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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.

FASCICLE 3, VIBURNACEÆ TO SENECTIONIDEÆ

Price Fifty Cents.

PORTLAND OREGON,

August 31st, 1900.

II Gamopetalæ 275

+7 Viburnaceæ 277

48 Rubiaceæ 283

49 Valerian 286

50 Dipsac 289

51 Composit. 290

II Eupatori. 291

II Asteroid. 293

III Scrophulariaceæ 323

IV Helianthaceæ 333

V Helenioidææ 351

II Anthemidææ 360

III Senecionidææ 367

VI Gynossidææ 379

IX Eichoraceæ 386

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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 verticellate 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 verticellate leaves, without stipules and capitate involucre 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 *Glaux*. 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 diœcious. 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.

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↔ 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. *Plugulunculacæ*. 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. *Labiatæ*. 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. *Verbenacæ*. 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. *Plantaginacæ*. 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 exserted: 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

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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 fastigiate 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 trifid 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 leave 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 fastigiate, 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 the erect branches, 2-bracteolate 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.

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§ 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, 4-8 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 cerulea* 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. confugialis *Lonicera confugialis* 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. involucratum Richard App. Frankl. Journ. 6. *Lonicera involucrata* 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 obcordate, 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

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C. ciliosum Pursh. Fl. 160. *Lonicera ciliosa* Pair. 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 R. 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. **Gallum**. 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; introrsely 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 uncinat 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 uncinat-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 dioecious: bristles on the fruit short and uncinat or none.

+ Leaves in fours throughout or fewer.

G. Oregonum 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.

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+ + 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. asperrium 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 monoeious 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 *RELBUNUM* 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, 533. Depressed: cespitose, 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 funnelform, 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. gallioides 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 scarious: flowers small, in a loose dichotomous cyme, the long pedicels thickened above and articulated with the flower; corolla funnelform, white or pinkish, 3-5 lines long, pubescent on the outside: fruit small, oblong, coriaceous, uncinately 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 funnelform 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.

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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 root-stocks or roots, simple or pinnate leaves and white or flesh colored perfect or polygamo-dioecious; flowers in terminal often panicled 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 lacinate-pinnatifid: cauline rarely none, commonly 1-3 pairs, sessile, pinnately parted into 3-7 linear or lanceolate divisions: flowers polygamo-dioecious, yellowish white, sessile in the cymules which form an elongated thyrsoïd 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. Sitchensis Bong. Veg. Sitch. 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 funnelliform; 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. Columbiانا 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-acutish 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 thyrsus, 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 funnelform 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.

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P. samolifolia Hœck in Engler, Jahrb lli, 37. A span to a foot high: verticillastrate 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, funnelform 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 funnelform, 4-cleft.

D. SYLVESTRIS Mill. Dict. Stems stout, 2-5 feet high prickly: lanceolate-oblong, connate at base, 4-8 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 involucre 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: *mediate* when there are enlarged ligulate flowers in the margin: *ligulate* when all the flowers have ligulate corollas: *discoïd* 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 discoïd flowers all hermaphrodite, never yellow; anthers not caudate at base.

291

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 prominent and extending either to the naked summit or to a more or less distinct pubescent or hispidulous tip or appendage.

293

II. *Asteroidæ*. 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.

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III. **Inuloides**. 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.

323

IV. **Hellanthoides**. 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.

333

V. **Helenioides**. 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.

351

VI. **Anthemidæ**. Anthers not caudate; style-branches mostly truncate; involucre of dry and scarious bracts, receptacle without or sometimes with bracts subtending the flowers: pappus coroniform r of short pale or none.

360

VII. **Seneceloides**. 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

368

III. **Cardulines** ^{Cardulines} 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 foveate: pappus usually of many plumose bristles: heads never truly radiate

379

SUBORDER II. LIGULIFLOREÆ.

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.

386

Tribe I. EUPATORIÆ 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.

I 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-

indricul 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 striae. 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 Ell. 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 subplumose. In gravelly gulches and along streams, southern Oregon and northern California.

C. oblongifolius 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 muricate 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. linifolius 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.

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+ + 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 dioica* cious 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. **Grindella.** 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-brown 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-villose: 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. **HETEROCHROMEÆ.** 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 panicled 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, 5-7-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, *Homochromææ*. 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 amplicate 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 on the 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 bidenate, at summit: awns of the pappus mostly 2. On dry hillsides. Washington to California.

G. discoides Nutt. l. c. 315. Whole herbage glabrous. stems slender, several from the same root, fastigiate 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 CHRYSOPTIS 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

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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. *grindelloides* Nutt. l. c. *Aplopappus Nuttallii* T. & G. Cinerous-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, -cabro 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 in rosette and concealed in the pappus. On plains and rocky hillsides; British Columbia to Oregon and Idaho.

P. radiata Nutt. Frans. 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, exserted but inconspicuous: achenes 4 lines long, about the length of the rigid expanding pappus, the bristles of which are barbellate-scarious. Dry plains near Walla Walla, Washington

P. cusickii 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 exserted 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 2 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. pauciculata T. & G. l. c. Glabrous. Stems a foot high, branched at the summit: leaves oblong-lanceolate, mucronate, obscurely and remotely

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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, floriferous 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 lower 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 oft, whitish. Eastern region and Washington.

P. Howellii Greene l. c. 70. *Aplopappus Howellii* Gray. ericeous-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-

nent 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 scarious 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 ob-lanceolate: 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 elongated-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.

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S. acaulis Nutt. Trans. Am. Phil. Soc. vii, 334. *Aplopappus acaulis* Gray. Depressed-caespitose 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, 1-3 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 Naskatchewan.

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 exserted, 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 CHRYSOETHAMNUS Nutt. Trans. Am. hil. viii, 323.

Perennial herbs or suffrutescent 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 fastigiately 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 *Aplopappus 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 fasciated in their axils: heads small, corolla 5-lobed: 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-

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flowers 8-9 as long as the rays; branches of the style linear-subulate, the
hirsute appendages much longer than the stamatic portion. Plains of
the higher mountains, Washington to Nevada, Idaho and Utah.

C. Bloomeri Greene Eryth, lii, 115 *Anthropapaus 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 taper-
ing base, or spatulate-linear, mucronate, scarcely punctate, 1-2 inches
long: heads narrowly panicle or corymb, leafy-bracted, 8-10 lines
high 10-25-flowered: bracts of the oblong cylindraceous involucre imbric-
ated in 3 or 4 ranks, chartaceo-coriaceous with a greenish midrib and
scarious margins, the inner linear-oblong, thinner and villous-ciliate, ob-
tuse, a little shorter than the disk, the outer shorter and abruptly tipped
with a subulate foliaceous appendage: rays 1-4 or none, oblong, conspicu-
ously exserted: style-appendages subulate-filiform, much exserted:
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 corym-
bose, 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, ses-
sile 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 imbric-
ated, appressed, destitute of foliaceous or herbaceous tips.
Receptacle narrow mostly alveolate. Appendages of the style
lanceolate. Achenes somewhat tetrahedral, many-ribbed. Pappus
simple, of numerous scabrous capillary bristles.

S. confertiflora DC. Prodr. v. 339. Stems simple, leafy to the thyrs-
us, 1-3 feet high, glabrous, angular above: leaves oval-lanceolate, or ob-
long-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 *naua* 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 some-
what corymbosely disposed clusters: leaves thickish and veins very in-
conspicuous, linear or lanceolate (2 or three inches long), entire, rarely
with some minute serratures, the margins usually scabrous-ciliate, glab-
rous and smooth: heads about 1 line high crowded in thyrsoïd 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 fastigiate, branched at the summit: leaves rigid, crowded, often fascicled 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 second 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. xli, 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 limbrillate 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. *Heterochromæ* Gray. Syn. Fl. i p. 2 54. Ray flowers blue red or purple to white rarely yellow or wanting in certain species. Disk of hermaphrodite and mostly fertile flowers, their

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13 BELLIS LORUM (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. Bert. 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. latispinosa 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 Ann. Nat. 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 cuneately 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, minutely 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 exserted 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 Nevadas 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 exserted; achenes slender, fully half as long as the white pappus, slender, not very densely silky. On dry or gravelly plains western Oregon and Washington.

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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, 388. 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, 6-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 thyrsoidly 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. lewis* 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 thyrsoid-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 involucreal bracts, the e mostly with obtuse tips: heads numerous, racemously 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 canescent-hirsute. On plains and river banks Eastern Oregon and Washington to Utah and Dakota.

A. chamissonis 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 panicled, 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 panicled, 4-5 lines high: involucre campanulate; its bracts numerous and imbricated in several ranks, thickish, linear, with short usually somewhat

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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 similar: 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: involucre 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. Eatonii *A. foliaceus* var. *Eatonii* 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.

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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 racemously 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 purplish 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 preceding, 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, 8-18 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,

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O. alpigenum Greene l. c. 147. *Aster alpigenuus* Gray *Aster pulchellus* Eaton? Scapiform stems spreading and asurgent, 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, nerveless 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 Nevadas.

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. stenomerus Greene l. c. *Aster stenomerus* 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 tubulate: 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-canescant. 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 involucral bracts, the lower attenuate below

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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 Nevada, 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 laner, 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 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:

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rays about 100,
equal or spatulate,

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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 multiseptate 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. Aliciae. 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 hairs: 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, 2-8 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-villous: outer pappus slender-squammate, 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-complanate, its bracts narrow, numerous 3-5 lines long, hirsute: rays, 40-60, 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 flowing 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, Arctic seacoast, Greenland, and Spitzbergen to the higher mountains of Washington, Oregon and California and the Rocky mountains.

Var. discoides Gray, Am. Jour. Sci. Sér. 2, xxxii, 237. Rays wanting or abortive: heads commonly smaller. Same range as the radiate form, often growing with it.

+ + + Dwarf or low species, alpine or alpestrine, 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. radicans 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-

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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-scarious 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 cymosely 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. Oregonus Gray. Proc. Am. Acad. xix, 2. Pubescent throughout:

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stems numerous in a rosette 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 corymbosely-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 bristley 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. Drœbachensis 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 semingly discoid heads inconspicuous, little flat 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 overy 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

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and often tortuose and more or less clavellate bristles: of the pistillate of usually more numerous and fine bristles.

Trib. iii, Inuloides 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 FILAGINEÆ. 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 *Hesperexax* Receptacle villous, its centre elongated into a narrow column: achenes pear-shaped, flattened parallel to the subtending chaff: pappus none.

SUBTRIBE II GNAPHALIEÆ. 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 *Anaphalls* 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 *Gnaphallium* 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 EUINULEÆ 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 ADENOCAULÆ 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 involucre bract enclosing or subtending each pistillate flower or achene. Corolla of the pistillate flowers a filiform tube, shorter than the style; of the hermaphrodite flowers a filiform tube, shorter than the style; 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 MICROPUS 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 involuving 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 *Gnaphalæ* 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-branched 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.

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29 ANTENNARIA Gaertn. Fruct. & Sem. ii, 410, t. 167.

Diœcious or polygamo-diœcious perennial herbs with alternate leaves and many-flowered heads of inconspicuous flowers. Heads discoïd; 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, cespitose, 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 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 whit 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 caespitose: radical shoots not very numerous, short: densely silky-woolly: flowering stems 1-6 inches high: radical leaves broadly spatulate to ovate, 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.

heads numerous, late, in terminal woolly at base; bracts shorter, the tips which in dry open

the subterranean summit, and inner bracts of the obtuse tips; silvery-lanate:

ly: stems slender the lowest narrowly: heads small (2 numerous: involucre the pistillate heads the petaloid tips of the and Wyoming, east

with a very fine 20 inches high, 2 inches long, somewhat clasping numerous, paniculate or acutish: tips of n to California.

as to the American: heads high: lower below to a slender: heads several to 4 lines high, dense: tips; of the standard acute: achenes dilated bristles.

humifuse and

to the American numerous, short: radical leaves broad-petiolate to linear: late cluster, with minate heads off-sets with scarious On the highest Mountains.

loosely surculose: heads high, leafy: an inch or more 1½ inches long: the involucre rose-staminate plant a 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 faces and thin: heads on slender pedicels of ½-1 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 pluri-serial, 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. Sprengellii 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 cymulose disposed

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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-oblanccolate, 6-12 lines long: heads numerous, in racemously 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 capitate 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. 1, 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-lentate 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-woolly, simple or branched, 6-18 lines long, from a long annual taproot: leaves ovate or oval, including the broad petiole 10-14 lines long, thinly white-woolly beneath, soon glabrate and green above: heads numerous, subsessile, in dense terminal glomerules: corollas purplish or flesh-color: pappus

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COMPOSITÆ

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of 20 long-plumose bristles. On high stony hills, near Stein mountain
southeastern Oreg. n.

Tribe iv *Helianthoides* B. & H. Gen. ii, 166. Heads heterog-
amous and the pistillate flowers ligulate and radiate, or rarely with
corolla wanting, and then sometimes monœcious: or sometimes homo-
gamous 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 herma-
phrodite or sterile flowers truncate or continued into a hairy conical
to subulate appendage. Pappus various or none: never of truly cap-
illary 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 1-2-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
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 inter-
mediate chaffy scales.

- 43 **Hellanthus** Achenes thick, quadrangular-compressed or with the sides convex and the angles obtuse: pappus a pair of caducous chaffy scales or awns.

SUBTRIBE IV, BIDENTIÆÆ 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, GALINSOGÆÆ 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, MADIÆÆ 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 **Antiscarpus** 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 **Harpocarpus** Rays 4-8, very short and inconspicuous; disk-flower solitary, fertile, enclosed in a 3-5-toothed herbaceous 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 enwrapping 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 herbaceous bracts; pappus of conspicuous chaffy scales.

54 Centromadia Achenes of therapy-flowers very oblique, the small terminal areola from the summit of the inner angle or face, on a narrow beak: receptacle convex or conical, 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 Ixer 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 funnelform 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-

branaceous 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 dicecious 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*

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GÆRTNERIA
XANTHIUM

COMPOSITÆ

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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. 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. 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 laciniate-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 cylindraceous.

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 uncinate-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: axils 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 puberulent; 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-scarios and often 4-toothed crown, sometimes deep and cupuliform, sometimes obsolete, or none.

R. *Californica* 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, narrowly 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

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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 teretibenthine 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 ARTORRHIZA 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. *alticola* 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, spinulosely dentate or some-times 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 laciniate pappus, one or more of the teeth usually prolonged into a rigid persistent awn.

W. hellanthoides Nutt. l. c. Stems leafy, 6-18 inches high, simple and

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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-quad-rangular 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-oblancoate, 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 squamelle. 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, compressor 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 North-west 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.

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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. Sym. 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 trifoliate, 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. Ray 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: stem erect, 2-8 feet high, branching: leaves pinnately 3-5-divided into lanceolate or broader sharply serrate and pinnately veined 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-foot 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 Continent.

B. Beckii Torr. in Spreng. Neue Entdeck. ii, 135. Aquatic perennial submerged stems much elongated in deep water, simple or little branched: submerged leaves sessile, 1-2 inches long, repeatedly divided into numerous capillary segments: emerged 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 streamlets, 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

COROPHIS
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lanceolate to subulate
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(anting), 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 scarious, mostly deciduous with the fruit. Bracts of the involucre merely connate.

46 BLEPHARIPAPPUS Hook. Fl. i, 316 in Part.

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perfect, fertile
entire or minutely
or subulate tips
cuneate, oblong
or hispid awns.

hairy annual: stems
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Oregon and Missouri: rare
C. V. Piper, perhaps

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 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, 2-cleft only at the apex; the branches obtuse and not adnate, or in the central sterile ones nearly entire. Achenes subulate, silky-villous. Pappus of 10-12 linear or aristiform hairs with hyaline margins which are mostly lacerate-fimbriate as to appear plumose.

scaber Hook. l. c. Puberulent and scabrous, and with some hispid hairs above: stems stoutish, 4-12 inches high, loosely branched: leaves linear, sessile. $\frac{1}{4}$ -2 inches long with entire revolute or involute margins: bracts 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 conspicuous when the sun shines on them: anthers brownish-purple. Plains and mountains, Brit. Columbia to California and Idaho, east of the Cascade Mountains.

laevis Gray Bot. Gaz. xiii, 73. Stems slender, 6-12 inches high, branched: leaves linear, 2-10 lines long, sessile, the lower ones spreading, those of the branches closely appressed: heads small, terminal: 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, 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 ANISOCARPUS Nutt. Trans. Am. Phil. Soc. vii, 388.

Villous-hirsute perennial herbs with linear to lanceolate entire entire 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, tubular, those of the disk tubular, staminate and pistillate but

and fertile (rarely

sterile. Bracts of the subglobose involucre as many as the ray 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 small fimbriate-lacerate membranaceous scales.

A. madioides Nutt l. c. *Madia Nuttallii* Gray. Stems slender, 1-2 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-pedicled, 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.

48 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, with broad base, the lower crowded in a somewhat rosulate tuft, the others opposite or scattered and becoming smaller upward: heads numerous, in 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 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-linear entire or denticulate sessile leaves and sessile or short-

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annuals with oblong
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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. 1, 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 capitate 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 panicled 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 funnelform, 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

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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 exserted 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 racemously 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 funnellform, 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: γ appus 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 pinatifid 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-triangular: 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-obovate: 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-

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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 middle-sized 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 Schauer 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 HELENIOIDEÆ 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 exserted and spreading.

60 Baeria Receptacle high-conical, minutely muciculate: 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 Bahia 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 Chænaetis 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 Jaumiæ. 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, Heleniæ. 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 equaling 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 capitellate-conical. Achenes narrow, from clavate-linear to cuneate-oblong, mostly 4-angled. Pappus of nerveless and mostly pointless paleæ.

E. stachadifolium Lag. l. c. Canescent with close-pressed panuose 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 thinish bracts: rays 6-8, only a line or so long, roundish-oval: receptacle

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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. Surculose-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, Siekiyou 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 scarious 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 scarious-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-scarious 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-

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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. Nevil 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 unequally 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: pales 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 multicapital 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 multicapital 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, bearing several or sometimes solitary large heads: leaves thickly entire, oblong-lanceolate, or the lower spatulate with long tapering petioles, somewhat nervose: rays becoming inch long, tardily reflexed: disk three-fourths inch high, hemispherical: receptacle in fruit ovoid-lanceolate: 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 Fougereux 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

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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 lacinate-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: anthers 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. *ARVENSIS* 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 corymbosely 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 fastigate 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

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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, laciniate-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, 2-8 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 cobwebby 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-

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* * 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: caespitose 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 quaternately 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: 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-canescant 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 lignescent caudex: leaves 1-2-pinnately parted into narrow, linear or lanceolate entire or sparingly laciniate 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

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and close tomentum. Heads homogamous, the flowers all her-
maphrodite and fertile Receptacle not hairy.

* Heads solitary in the axile, surpassed by the rigid leaves.

A. rigida Gray Proc Am. Acad. xix, 40. "A span to a foot high from a
thick woody base or short stem, producing a profusion of rigid and slender
rather simple fastigiate branches, leafy to the very top: leaves also rigid,
silvery-canescant, 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 re-
duced 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 trun-
cate 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-canescant. 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 Des-
ert and the southern borders of San Diego Co. California."

A. trifida Nutt. l. c. Silky-canescant: 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: invo-
lucre 3-9-flowered, its outer or accessory bracts oblong to short-linear or
lanceolate. Elevated plains, Washington to California.

Tribe vii, *SENECIONIDEÆ* 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 engittate. Style-bran-
ches of hermaphrodite flowers most commonly truncat or obtuse,
tipped with short appendages or none. Pappus of numerous capil-
lary bristles, sometimes caducous.

* Heads suldicous: 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 *Cacalopsis* Heads very many-flowered: anthers entire at base.

80 *Laina* 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 *Baillardella* 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 Gært. 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, subdioecious; 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 exserted, 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 exserted, sagittate at base. Style glabrous, its flattened and linear branches obscurely papillose 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 *Nabalus*, but more nearly the characters of *Mesadenus*. 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 cylindric 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-fuscaous. Dry northward slopes, in rocky soil at the limit of trees on Mount Rainier Wash."

* * *Style-branches of hermaphrodite flowers either truncate or capitate 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. 1, 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

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§ 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, fastigately 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 8 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 lignescens: 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. discolor 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.

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A. spathulata Greene Pitt. iii. 103. "A foot high or more, stoutish, somewhat vividly 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 orbiculate, 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. Sitch. 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 Waldco, 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, fastigiate 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 radial 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 rootstocks, 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 na-

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ked at base: the scales thin-herbaceous, lanceolate or linear,
equal, in one or two series. Receptacle flat, naked. Rays elon-
gated: disk-corollas with distinct and usually elongated tube and
funnelform or cylindraceous 5-lobed limb. Style-appendages
obtusely, 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 pu-
bescence 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, lanceo-
late 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 some-
what fleshy, from round-oval to oblong and oblong-lanceolate, 6-12 lines
long, tapering or abruptly contracted to a short or long petiole, almost en-
tire or repandly 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 cau-
dex, 6-12 inches high, leafy to the top: leaves thickish, from rounded-ob-
ovate or spatulate to oblong, obtuse, obtusely or acutely dentate, some-
times 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 lanceo-
late, 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, some-
what 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 petiolate, 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.

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** * 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. Organus. 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'Alene 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 fastigiate 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 fastigiate 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-ovate 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 lacinate, 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. balsamita 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

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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 incisely pinnatifid the long or roundish lobes and the sinuses sharply toothed: heads 4-5 lines high: tips of the involucre 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 radiatiform and heterogamous by enlargement of the limb of marginal flowers which are commonly neutral. Involucre much im-

bricited: 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 CARDUINÆ 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 CENTAURINÆ 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 paleæ.

92 Cnicus Achenes terete: pappus double, each of 10 aristiform bristles.

Subtribe i. Carduinæ 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-

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lucre imbricated in several series, mostly not appendaged. Re-
ceptacle flat, fimbriate or with persistent chaff. Corollas with
slender tube, inflated throat and 5-cleft limb. Anthers with se-
tiform 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 ob-
long-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, ra-
cemosely, corymbosely 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 re-
pand or dentate, mostly cordate, the lower often 18 inches long: petioles
solid, deeply furrowed: heads clustered or corymbosely, sometimes long-pe-
duncled, 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 matur-
ity 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 sagit-
tate 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 dioecious heads.

C. ARVENSIS Robs. Brit. Fl. 161. (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, dioecious, 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. Phila. 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 imbricate 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

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clavellate tips. Common on prairies Brit. Colum'ia 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: corolla purple or whitish the lobes much shorter than the throat, filiform in the dried state and capitate-callous at the apex. Edge of timbered lands, Alaska to California west of the Cascade Mountains.

C. Hallii, *Unicus 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-imblicated 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: involucre 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: involucre 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. Stouter, 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 Gærtn. 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-cleft 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 Gærtn. 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 2½ inches broad: corollas rose-purple, deeply cleft: pappus-bristles white, barbellate. Waste places and road-sides, Brit. Columbia to California. Naturalized from Europe.

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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.

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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 involucral bracts armed with a rigid spine or prickles 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 involucre-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. MEL TENSIS 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 coatate: 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: involucral 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 lacinate-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 homogenous 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.

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