glaber	780	alyssoides	232
Oregonensis	306	Leckenbyi	780	andinum	233
rigidus	306	villosum	780	Boothii	232
SHEPHERDIA	601	SIUM	268	contorta	232
argentea	601	cicutaeifolium	268	Var. pubens	232
Canadensis	601	SMELOWSKIA	56	Var. Greenei	232
SIBBALDIA	175	calycina	57	Hilgardi	232
procumbens	175	Fremonti	57	spirale	232
SIDA	103	SMILACINA	656	SPHAERALCEA	102
hederacea	103	amplexicaulis	656	acerifolia	103
SIDALCEA	101	racemosa	656	leptosepala	103
campestris	102	sessilifolia	657	Munroana	102
glaucescens	101	stellata	657	SPIRANTHES	629
Hendersoni	102	SMILACEAE	637	SPIRODELA	669
malvaeflora	101	SMILAX	637	polyrhiza	669
Oregana	102	Californica	637	SPIRAEA	186
spicata	101	SOLANACEAE	496	arbuscula	186
virgata	101	SOLANUM	497	caespitosa	187
SILENE	75	nigrum	497	Douglasii	186
acaulis	75	sisymbriifolium	498	lucida	186
antirrhina	75	triflorum	497	Menziesii	187
Californica	76	umbelliferum	497	pyramidata	186
campanulata	76	villosum	497	SPOROBOLUS	722
Columbiana	78	SOLIDAGO	303	airoides	723
Douglasii	78	Californica	304	asperifolius	723
Gallica	75	confertiflora	303	Bolanderi	724
Gormanii	77	elongata	304	confusus	724
Greenii	76	hesperius	303	cryptandrus	723
Hookeri	76	Missouriensis	304	filiformis	724
longistylis	76	serotina	304		
Lyallii	77	Tolmieana	303		

INDEX

gracillimus	724	obtusa	447	Var. involucreatum	259
simplex	724	SYMPHORICAR-		THELYPODIUM	57
SPRAGUEA	97	POS	280	eucosmum	56
multiceps	97	acutus	281	flexuosum	58
umbellata	97	occidentalis	281	Howellii	58
STANLEYA	59	oreophilus	281	integrifolium	58
confertiflora	59	pauciflorus	281	laciniatum	58
viridiflora	59	racemosus	281	lasiophyllum	59
STACHYS	558	rotundifolius	281	Nuttallii	58
bullata	559	SYNTHYRIS	524	THERMOPSIS	121
Chamissonis	559	major	525	argentata	122
ciliata	559	pinnatifida	525	gracilis	122
Var. pubens	559	reniformis	525	montana	122
Emersoni	559	rotundifolia	525	robusta	122
palustris	559	rubra	526	THLASPI	64
pycnantha	558	TAENIOPLEURUM	263	alpestre	65
vestita	558	Howellii	269	THUJA	785
STEIRONEMA	436	TALINUM	93	plicata	785
ciliatum	436	spinescens	93	THYSANOCARPUS	65
laevigatum	436	TANACETUM	363	curvipes	66
STENANTHELLA	663	canum	364	radians	66
occidentalis	663	Huronense	364	TIARELLA	202
STENOTUS	300	potentilloides	364	laciniata	202
acaulis	301	vulgare	363	trifoliata	202
Brandegei	300	TARAXACUM	403	unfoliata	202
lanuginosus	300	officinale	403	TILLAEA	212
Lyalii	300	TARAXIA	231	angustifolia	212
stenophyllus	301	gracilliflora	231	minima	212
STENOPHYLLUS	694	heterantha	231	TISSA	88
Capillaris	694	longiflora	231	diandra	89
STEPHANOMERIA	388	ovata	231	macrothecum	88
STREPTOPUS	657	TAXACEAE	781	salina	88
amplexifolius	658	TAXUS	781	rubra	89
brevipes	658	brevifolia	781	TOFIELDIA	664
roseus	658	TETRADYMIA	370	glutinosa	665
STIPA	736	canescens	371	intermedia	665
Bloomeri	737	glabrata	371	occidentalis	665
comata	737	Nuttallii	371	TONELLA	507
Kingii	737	spinosa	371	collinsioides	507
Lemmoni	738	TELLIMA	198	floribunda	507
minor	738	grandiflora	199	TOWNSENDIA	305
occidentalis	736	odorata	199	florifer	306
Oregonensis	737	racemosa	199	Parryi	306
setigera	737	TEUCRIUM	547	TRAGOPOGON	389
viridula	738	occidentale	547	porrifolius	389
STREPTANTHUS	46	THALESIA	541	TRAUTVETTERIA	12
glandulosus	47	fasciculata	542	grandis	13
Howellii	47	purpurea	542	TRIENTALIS	436
longirostris	47	uniflora	542	arctica	436
orbiculatus	46	THALICTRUM	7, 11	latifolia	436
STYLOCLINE	325	Fendleri	11	TRIFOLIUM	132
flaginea	325	polycarpum	11	albopurpureum	133
SUAEDA	598	occidentale	12	altissimum	134
SUBULARIA	60	sparsiflorum	11	Beckwithii	134
aquatica	60	venulosum	11	Breweri	135
SULLIVANTIA	196	THASPIUM	259	ciliolatum	135
Oregona	196	aureum	259	cyathiferum	137
SWERTIA	447	Var. trifoliatum	259	denauperatum	138

INDEX

eriocephalum	133	Californica	600	VERBENACEAE	560
fimbriatum	136	UNIFOLIUM	657	VERBENA	560
fucatum	138	dilatatum	657	bracteosa	560
Hallii	135	UROAPPUS	392	hastata	560
Harneyensis	134	linearifolius	392	prostrata	560
heterodon	136	macrochaetus	392	VERONICA	526
Howellii	134	URTICACEAE	602	Alleni	527
Kingii	134	URTICA	602	Americana	526
longipes	133	Breweri	602	avensis	527
Var. latifolium	133	gracilis	603	Cusickii	526
megacephalum	132	holosericea	602	peregrina	527
microdon	137	Lyallii	603	scutellata	526
microcephalum	137	UTRICULARIA	543	serpyllifolia	527
obtusiflorum	136	intermedia	544	Wormskioldii	527
oliganthum	137	minor	543	VIBURNACEAE	277
Oreganum	134	occidentalis	543	VIBURNUM	278
Plummerae	132	vulgaris	543	ellipticum	278
plumosum	133	VACCINIACEAE	410	Opulus	278
pratense	133	VACCINIUM	410	pauciflorum	278
procumbens	135	arbuscula	411	VICIA	155
repens	135	Alaskaensis	412	Americana	156
spinulosum	136	caespitosum	411	Californica	156
tridentatum	136	Var. cuneifolium	411	exigua	156
variegatum	137	membranaceum	411	gigantea	155
TRICHOSTEMA	547	Var. rigidum	411	hirsuta	156
lanceolatum	547	microphyllum	411	sativa	156
laxum	547	Myrtillus	411	semicineta	156
oblongum	547	occidentale	411	truncata	156
TRIGLOCHIN	677	ovalifolium	412	VIOLACEAE	68
maritima	677	ovatum	412	VIOLA	68
palustris	677	parvifolium	412	adunca	72
TRILLIUM	661	uliginosum	411	Beckwithii	71
chloropetalum	661	Var. mucronatum	411	blanda	69
ovatum	661	Vitis-Idaea	412	Brooksii	71
petiolatum	661	VAGNERA	656	Canadensis	71
rivale	661	VALERIANACEAE	286	cognata	68
TRISETUM	744	VALERIANA	287	cuneata	72
barbatum	744	Columbiana	287	Douglasii	71
canescens	744	edulis	287	glabella	72
cernuum	744	Sitchensis	287	Hallii	71
subspicatum	744	sylvatica	287	Howellii	72
Var. molle	745	VALERIANELLA	289	Langsdorffii	69
TROLLIUS	20	olitoria	289	lobata	71
laxus	20	VALLISNER		Macloskeyi	69
TROXIMON	400	IACEAE	670	Nuttallii	70
TSUGA	788	VANCOUVERIA	28	occidentalis	69
heterophylla	789	hexandra	28	ocellata	72
Mertensiana	789	chrysantha	28	orbiculata	70
TUBULIFLORAE	290	VELAEA	267	palustris	69
TYPHACEAE	667	Howellii	267	praemorsa	70
TYPHA	668	Kelloggii	267	puberula	72
angustifolia	669	VERBASCUM	503	purpurea	70
latifolia	669	Blattaria	503	sarmentosa	70
ULEX	130	Thapsus	503	Sheltoni	70
Europaeus	130	VERATRUM	662	trinervata	71
ULMACEAE	601	Californicum	663	VITACEAE	115
UMBELLIFERAE	243	caudatum	663	VITIS	116
UMBELLULARIA	600	viride	662	Californica	116

INDEX

WHIPPLEA	206	involucratum	282	ZOSTERA	671
modesta	206	Ledebourii	282	latifolia	672
WYETHIA	340	Utahensis	282	marina	672
amplexicaulis	341	villosum	282	ZYGADENUS	662
helianthoides	340	ZANNICHELLIA	673	elegans	662
lanceolata	341	palustris	673	Douglasii	664
robusta	341	XEROPHYLLUM	666	gramineus	664
XANTHIUM	337	Douglasii	666	intermedius	664
Canadense	337	tenax	666	paniculatus	664
strumarium	337	ZIZIA	268	venenosus	664
spinosum	338	cordata	268		
XYLOSTEON	281				
conjugialis	282				

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