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LEAFLETS

OF

BOTANICAL OBSERVATION AND CRITICISM.

BY

EDWARD L. GREENE.

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Distribution of *Bidens vulgata*.

Soon after having published this species I ventured a suggestion that, inasmuch as it is notably less common at the east than *B. frondosa*, it might have come to this side of the continent from the West (Pitt. iv. 250).

A recent September tour through parts of Indiana, Illinois, Wisconsin, and Minnesota gave the opportunity of observing the species in many western localities; and the opinion which I had almost adopted as to its western nativity is not confirmed. I found the plant everywhere, but everywhere much less common than its ally, *B. frondosa*; also almost invariably a tenant of cultivated grounds, gardens, cornfields, etc., whereas *B. frondosa*, in the upper Mississippi valley as in that of the Potomac, abounds in wild uncultivated lowlands along streams and margins of lakes and ponds, where *B. vulgata* is never seen.

I everywhere observed of *B. frondosa* that in its maturest autumnal state the whole herbage is of a bronzy purple; but *B. vulgata* remains green.

A New Southern Violet.

In a recent allusion to the geographical distribution and variations of *Viola pedata*, I ventured the suggestion that it may in time be shown to consist of a number of definable species, or at least marked varieties (Pitt. v. 126).

Having indicated as a varietal segregate the plant of the U. S. midland prairie region, and which I shall here and hereafter denominate *V. inornata*, I wish to direct attention to a southern ally of the Middle Atlantic, *V. pedata*, which exhibits characters so pronounced that I wonder no one hitherto has noted them.

Before proceeding to the diagnosis of specimens I must make mention of the unpublished colored figure of supposed *V. pedata* made by Le Conte. As often as I have consulted that figure, so often has the conviction forced itself upon me that his subject must have been a form of *V. pedata* unseen by me, at least in a living state; a plant of remarkably slender habit, seven inches high from the crown of the rootstock to the extremity of the corolla, this last wanting but the sixteenth of an inch of being two inches from tip to tip of the light-blue petals; these last also wanting a certain firmness of texture in virtue of which the corolla of *V. inornata* at least, if not that of true *V. pedata*, is flat and stiff-looking in its perfect expansion. But in the corolla as represented by Le Conte there is seen over and above their extraordinary size, a certain half-undulating easy grace in the spread of the petals which is foreign to the flower of northern and middle country *V. pedata*.

It is well known that Le Conte's admirable work on violets was done chiefly in the field and at the farther South—the Carolinas, Georgia and I believe Alabama, and in our herbaria, among scores of *V. pedata* sheets—yes, hundreds of them—there are occasional specimens from the Carolinas southward which answer as well as dried specimens may, to this beautiful plate which Le Conte has left; and the specimens disclose one character of importance which none have mentioned, that is, a remarkably prominent spur to the odd petal. This organ is most conspicuous in a sheet of specimens collected on dry gravelly

hills at Saratoga, Mississippi, 4 April, 1903, by Mr. S. M. Tracy. These I take as the type of a new subspecies which may be called

VIOLA AMPLIATA. Of the habit and with the foliage of *V. pedata* but taller, commonly 5 to 8 inches high, glabrous or very nearly so, the rootstock not as stout, often ascending rather than erect: sepals thin, broader at base than those of the ally, more slenderly tapering, the margins merely serrulate-scabrous: corolla about 2 inches long, the petals thin, pale-blue, the odd one with a conspicuous stout upturned and almost hooked spur.

Besides the type specimens in my own herbarium, I find two sheets in the U. S. Herb. which seem to represent the species. The most undoubted of these is from Meridian, Miss., by Mr. Canby, 4 April, 1900. Of the two specimens one is six inches high, the other nine, and the plants are as slender as those of Mr. Tracy; the dry corollas measuring about $1\frac{1}{2}$ inches, the sepals and spur as in Mr. Tracy's plants. The other one is from Auburn, Ala., 22 Apr. 1900, by Mr. Earle. Here the corolla is as large, but the two upper petals seem to have been red-purple. The specimens are from five to six inches high, slender, from ascending rootstocks; but the spur in these is not stout, nor has it a certain acutangular upper terminal corner, so to speak, which gives the somewhat hooked appearance to that of the type.

While ordinarily *V. pedata* and *inornata* have a merely saccate lower petal, this barely visible between the two sepals next it, there are nevertheless rare forms of these exhibiting a distinct and even conspicuous spur. In the U. S. Herb., one sheet, from New Providence, Penn., by A. A. Heller, May, 1900, has flowers with an evident spur, not long, yet long enough to be rather strongly curved. It terminates obtusely, with no hint of any angularity at the end. Another sheet, from Reading, Mass., by Chester Kingman, 17 May, 1897, has a peculiar, well elongated narrow upturned spur. The corolla here is $1\frac{1}{4}$ inches long, the petals all of one color, and all emarginate. In both these instances the plants are, in all except the spur, quite like the usual *V. pedata*, and do not connect with *V. ampliata*.

Similarly, a fine sheet of specimens of *V. inornata* from Iowa, stout, low, and scaberulous, and with the thick obtuse sepals of that species, show a distinct though not very long but stout curved spur, this as completely rounded at its terminus as the organ is in other northern forms here cited.

In the Wrong Genus.

While examining some *Potentilla* bundles lately in the U. S. Herb., I came incidentally to a sheet of specimens labelled *P. gracilipes*, Piper, n. sp., the first glance at which suggested a *Sieversia*, and an examination revealed the characters of that genus. It will therefore be called

SIEVERSIA GRACILIPES. *P. gracilipes*, Piper, Bull. Torr. Club xxvii. 392. The species has for its nearest affinity *S. sericea*, Greene, Pitt. iv. 50.

Further Segregates from Aster.

Somewhat late in summer seven years ago, following an old wood road up a mountain side in northern Pennsylvania, I paused for a moment in admiration of some nodding corymbs that in partial shade were peering a little above the rest of the woodland herbage and seemed as if they must be those of some asteraceous plant; though up to that time I had not seen, or even heard of any asteraceous plant with nodding heads. But on a near approach to the plants I discovered by the unmistakable cut of the foliage that this was what I had known well enough in herbarium specimens for perhaps forty years, what is called *Aster acuminatus*. Somewhat later that season I transferred roots of the plant to my garden near Washington, discovering what also had not, and has not until now been mentioned, that the species propagates by tubers rather by stolons. At the end of each long slender subterraneous branch a small organ is formed which, exactly resembles a small potato, and from each of these springs a plant for the next year.

Having studied this type in the living state for another season, I in 1897 labelled all my herbarium sheets of this species *OCLEMENA ACUMINATA*, having first noted that neither the achenes nor the pappus are those of the genus *Aster*, the former

being prismatic rather than compressed, and the latter much too fine and soft. As a genus, OCLEMENA bears much the same relation to *Aster* which *Erechtites* bears to *Senecio*.

I am also now persuaded that the genus is not monotypical, and would name as a second species O. NEMORALIS, this being of course the *Aster nemoralis*, Ait., which, seeing it was no *Aster*, I formerly transferred to *Eucephalus*, where it was not well at home. It has the same habit, and the same reproduction by tubers which the type species portrays, though its pappus is firmer, and its achenes, though 5-angled, are a little compressed. Whether its heads are nodding before expansion or erect I do not know, never yet having had the fortune of seeing the plant alive. That in the type species the heads are nodding before expansion has now at last been announced by Mr. Small in his new book already famous.

The genus VIRGARIA proposed by Rafinesque I have wished for years to be able so to extend as to include in it *Aster sericeus* and its allies. They are all wiry and coriaceous things as to texture, with silvery-silky foliage and peculiarly foliaceous involucre—plants abundantly distinct from the type of *Aster*. But *Virgaria concolor*, Raf., stands apart from the others in several particulars. Its mode of growth and propagation underground, its inflorescence and its flowers—those of the disk being never yellow, but at first white, then rich purple—and then its silky villous achenes, all combined bespeak its title to the rank of a genus from which its kindred of the west and south must needs be separated.

To them I accord generic rank under the name LASALLEA. Their heads are large and solitary; their disk-corollas at first yellow, then becoming brown; their achenes perfectly glabrous. The species seem to be about three: L. SERICEA (Vent. under *Aster*), L. NUTTALLII (*Aster montanus*. Nutt. not of Allioni) and L. PHYLLOLEPIS (T. & G. under *Aster*).

When in 1896 I was studying *Döllingeria* (Pitt. iii. 50) as a necessary segregate from the Linnæan *Aster*, I would fain have made positive Nees' doubtful placing of *Aster ptarmicoides* in

that genus. But habitally this type is wholly unconformed to *Daellingeria*—as far from it as it is from typical *Aster* itself. It is even less repugnant to *Sericocarpus*, as Nees himself observed. But that genus has densely silky-villous achenes, while those of the type in question are perfectly glabrous, white and almost shining as well as rather strongly quadrangular and little or not at all compressed. The pappus, too, is very clear white even in maturest age and after long years in the herbarium; and this is not true of any of its supposed allies. And that the bristles of the pappus are visibly dilated at tip is a character here for the first time noted. By these marks, and by its almost filiform disk-corollas which are always white, and the thick and appressed involucre bracts, it must be admitted, rationally, in the rank of a genus, which I purpose calling UNAMIA.

Over and above the type species, which must be called U. PTARMICOIDES, the following seem specifically distinct:

U. FASTIGIATA. Leaves narrower than in *U. ptarmicoides*, entire, marked with a pair of lateral veins more or less distinctly anastomosing with the not very much more conspicuous midvein, the surface and margins scabrous; inflorescence strict and fastigiate, flat-topped, the peduncles closely bracteolate, the bractlets passing gradually into those of the turbinate involucre, which are acute.

Apparently local in moist sandy lands along the southern shore of Lake Michigan, the best specimens by L. M. Umbach, at Pine, Indiana. The rays are evidently white, otherwise I should have suspected it to be the var. *lutescens* of the type species. The long almost imbricate-bracteolate peduncles, turbinate involucre, (campanulate in *U. ptarmicoides*) and fastigiate cyme compel the recognition of this as at least a strong sub species.

U. GEORGIANA. *A. ptarmicoides*, var. *Georgianus*, Gray. In habit like the last, but less strongly fastigiate, the cyme not flat-topped, the lateral peduncles quite surpassing the terminal head, all the peduncles strongly bracteolate and the involucre still more acutely turbinate, the bracts narrow and acute, glabrous even marginally.

The real characters of this are here for the first time indicated. It is the acutely turbinate involucre of narrow pointed bracts which tells. The species seems to range westward from Georgia into the Indian Territory, and perhaps southern Missouri.

U. SUBCINERA. Stout and rigid, a foot high or more, subcinerous-scabrous: leaves large, oblong-lanceolate, entire, somewhat undulate, hardly acute, 3 to 5-veined and the lateral veins divergent: cymes short and broad, the branches of it and the pedicels strongly hispidulous, their bracts few, large, leaf-like: involucre large, campanulate, their thick acutish bracts hispid-ciliolate, sulcate on the back, the midvein being at the bottom of a distinct if not deep furrow: rays not large for the plant, evidently ochroleucous or yellow.

Near Ft. Meade, South Dakota, August and September, 1887, Dr. W. H. Forwood. Genuine *U. ptarmicoides* is in the collection from the same place, but this broad-leaved thing, pale with a peculiar rough-hairiness, is very distinct.

Neglected Eupatoriaceous Genera.

Respecting the genus which has *Eupatorium cannabinum* for its type, I have for some years past felt convinced that our verticillate-leaved purple-flowered plants, a group headed by *E. purpureum*, are its only representatives in America.

Nearly three years since I proposed the restoration of *Conoclinium* as a genus (Pitt. iv. 272), and in the course of the preparation of that paper, among other alterations which I made in my herbarium bundles was that of labelling under the generic name of OSMIA such of the species as were found referable to that evidently natural genus long ago proposed by Schultze.

Seeming compelled, in view of its excellent characters, to give the same recognition to the group named *Ageratina* by Spach (in allusion to the strong likeness of the plants to *Ageratum* rather than to genuine *Eupatorium*), I began a general revision of this genus under the name KYRSTENIA which Necker had assigned it long before the days of Spach. The manuscript has been lying for more than two years unfinished.

Meanwhile Mr. Small, in his Flora of the Southeastern States, has seconded my restoration of *Conoclinium* and also admitted *Osmia*. It is therefore opportune to present suggestions of the excellent titles to generic rank held by other assemblages of species of so-called *Eupatorium*.

KYRSTENIA (Neck. Elem. i. 81) has for its most historic and representative species two herbaceous plants known well in pre-Linnæan days, one of which Linnæus called *Eupatorium aromaticum* and the other *Ageratum altissimum* better known to us as *Eupatorium ageratoides*, a name assigned it by the younger Linnæus.

These two plants, and with them a host of their congeners, are so unlike true *Eupatorium* and at the same time so like *Ageratum* in foliage, inflorescence, uniserial involucre, and even as to flowers and fruits, that nothing but the fine-bristly rather than paleaceous pappus could have kept them apart from the genus last named, where, as already noted, Linnæus did actually place the first species. They differ from *Eupatorium* by a set of characters exactly corresponding to those by which *Erigeron* is held separate from *Aster*.

One must needs assume the Atlantic North American species just mentioned to be the proper type of KYRSTENIA. They are herbaceous perennials with opposite leaves and a corymbose inflorescence; their thin almost uniserial involucre bracts notably pointed.

I subjoin a list of representative species, all belonging to the flora of the United States, using the specific names at present in vogue for each under *Eupatorium*, save only in the case of *E. ageratoides* which alone has a specific name older than that in common use; and I give in parenthesis the place of publication of each as an *Eupatorium*.

KYRSTENIA AROMATICA (Linn. Sp. 839), VIBURNIFOLIA (Greene, Pitt. iv. 276), ANGUSTATA (Greene, l. c. 277), NEMORALIS (Greene, l. c. 278), TRACYI (Greene, l. c.), ABORIGINUM (Greene, l. c. 277), BOREALIS (Greene, Rhodora, iii. 83), CEANOTHIFOLIA (Muhl, in Willd, Sp. iii. 1755), ALTISSIMA (Linn. Sp. 839 under *Ageratum*; *Eup. ageratoides*, Linn. f. Suppl. 355), INCARNATA (Walt. Carol. 200), JUCUNDA (Greene, Pitt. iii. 180), MELIS-

SOIDES (Willd. Sp. iii. 1754), PAUPERCULA (Gray, Proc. Am. Acad. xvii. 205), ROTHROCKII (Gray, Syn. Fl. 102), HERBACEA, ARIZONICA (Greene, Pitt. iv. 279, 280).

This typical group has many representatives beyond our borders in Mexico, Central and even South America, some herbaceous, others shrubby, of which I cite but few. K. GRANDIDENTATA (DC. Prodr. v. 167), AMPLIFOLIA (Gray, Am. Acad. xv. 28), EUONYMYFOLIA (Greene, Pitt., iii. 31) BELLIDIFOLIA (Benth. Pl. Hartw. 43), OREITHALES (Greenm., Am. Acad. xxxii, 308) PAZCUARENSIS (HBK., N. Gen. N. & Sp. iv. 123), GRANDIFOLIA (Regel, Gartenfl. i. 102), AGERATIFOLIA (DC., Prodr. v. 173), CILIATA (Less., Linn. vi. 404), GLECHONOPHYLLA (Less., lc. 105), CALAMINTHÆFOLIA (HBK., N. Gen. iv. 129), DONNELL-SMITHII (Conlt. Bot. Gaz. xvi. 95), COLLINA (DC. l. c. 164), ESPINOSARUM (Am. Acad. xv. 28), BENTHAMII (Klatt. Leopoldina, xx. 90), DELTOIDEA (Jacq. Schœnbr. iii. 63), COAHUILIENSIS (Gray, Am. Acad. xvii. 205), GUADALUPENSIS (Spreng. Syst. iii. 414).

On the Pacific slope of the United States we have no typical KYRSTENIA; though a distinctively Mexican group of species with tufted stems from a woody base, alternate leaves, thyrsoidean heads, and involucre not quite as simple, is represented in the mountains of California and northward by a single rather handsome pink-flowered species, K. OCCIDENTALIS (Hook. Fl. i. 305). Among Mexican species of this habit are K. KÆLLIÆFOLIA (Greene, Pitt. iii. 31), BREVIPES (DC. Prodr. v. 168) and some of the following here proposed as new.

K. THYRSIFLORA. Stems stout, erect, herbaceous, 2 feet high or more, simple up to the contracted and somewhat thyrsoform inflorescence and very leafy, all the leaves alternate, pale but cinereous-scaberulous rather than glaucescent: leaves ovate and scarcely acute, or lance-ovate and acute, ascending on short petioles, distinctly or obscurely serrate-toothed: pedicels and biserial bracts of involucre densely scabro-puberulent: corollas white, with slender tube, short-funnelform throat and long spreading lobes: achenes not strongly angled, glabrous.

Chihuahua, Mexico, chiefly southward in the State; collected by Palmer, Pringle and E. A. Goldman, and always distributed for *E. occidentalis* var. *arizonicum*; which is a strange proposition.

K. BETULÆFOLIA. Near *K. occidentalis*, like it in size and habit, but all the foliage opposite; leaves of broad and deltoid outline, with an abrupt acumination and coarse serrate teeth: inflorescence much more open and heads fewer; bracts of the involucre broader, firmer, rather strongly 2-ribbed: corolla pinkish, with broad and short throat and much more deeply cleft limb: achenes black, hirtellous.

This is Mr. Pringle's n. 1263 from Chihuahua, distributed for a variety of *Eupatorium occidentale*, from which it differs widely by its opposite and very birch-like leaves, and still more certainly by the form of its corollas, this in *K. occidentalis* being narrow and tubular in comparison, with very short teeth.

K. SUBINTEGRA. Shrubby, glabrous: leaves 2 or 3 inches long, deltoid-ovate, acuminate, subtruncate or abruptly tapering at base, short-petioled, obscurely and remotely denticulate: cymes sessile among reduced leaves at the ends of all the branches: involucres long and narrow, the inmost of the few bracts striate, the outer glabrous or glandular-puberulent: corollas with slender tube and funnelform rather deeply cleft limb: achenes setulose.

Pringle's 3311 from San Luis Potosi, published by Mr. Robinson as a variety of *E. Espinosarum*, though specifically distinct by characters of foliage, inflorescence, and especially by its elongated heads.

K. AMPLISSIMA. Stout, several feet high, branched above to form a somewhat leafy thyrsoidal inflorescence: larger leaves 5 inches long, 3 or 4 in breadth, obtusely somewhat deltoid-ovate, crenate, glabrous: pedicels and rather large involucres with a short harsh pubescence: corollas tubular-funnelform; achenes glabrous.

Pringle's 2878, from Jalisco, Mexico, 1889, distributed as a variety of *E. amplifolium*, from which this differs exceedingly in habit, foliage, inflorescence and achenes; for in the real *K. amplifolia* there are angular and acute leaves, a naked-peduncled terminal cyme, scaberulous achenes, etc.

K. RUFA. Herbaceous, erect, 2 feet high or more, simple up to the cymose-panicked summit, the stem, and leaves beneath, of a dark red-purple, the petioles and nodes hirsute with a

ferruginous retrorse hairiness: leaves firm, ovate-elliptic, 2 or 3 inches long, lightly serrate, acuminate, short-petioled: bracts of involucre striate, lightly pubescent, commonly fleshy-tinted: corolla with slender tube and short funnelform limb: ovaries pubescent.

Pringle's 8028, distributed under the name *E. ciliatum*, though not like that in either aspect or character.

K. ACUTA. *E. ageratifolium* var. *acuminatum*, Coult. Contr. U. S. Herb. 179. Suffrutescent, rigid, brittle, the branches and lower face of leaves pubescent: leaves deltoid-ovate, coarsely subserrate-toothed on the sides, the subtruncate base and short acumination entire; petioles slender, shorter than the blades: heads rather few and large in a broad sessile cyme: involucre somewhat imbricate, the rather more than biserial bracts linear, acute, 2-nerved: corolla tubular-funnelform, short achenes setulose both along the raised and whitened angles and in a less degree between them: pappus firm, yellowish.

This is in many ways very unlike *K. ageratifolia*, and so much so as to its involucre that I have hesitated before admitting it into *Kyrstenia*.

K. LÆTA. Rigidly shrubby, divaricately branched, the flowering branchlets densely leafy, the foliage, pedicels and involucre of a bright green; strongly resinous-viscid: leaves deltoid-ovate, acute, obscurely crenate-dentate, closely reticulate-renulose: heads short and smallish, in sessile crowded compound cymes: bracts of involucre biserial, subequal, oblong-lanceolate, 2-nerved below: achenes minutely setulose along the thin sharp angles.

Foot of Monte Alban, Oaxaca, Mexico, 23 Oct. 1894, C. L. Smith; distributed for *E. calaminthæfolium*, to which it bears no near relation.

K. CALOPHYLLA. Shrubby; branches suberect, ending in a short-peduncled cyme: leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, suborbicular to subdeltoid-ovate, somewhat crenate-toothed, glabrous, coriaceous, remarkably scrobiculate beneath, the reticulations circumscribing shallow depressions: bracts of involucre scarcely biserial, oblong, acutish, purple-tipped: slender corollas pinkish; achenes pubescent.

Near Saltillo, Mexico, June, 1898, Palmer (n. 318 in U. S. Herb.); the specimens labelled *F. calaminthæfolium*.

K. PARVIFOLIA. In habit near the last, but abundantly leafy with mostly deltoid ovate entire leaves only $\frac{1}{2}$ to $\frac{1}{2}$ inch long, not coriaceous, smooth and glandular-punctate beneath; cymes sessile, surpassed by slender leafy-bracted branchlets: bracts of involucre biserial, oblong-lanceolate, acute, pubescent: flowers pinkish: achenes scaberulous and glandular.

Also from near Saltillo, Palmer (n. 289 in U. S. Herb.), also called *E. calaminthæfolium*, though most distinct, and with copious small leaves recalling those of *Mitchella repens*.

The history of what has lately begun to be called *Eupatorium capillifolium* is uncommonly replete with interest. In aspect it is so exceedingly unlike the rest of the Eupatoriaceæ, and so completely imitates *Artemisia*, that when early in the eighteenth century it became known in Europe the botanists all called it a new *Artemisia*, Dillenius leading the way in 1732, Lamarck in 1784 being perhaps the last author to continue it under that genus; Walter in 1785 being the first to pronounce it an *Eupatorium*; this disposal of it being adopted by Willdenow in 1803, the celebrated author of Michaux's Flora in the same year transferring the type to the Asteraceous genus *Chrysocoma*.

When conservative authorities are at such extremes of disagreement as to the generic status of a type, the end of controversy about it is apt to be reached by conceding to it the rank of a genus; and this, for the type in question appears to have been proposed by Wallroth in 1822. His paper I have not seen, but only very authentic citations of it. He named the plant TRAGANTHES TENUIFOLIA; and yet, within some five or six years thereafter, Cassini, the most accomplished and at the same time the least conservative of nineteenth century synantherologists, for some reason declines Wallroth's very rational proposition, and proceeds to assign it a place under *Mikania*, calling it *M. artemisioides*; acknowledging that it fits the place not at all well, and failing to give any good reason for overruling the judgment of Wallroth.

The group is a small one, but so strongly marked in habit, that I have no doubt of its ultimately being accepted as a genus, under the name TRAGANTHES, the species over and above the

original one, to take names as follows: all having been named under *Eupatorium* by the authors indicated: T. COMPOSITIFOLIA (Walt. Carol. 199), PINNATIFIDA (Ell. Sk. ii. 295), LEPTOPHYLLA (DC. Prodr. v. 176), EUGENEI and PECTINATA (Small. Fl. 1165).

By far the greater proportion of the United States Eupatoria belong to a group of herbaceous perennials with opposite leaves, and white flowers in sessile terminal compound corymbs; the involucrel bracts quite as few as in *Kyrstenia*, even fewer, but in two or more very unequal series, the individual bracts of firm texture, not ribbed or obviously nerved, obtuse or acute, often white-margined or even scarious-tipped. The corollas are small, consisting of a short tube and equally short, narrow funnel-form throat or limb, the color always white; style-branches not short, notably clavellate. Both involucres and achenes apt to be strongly gland-dotted; the fine white pappus-bristles from scabrous to barbellulate.

Of this assemblage I take *E. perfoliatum*, Linn., to be about the oldest type, and name the genus UNCASIA, transferring to it by name the following: U. PERFOLIATA (Linn. Sp. 838), TRUNCATA (Muhl. in Willd., Sp. iii, 1751), CUNEATA (Engelm. in Torr. & Gray, ii, 88), SESSILIFOLIA (Linn. Sp. 837), ALTISSIMA (Linn. Sp. 837), ROTUNDIFOLIA (Linn. Sp. 837), SCABRIDA Ell. Sk. ii, 298), PUBESCENS (Muhl. in Willd. Sp. iii, 1755), SEMISERRATA (DC. Prodr. v. 177), CUNEIFOLIA Willd. l. c. 1753), HYSSOPIFOLIA (Linn. Sp. 836), TORTIFOLIA (Chapm. Bot. Gaz. iii, 5), LINEARIFOLIA (Walt. Carol. 199), LECHEÆFOLIA (Greene, Pitt. iii, 177), TORREYANA (Short, Supplem. 5), LEUCOLEPIS (Torr. & Gray, Fl. ii, 84), ALBA (Linn. Mant. 111), PETALOIDEA (Britt. Bull. Torr. Club, xxiv, 492), VERBENÆFOLIA (Michx. Fl. ii, 98), ANOMALA (Nash, Bull. Torr. Club, xxiii, 106), MOHRRI (Greene, contr. U. S. Herb. vi, 762), RESINOSA (Torr., DC. Prodr. v. 176), MIKANOIDES (Chapm. Fl. 195).

With the exception of *U. serotina*, which ranges southward into Mexico, I have not seen any Mexican Eupatoria that are of this genus; but in South America there seem to be a number of species; U. GLOMERATA and PALLESCENS (DC. Prodr. v. 154) for mere examples, and, for one that in aspect recalls *U. perfoliata*, U. SALVIA (Colla).

The Logic of It.

At page 142 of the Third Volume of *Torreya* one reads a sort of diatribe against a man in Italy who has lately not only perpetrated some duplicate binary names in zöology, but also shown himself unaware of the circumstance that such a thing had been done before.

I have no sympathy with narrow provinciality and ignorance—though it occurs in many places outside of Italy—and I quite enjoy the keen rebuke administered to that malacographer, and to some other people nearer home, by the writer in *Torreya*. At the same time I wonder why the critic did not take his malacologist to task for another piece of innocency which, if less ridiculous, is more dangerous. I refer to his assertion, as quoted by the critic, that these duplicate names result from his having retained the “original Linnæan names for the species, though these may have been chosen to denote the genus.” The man evidently thinks that these appellations which he has been doubling up came into existence there in the margins of the Linnæan pages as species names, and were afterwards placed in the rank of generic names; while the fact is that not one such name is original with Linnæus. They all existed as genus names before Linnæus.

Now such an inversion of history as this Mediterranean malacologist makes in calling them “original Linnæan names” seems to me the really reprehensible fault in this paper as quoted. Why is this expression of a palpable untruth allowed to pass unscathed? Is it perchance needful in order to secure currency for these *Cat cat*, *Dog dog*, names, that one should try to keep alive the moribund faith in that mythical Linnæus in whom our forefathers believed, who was supposed to have been the original author and promulgator of a scientific nomenclature for groups of living entities? Is some survival of this myth to account for the critic’s silence as to this error?

Some dozen years ago, I was told by an aged gentleman that his father, a New York naturalist at the beginning of the nineteenth

century, assured him that, at a public celebration of the centenary of Linnæus, there was displayed, writ in large letters, this motto: "God Created; Linnæus Named." With admirable terseness did this express what a century ago was the general opinion, that Linnæus had been the wonderful man with whom had originated both genus names and species names for animals and plants. Is there, then, after the lapse of yet another century, here and there a man in Italy, and here and there a man in New York, who would keep alive this antiquated cult?

As regards duplicate binary names, they are naturally offensive to every man of common sense, not to say of literary or scientific good taste; and I have no doubt there are botanists, if not zoologists, who while they openly employ them yet secretly abhor them.

But it is not so much the names themselves, their absurdity and senselessness to which we object, as it is the groundless assumption on which they are based, namely, that Linnæus is the father of nomenclature and that the names duplicated do in their singleness belong to him by right of priority; the truth being that all of them are genus-names, and were all current, some of them for centuries, before Linnæus.

As regards the measure of success attending recent efforts to establish duplicate binaries, I do not see what influence this can have upon the thought and action of the scientific and scholarly; for these as a class, unless they have resigned individual freedom of thought and action, are governed by principle and guided by reason. As an argument, the fact that a multitude follows a certain course, is more in use with politicians than with botanists and zöologists. It is true that both the contending parties as to nomenclature in this country have used this argument; but neither has thereby added strength to a cause, or dignity to a position.

But now, had I been in the critic's place, advocating duplicate binaries, felicitating my party on the growing popularity of these nomenclatorial deformities, and citing the most significant instances of their use with authors, I do not think I could have failed to see in this much berated Italian malacologist about the most notable example of them all; for he alone among them—

if we except the case of Hill in the Hortus Kewensis—seems to have acted without known precedent, and therefore independently; arriving at this course by his own individual reasoning and reflection. Through a rather discreditable innocency of all that is going on in the nomenclatorial world outside of Italy, he lays down for himself a line of procedure which is, to his mind, new; and in having followed it, as it were all alone, he must be credited with the virtue of a strong independency that is somewhat rare, and which merits praise. And if examples are to stand for arguments his, unless he should by and by retract, may perhaps, outweigh the force of Hill's example of so long ago; for he, having once propounded *Cyanus Cyanus*, *Mariana Mariana* and one or two more like them, repented of his error and declined to make other such names; which, by the way, the critic did not mention.

Certain Polygonaceous Genera.

Some twelve years have passed since in the Flora Franciscana, I indicated, though indistinctly, what was then and has ever since been my opinion that the groups subgenerically known as *Bistorta*, *Persicaria*, and *Bilderdykia* ought all to obtain recognition as proper genera; a rank which had been universally conceded to them up to the time when Linnæus, with his fascinating but unphilosophic artificialism, introduced what was fated to be a long epoch of retrogression in the history of natural classification.

During the last nine years, in my herbarium, these and other genera allied to them, have been segregated, each under its own name; and I now desire that a more open presentation of my ideas along this line of study should be made without further delay.

BISTORTA (Cæsalpino de Plantis, 167, (1583) has long seemed to me one of the most pronounced generic types in this whole family, in view of its strong habital and vegetative characters. In these respects it has more in common with *Lapathum* (erroneously called *Rumex* in these days) than with any other genus. In all but the inflorescence it closely imitates the dock in aspect, and like it the herbage wants the pellucid dots or glands that mark the genus *Persicaria*; and this kind of vegetative character is allowed great weight in plant classification generally.

The contortions of the root in this genus are peculiar, and early gave rise to such generic synonyms as *Colubrina* and *Serpentaria*; while in England it was of old commonly called Snakeweed, as Gerarde testifies. This quaint old author, by the way, reports that the herbage was used in some parts of England "as an excellent pot herbe," and also adds, what all do not know, that "it is called BISTORTA of his writhed rootes."

The following are some of the authors of renown who may be consulted upon this type in the rank of a genus, and under this name, since Cæsalpino: Ray, Meth. 1 ed. 68 (1682); Tour-

nef. Elem. 412, t. 291 (1694) and Inst. 511, t. 291 (1700); Ray, Meth. 2 ed. 22 (1703); Linn. Fl. Lapp. 115 (1737) and Fl. Suec. 116 (1745); Hill, Brit. Herbal., 488 (1756); Adans. Fam. 277 (1763); S. F. Gray, Nat. Arr. ii. 267 (1821); Raf. Fl. Tell. ii. 12 (1836) Spach. Phaner. x. 538 (1841); Fourreau, Trans. Linn. Soc. Lyon. xvii, 146 (1869).

Let me remark that if I have here attributed BISTORTA as a genus to Cæsalpino, it has not been that the name originated with him. The type was figured under this name by Tragus as early as 1552; but Cæsalpino was the first of botanists to define genera, and arrange them in a natural sequence. He is the real Tournefort, and a century earlier than the one who bears that name, and has usually the credit of having laid the foundations of Systematic Botany.

The type species rejoices in some diversity of binary names, one of which, being invested with the right of priority, I would adopt; adding a partial list of the authors who have employed it: B. MAJOR, Tragus (1552), Dodonæus (1583), Thalius (1586), Gerarde (1597), Clusius (1601), Tabernæmontanus (1625), Ray (1696), and many more of the pre-Linnæans. Then, since 1753, S. F. Gray (1821). By the synonym *B. vulgaris*, Hill, Brit. Herbal., 488 (1756); also *B. officinalis*, Raf. Fl. Tell. iii. 12 (1836) and Fourreau, l. c. (1869).

Some other species of BISTORTA, indigenous to North America, are B. VIVIPARA, S. F. Gray, l. c., and B. AMERICANA, Raf. l. c., this based on *P. bistortoides* Pursh; B. LINEARIFOLIA, CEPHALOPHORA, VULCANICA, JEJUNA, BERNARDINA, GLASTIFOLIA (Greene, Pitt. v. 197-199, under *Polygonum*); also B. MACOUNII (Small, in Macoun, Pl. Pribil. 570) and PLUMOSA (Small).

The following may be added to the number of recognizable North American species.

B. LILACINA. Slender, a foot high or more from a stoutish contorted fibrous and chaffy-crowned root: leaves lance-linear and linear, 3 to 6 inches long, retrorsely scaberulous beneath and with a broad flat striate midvein without other manifest nervation, the margins crisped in the large, in the narrower not so, in all revolute: ocreæ an inch long, ending in a short scarious cup and a linear very erect leaf 1 or 2 inches long: spikes ovoid

or short-cylindric; bracts ovate-lanceolate, caudately pointed: flowers at first white, changing in age to lilac-purple.

In the mountains near Pagosa Peak, southern Colorado, at 12,500 feet C. F. Baker, 28 Aug. 1899; distributed for *Polygonum bistortoides*; resembling *B. linearifolia* and with leaves quite as narrowly linear, but otherwise very different.

B. CALOPHYLLA. About 2 feet high, the lowest leaves about 10 inches long including the 3-inch petiole, all from a short stout contorted and fiber-bearing root: blades of leaves oblong and elliptical, flat even to the slightly wavy margin, glabrous throughout, very bright-green above, glaucous beneath, with broad flat striate midvein and obvious though delicate featherveins: ocreæ $1\frac{1}{2}$ to 2 inches long, ending in a short scarious rim and a rather large oblong-lanceolate spreading leaf: spike ovoid to subcylindric, 1 to 2 inches long; lower bracts round-obovate and toothed, the upper narrower and acuminate: flowers milk-white, drying cream-color.

Subalpine in the mountains of southern Colorado; Baker, Earle and Tracy's 373 from 9,000 feet on Chicken Creek, and Bakers n. 293, from near Pagosa Peak at 10,500 feet are the types; the species noteworthy by its large handsome foliage, and recalling the far northwestern *B. glastifolia* which has a much firmer foliage reticulate-venulose, and underneath lepidote-puberulent.

B. LITTORALIS. Allied to *B. vivipara* but large, nearly 2 feet high, the rather slender stem and long leaves from a thick horizontal bent rootstock: lowest leaves a foot long, the petioles rather longer than the linear or lance-linear blades, these subcoriaceous, abruptly acute at both ends, glabrous on both faces, very glaucous beneath, the midvein thick but rounded, not flat and striate: spikes 2 to 4 inches long, bulbiferous only at and near the base: bracts subreniform-ovate, toothed across the broad summit and with a short subaristiform acumination.

Shores of Yes Bay, Alaska, 20 July, 1895, Thomas Howell, n. 1048 in my set of his plants. The large very sharply outlined coriaceous leaf-blades strongly recall the fronds of some simple-fronded ferns, both by outline and the venation.

B. OPHIOGLOSSA. Stems several, very erect, 4 to 6 inches high

from a stout ascending rootstock: basal leaves elliptical to elliptic-oblong and oblong-linear, subcoriaceous, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, on slender petioles not so long, glabrous above, pale and hairy beneath, the thick margins revolute; cauline leaves mostly 1 or 2 only, as long as the others but linear, very erect: spikes 1 to $1\frac{1}{2}$ inches long, linear, dense, bulbiferous to the middle: bracts broadly ovate, entire, tapering to a short but conspicuous acumination.

An inland species of Alaska, the specimens from Ranch Creek in the Yukon Valley, 26 June, 1899, by M. W. Gorman, and distributed for *Polygonum viviparum*.

B. LEPTOPHYLLA. Subterranean parts not seen: upright stems 2 feet high: basal leaves 8 to 12 inches long, only $\frac{1}{4}$ inch broad, linear, tapering to a very short petiole, acutish, glabrous on both faces traversed underneath by a broad flat midvein and delicately reticulate-venulose, the margins thin and somewhat crisped; not in the least revolute: ocreæ an inch long, terminating in an oblique red-brown scarious appendage and a small leaf, this lance-linear to oblong-linear: spike 1 to 2 inches long, oblong to cylindric: bracts ovate or ovate-lanceolate, but with an almost aristiform acumination from the truncate or even emarginate upper end: flowers white.

Frequent in the higher Sierra of California, here described from specimens collected forty years ago by Bolander. The leaves are remarkably like those of *Rumex crispus* though narrower.

B. SCOPULINA. Stout and low, the several stems 3 to 5 inches high from a more or less rounded and compacted mass of short rootstocks, the whole much like a tuberous root in appearance; leaves all erect, elliptical to oblong-linear, $\frac{3}{4}$ to 2 inches long, firm if not subcoriaceous, bright green and glabrous above, pale and minutely rough-hairy beneath, the midvein neither broad nor flattened, traversed by a raised line in the middle, veinlets obsolete except at the very margin, there abruptly prominent: spikes commonly 2 or even 3 inches long and longer than the stem itself, bulbiferous for more than half their length, the floriferous portion thick and dense: bracts suborbicular, entire, cuspidate-pointed.

This is of the mountains of northern and middle Colorado,

the type specimens from Cameron Pass at an altitude of 11,700 feet, collected by C. F. Baker, 16 July, 1896.

Of all the new species of *Bistorta* here proposed the types are in my own herbarium; and doubtless many more species not yet described exist in other herbaria. The characters on which species may be established—those of rootstock, leaf, spikes and especially their bracts—are herein sufficiently indicated, and other students of the group will carry forward the work here begun upon our North American forms.

The genus is one of many which while but feebly represented in the floras of Europe and eastern North America, exhibit a multiplicity of species in those of both Asia and western America; and I next subjoin a partial list of such Asian species as accord perfectly with the type as to vegetative characters and a simple and terminal spike; taking for their names under *BISTORTA* the same that have been already assigned them under *Polygonum*: *B. BULBIFERA* (Royle, Trans. Linn. Soc. xviii. 94), *SPHAEROTACHYA* and *STENOPHYLLA* (Meisn. Monogr. 53, 52), *CONFUSA* (Meisn. in Wall. Pl. As. Rar. iii. 53), *PERPUSILLA* (Hook. f. Ic. Pl. t. 1490).

Also Asian, and of this genus as to habit and floral characters, but branched above and bearing several spikes: *B. SPECIOSA* (Meisn. Monogr. 66), *AMPLEXICAULIS* (Don. Prodr. 70) and *OXYPHYLLA* (Wall. Catal. n. 1715); and lastly two species of Asian mountains that are suffrutescent, bear graceful spikes of intensely red flowers, are hardy in England and highly ornamental under cultivation in Kew Gardens: *B. AFFINIS* (Don. l. c.) and *VACCINIIFOLIA* (Wall. l. c. n. 1695).

From *Bistorta*, the distribution of which is rather northern and subalpine, the transition to the almost subtropical genus *TRACAULON* is every way abrupt. No thoughtful and unbiased mind would be likely to regard the two groups of species as members of one and the same genus; and in the early history of the typical species they were associated with *Fagopyrum* or else *Helxine* rather than with *Polygonum*; so even with *Linnaeus* at the first.

The characters of this genus are well brought out, though under the subgeneric name *Echinocaulon*, by Meisner, DC., Prodr. xiv. 131. Hasskarl appears to have made more than one attempt to obtain recognition for the group as a genus a little later than the date of Rafinesque's publication of the same opinion.

Only three species of TRACAULON have been credited to the United States; two of which are correctly presented by Mr. Small in his admirable book; but his *T. Beyrichianum* is doubtless a misapprehension. The real *T. Beyrichianum* is Brazilian and the plant of our southern borders fails in important points to answer the description of it. It is *P. multangulare*, H. & A. Comp. to Bot. Mag. ii. 62, and should be called T. MULTANGULARE.

Next of kin to our two familiar species of the Eastern and Southern United States are three North Asian which in their earlier history were confused with ours in nomenclature. They are T. SIBIRICUM—*P. sagittatum Sibiricum*, Meisn., T. SIEBOLDII (Meisn.) founded on *P. sagittatum* Thunb. and T. THUNBERGII (Sieb. & Zucc.) based on *P. arifolium* Thunb. Yet a fourth Japanese species is T. HASTATO-TRILOBUM (Meisn.), and even antipodal Australia and New Zealand have one which was at first confused with our *T. arifolium*. This is T. STRIGOSUM (R. Br.)

I subjoin a further list, far from complete, of TRACAULON species of various parts of the world, indicating where they were published under *Polygonum*: T. MEISNERIANUM (Ch. & Schl. Linnæa. iii. 40), RUBRICAULE and STELLIGERUM (Ch. Linnæa. viii. 130, 131), MURICATUM (Meisn. Monogr. 74), PERFOLIATUM (Linn. Sp. 2 ed. 521), PEDUNCULARE (Wall. Catal. n. 1718), PRÆTERMISSUM (Hook. f. Brit. Ind. v. 47), HISPIDULUM and TETRAGONUM (Blume, Bijdr. 535), MAACKIANUM (Regel, Fl. Ussur. 127).

More easily confused with *Polygonum*, and somewhat similar in aspect to such plants as *P. tenue*, is a small group of Californian annuals which the late Mr. Watson segregated under the subgeneric name of *Duravia*. But the characters of solitary

flowers, one only in the axil of each bract of the spike, the persistent styles, and, more important than all else, the absence of that articulation at base of the leaf-blade which marks *Polygonum*,—these are three generic characters, and I propose for the group generic rank under the name DURAVIA. The species as far as known have received specific names under *Polygonum* as follows: D. CALIFORNICA (Meisn. in DC., xiv. 100), BIDWELLIÆ, GREENEI (Wats. Am. Acad. xiv. 294, 295); of the same genus, apparently, is the large suffrutescent species D. BOLANDERI (Brewer ex Gray, Am. Acad. viii. 400).

For the small assemblage of the convolvulaceous Polygonææ, long ago aptly denominated Climbing Buckwheat by country people—and surely less unreasonably reduced to *Fagopyrum* by pre-Linnæans, than to *Polygonum* by Linnæus—I indicated in the Flora Franciscana that the generic name is BILDERDYKIA, Dumortier.

I do not admire uncouth personal names in botany, and regret that *Tiniaria*, used by Mr. Small, has not priority.

Dumortier, whose *Florula Belgica* is very scarce—and as important for Polygonææ in particular as it is rare—places these plants, where they truly seem to belong, next to *Fagopyrum*; and in his view the group has a better claim to the status of a genus, than either *Bistorta* or *Persicaria*, both of which remain with him but sections of *Polygonum*.

Two species, *B. Convolvulus* and *dumetorum* are named by him. Some of the others that go with them are *B. SCANDENS* (Linn. Sp. 522), *CILINODIS* (Michx. Fl. i. 241), *CRISTATA* (E. & G. Pl. Lindh, 51) and *PTEROCARPA* (Wall. Catal. n. 1690).

The Japanese *P. multiflorum*, commonly associated with the above I have not seen; but the description reads as if it might, perhaps, constitute a generic type.

During some sixteen centuries was PERSICARIA recognized universally as a genus distinct from *Polygonum*. Linnæus, the great father of confusion as to genera of plants, reduced the species to *Polygonum*; but ever since there has been a succession of authors who have protested against this, and reasserted PER-

SICARIA as a genus; though the Linnæan notion has still seemed to prevail, doubtless for the most as a mere prejudgment, during the nineteenth century.

Among earlier authors there are some who distinguished two genera, *Persicaria* with mild, and *Hydropiper* with pungent or peppery herbage; and the aquatic species were even again by some reckoned a distinct genus called *Potamogeton*. It is indeed almost certain that the real *Potamogeton* of ancient botany is *Persicaria amphibia*; and on this account Bubani, in the *Flora Pyrenæa* lately published, assigns the modern *Potamogeton* a new name. And so, it is a mistake on the part of Mr. Small in his new flora to have placed our native homologue of *P. amphibia* first in his list of the species, as if it were typical of *Persicaria*; for it is not. *P. maculosa*, for which Mr. Small has coined a new and duplicate binary, is the type of PERSICARIA.

The following members of the genus, formerly published by me under *Polygonum*, are here transferred: *P. FUSIFORMIS* (Eryth. i. 259), *OMISSA*, *FALLAX*, *ARCUATA* (Pitt. v. 200, 201).

Other North American species not hitherto transferred are *P. CAREYI* (Olney, R. I. Pl. 29), *HARTWRIGHTII* (Gray, Am. Acad. viii. 294), *COCCINEA* (Muhl. in Willd. Enum. 428), *RIGIDULA* (Sheld. Minn. Studies, i. 14), *LUDOVICIANA* (Meisn. in DC., xiv. 116). This last Mr. Small may have failed to distinguish from *Persicaria segetum*, in the grammar of whose specific name he has also erred, supposing it to be an adjective, which it neither is nor can be made, except as *segetalis*.

In the group of species of which the Old World *Persicaria amphibia* is typical I have at intervals, as opportunity was given, during years pursued field studies, and made copious specimens, with a view of revising it, at least as it is represented in North America; and I have long enough deferred the placing upon public record of certain important biologic facts observed by me in relation to these plants.

All who have attained to even a superficial knowledge of their history are aware that the specific name *amphibia* was given to an Old World species because it was familiarly known to be amphibious, so to speak; one form, or variety, as they called it,

inhabiting ponds and lakes, the leafy part of the stem and also its leaves floating on the surface of the water, and another form growing on the ground, or at least on muddy shores, developing upright leafy stems, and exhibiting a very different foliage and inflorescence.

It was until somewhat recently understood that in various parts of North America we have the same *Polygonum amphibium* with its two very dissimilar varieties *aquaticum* and *terrestre*. There were early though unsuccessful protests against the doctrine that the European and American plants are specifically one; and latterly there has prevailed the view that the terrestrial plant is quite distinct, specifically, from the aquatic.

The view reached by myself after years of observation upon living plants both at the West and at the East is, that we have a number of distinct species that are normally aquatic, and as many more that are normally terrestrial; and that our aquatic species, at least in several instances, appear as riparian plants with wonderfully changed foliage and inflorescence, and that several of our normally terrestrial species do, under certain conditions, develop aquatic branches with floating foliage, this also strangely altered from that of the terrestrial type, yet at the same time most unlike that of the truly aquatic species in general.

I also suspect that some of the aquatic, or at all events some riparian species exist in even a third state, more strictly terrestrial, with a third set of strongly marked peculiarities of habit and foliage, and that in such third form the plants flower either very rarely or never at all.

If this judgment of mine as to the behaviour of the plants be well founded, it will follow that the delimitation of species will be most difficult, so long as a number of the species are known in only one of the three of their possible phases. Nevertheless, I am about to propose a very considerable number of new species; and shall found some upon the aquatic phase only, others some upon a riparian state only, as well as many more upon properly terrestrial plants. In the case of these last I am the less afraid of erring, knowing as I think I do, that these are more commonly of one phase only. But in the case of the

normally aquatic, I shall doubtless find aggregates; for I apprehend clearly the possibility, even the probability, that certain species which in their aquatic floating state present no characters upon which one may separate them, will in their riparian phases, when these are found, display their specific differences.

Here, then, is work for many a future generation of botanists, and most interesting work; but it must be begun in the field, and carried on there, patiently and persistently.

In the diagnoses that follow I decline to make any use or application of old varietal names, such as *terrestris*, *emersa*, *Muhlenbergii*, *natans*, and others. No one knows, and perhaps no one ever will know, just what the forms or states or phases were to which the authors applied the names; and to use them ignorantly of their first application is but to make confusion worse confounded.

It also seems necessary where aquatic, riparian and terrestrial phases of a species are known, to describe each in a separate paragraph, so very different are the characters of stem, leaf and inflorescence in the several phases. There is no other convenient way of making a full diagnosis of such species; for, as must be obvious to every one, these are states or phases, not varieties; so that to give them any kind of separate rank, or to assign them names as such would be to misrepresent the facts in the case, and therefore to be unscientific.

P. FLUITANS. *Polygonum fluitans*, Eaton in Eat. & Wright, 368. Aquatic. Stems very slender, the submerged internodes 3 to 6 inches long, the floating ones 1 to 1½ inches, exceeded by the remarkably slender petioles, these commonly 2 inches; leaf-blades elliptical to elliptic-oblong, 1½ to 4½ inches long, never subcordate, always tapering at base though abruptly spike solitary, short-cylindric, slender-peduncled: bracts broad-ovate, acute, glabrous.

Frequent in northern lakes from Maine and across Lower Canada to Wisconsin and south to New Jersey. Fernald's Aroostook Co., n. 95; a series of sheets from northern New York collected at various stations in 1879 and 1888 by L. F. Ward (these in U. S. Herb.), and some fine specimens taken by Mrs. C. F. Baker, at St. Croix Falls, Wisconsin, in 1899—all represent well this east-

ern plant for which so unhappy a misnomer as "*P. amphibium*, Linn." has hitherto prevailed. The plant of northern and middle western Europe has not only a lanceolate and subcordate foliage, but the margins of its leaves are keenly scabrous-serrulate. No such plant, or any presenting even a hint of these two excellent characters, has been found by me in the herbaria that I have consulted. It does not exist in North America. Muhlenberg and Willdenow a hundred years ago made this out, and published either this or some other species as *P. coccineum*. Precisely what that was, however, as to the aquatic type, one can not now say. But Amos Eaton as early as 1840 gave the name *P. fluitans* to what, from the description as well as the locality, we must conclude to have been that here described anew. I do not know where that St. John's Lake is which Michaux cites as the habitat of his var. *natans*; but I suspect it to be some northern lake now known by another name, and lying within the habitat of *P. fluitans*, in which case that may be an older, though a merely varietal designation which would in my view be of no consequence.

It will devolve upon botanists resident in various parts of the extensive area occupied by *P. fluitans* to find, if it may be found, the riparian state. Unless it be a deep-water plant always, on some muddy shores will be found the emersed and creeping form; and it may be predicted that the leaves of such will have a lanceolate outline.

P. PURPURATA. Aquatic. Habit of *P. fluitans*, quite as slender, the internodes as long, but floating portion of stem with distinctly swollen nodes, and very short ocreæ: slender petioles 1 to 1½ inches long, oblong-elliptic blades 1½ to 4 inches, thin, purple-tinged, always acute at both ends, most so at apex: spike solitary, small-flowered, very dense, ovate, the pedicels spreading: achenes small, round-ovate, acute, dull blackish, neither quite smooth nor with a definable unevenness.

Riparian state. Stems mainly prostrate, rooting in mud, stout and fistulous, the internodes 3 or 4 inches long and cylindrical: leaves lanceolate, very acute, 4 or 5 inches long beyond the short petioles, glabrous on both faces, only the reduced uppermost and floral muriculate-scabrous on midvein and margin: spikes

about 3, lanceolate, $1\frac{1}{2}$ inches long on glandular-scabrous peduncles: bracts broadly ovate, acute, glabrous.

In the northern Sierra Nevada, California, Silver Lake, Lassen Co., 30 July, 1894, Baker and Nutting; both states at the same place and same date, and extremely dissimilar as to outline of leaves and characters of the spikes; yet both were distributed under my direction indiscriminately under the name of *Polygonum amphibium*. An excellent sheet of the riparian state was communicated to the U. S. Herb. and is the type of that part of the above diagnosis.

P. CANADENSIS. Riparian. The rather hard and wiry prostrate stems slender, with internodes of an inch or more: leaves lance-elliptic, 2 or 3 inches long on short not slender petioles, green and glabrous, on the petioles and basal part of some of the reduced floral ones scabrous-strigulose: spikes one or two, borne well above the foliage on a peduncle of 2 inches or more, of lanceolate outline and about $1\frac{3}{4}$ inches long, with commonly an isolated bract an inch below the spike subtending a glomerule of 3 or 4 flowers: bracts ovate, barely acutish: achenes round-ovate, black, highly polished yet very minutely shallow-pitted.

Known to me only in a fine U. S. Herb. sheet collected at Galt, Ontario, 17 Aug., 1899, by L. M. Umbach, who reports it an inhabitant of small lakes. The stem is partly submersed, no doubt, but all the foliage present at flowering time, as well as the peculiar spikes and peduncles, are wholly aerial and not floating; whence I infer the specimens to be properly riparian. The habitat is entirely within the range of the aquatic *P. fluitans*, and the plant may possibly some day be shown to be the riparian state of that; but I think not.

P. MESOCHORA. Aquatic state. Larger and stouter than any of the foregoing; petioles as long but not slender; leaf-blades of another hue, being light-green, commonly 5 inches long and $1\frac{1}{2}$ to 2 inches breadth, ovate to elliptic-lanceolate according as the base is broad and subcordate or somewhat tapering, glabrous, more or less punctulate: spike solitary, rather long-peduncled, cylindrical, 1 to $1\frac{1}{2}$ inches long.

Riparian state. Stem stouter, the 3 or 4-inch-long internodes somewhat fistulous: leaf-blades broadly lanceolate, very acute,

rounded or truncate at base, the petioles 3 or 4 inches long, those of the uppermost showing some trace of hairs in the form of a diminutive muriculation: spikes commonly 2, strictly cylindric, longer and narrower than in the aquatic state.

This, as I apprehend it, is a northern midland homologue of *P. fluitans*, distinguishable in even its aquatic condition by the vivid green and the large dimensions of its leaves, as well as a different outline. The specimens are from the Upper Mississippi valley, from Indiana to Iowa and Minnesota. I am not without a fear that what I here describe is an aggregate, even as to the aquatic specimens. I therefore indicate as typical a sheet in the U. S. Herb. from Miller's, Indiana, 24 June, 1896, by L. M. Umbach. Beautiful Minnesota specimens, such as Ballard's, from Oshawa, Nicollet Co., Sandberg's, from Center City, and of Burglehaus from near Minneapolis all fail to exhibit the subcordate leaf-base. Yet, the riparian specimen, in which the subcordate character comes out strongly, is from Minnesota, at Fond du Lac, by F. F. Wood.

Similar plants from farther westward, like some from Nebraska, may or may not be of this species.

P. PLATTENSIS. Riparian. Leafy and floriferous terminal of stems assurgent, $\frac{1}{2}$ foot high or more, the elongated and prostrate portions rooting in mud, and with internodes 4 to 7 inches long, each node often emitting a short sterile leafy upright branch, the leaves of such oval to lanceolate and 1 to 3 inches long, glabrous or pubescent; but foliage of main stem under the spike much longer, often 4 inches long, $1\frac{1}{2}$ in. breadth, subcordately ovate-lanceolate, acute, bright green and glabrous, or more usually with a distinct pubescence along margin and mid-vein, the stoutish petioles an inch long or more: ocreae all thin and hyaline, glabrous: spikes cylindric, 2 inches long or somewhat less and narrow, their peduncles glandular-pubescent; bracts broad-ovate, scarcely acute, glabrous or with some short hairs toward the base.

Aquatic state (?). Floating leaves thin, oblong, obtuse at both ends, 2 or 3 inches long, glabrous: peduncle and bracts of the short oval spike also glabrous.

Riparian type from the North Platte River at Fairbanks in

southeastern Wyoming, July, 1894, A. Nelson. The description is drawn from two sheets in my herbarium, bearing the collector's numbers 479 and 551, a duplicate of n. 551 also in U. S. Herb. A fourth sheet I have seen in Herb. C. F. Baker, obtained by Mr. Nelson from ponds along the river at Dunn's Ranch, Albany Co., Wy., 16 July, 1900, and numbered 7598; this quite like the others except that it is glabrous altogether. Another specimen in Mr. Baker's herbarium, collected by himself at Fort Collins, Colorado, in 1894, has a scabrous peduncle and leaves marginally serrulate-scabrous without other pubescence, while one in Mr. Osterhout's collection from the same region is glabrous except as to the peduncle. Another Colorado specimen I have that was obtained by myself on Clear Creek, a tributary of the Platte, in 1870. But I do not feel very confident that all these are part and parcel of *P. Plattensis*; nor do I feel sure that the floating-leaved plant which I have appended as an aquatic phase of it really is such. This is Mr. Nelson's n. 7465 from Dunn's Ranch, July, 1900. Field study alone can enable one to decide.

P. SUBCORIACEA. Aquatic. Stems short, with internodes of an inch long, apparently submersed in shallow water; floating leaves subcoriaceus, oblong, obtuse at both ends, 2 to 2½ inches long, on firm petioles of ¾ inch: spike solitary, ovoid, hardly an inch long, on a stout peduncle of an inch or more: achenes small, round ovate, polished but with an obvious scarcely definable unevenness.

Riparian state. Foliage much larger, not as firm in texture, oblong-lanceolate, acute, subcordate, about 4 inches long and about 2 in breadth, on petioles of 2½ inches, both faces glabrous, but those smallest and near the spike distinctly though minutely scabrous-serrulate without trace of other pubescence: spike oblong, not longer than in the aquatic state but on a much longer and notably glandular-hispid peduncle.

This very satisfactory species rests at present on a single good sheet in U. S. Herb., from the North Fork of Laramie River, Wyoming, twelve miles from Laramie Peak, collected by Charles Schuchert, 24 Aug., 1899. The firmness of the foliage in the aquatic, and the serrulate margin of the uppermost riparian

leaves, as well as the hispid peduncle in this phase, separate the plant most definitely from its neighbor of a much lower altitude, *P. Plattensis*.

P. LÆTEVIRENS. Riparian. Prostrate rooting stems tortuous, short-jointed, the internodes little more than an inch long, more than half the nodes sending up a decumbent or upright densely leafy and terminally floriferous branch 6 to 10 inches high: leaves of a remarkably light and even yellowish green, elliptical to oblong-lanceolate, rarely more truly lanceolate and with broader and subcordate base, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, on petioles of $\frac{1}{2}$ to $\frac{3}{4}$ inch, glabrous on both faces but the margin varying from perfectly entire to scabrous-denticulate and even serrulate-ciliate: spikes very short-peduncled, almost sessile among the numerous leaves at summit of the branch, very short and thick, almost round-ovoid; bracts broad-ovate, cuspidately acute, glabrous.

This fine species well marked in habit, I know only in specimens distributed by Mr. Baker from near Gunnison, southern Colorado, 1891, his distribution number 806. The numerous very leafy stems, so crowded on the prostrate main stem, must appear in a singularly compact mass or bed.

P. PSYCHROPHILA. Aquatic, though apparently in shallow water, internodes about 2 inches long; leaves thin, oblong-lanceolate, acute, rounded at base but not subcordate, 3 or 4 inches long, glabrous, on not very slender petioles of about 2 inches: uppermost ocreæ (perhaps emersed) developing a broad green-herbaceous lobed and wavy rim: spike short-ovoid, less than an inch high, on a glabrous peduncle of less than an inch; bracts broad, pointless.

Seen only in the herbarium of Mr. Osterhout, who collects it in a subalpine lake in Estes Park in northern Colorado. The nature of the ocreæ would seem to indicate affinity for *P. Hartwrightii*, yet it is hardly of that group.

P. OREGANA. Riparian. Stoutish, short-jointed: lowest leaves (perhaps floating when young) oblong-lanceolate, subcordate, 3 or 4 inches long, on stout petioles of less than an inch, bright-green, glabrous; those above them smaller, oblong or elliptical, more or less villous or hirsute especially along the

midvein beneath and on the ocreæ: spikes very short and short-peduncled, ovoid, the peduncle slightly both pubescent and glandular; bracts ovate, obtuse, glabrous.

Tules of the Grand Rond Valley, eastern Oregon, W. C. Cusick, n. 1763 in my set and that of U. S. Herb. Quite similar, and perhaps specifically identical, is a plant from Lake Pend d'Oreille, Idaho, by A. A. Heller, 1892.

P. INSIGNIS. Aquatic, "growing in from 5 to 7 feet of water and floating on it," the stout stems with short internodes which, as to the lower and more deeply submerged are cylindrical, but nearer the summit swollen and fistulous: leaves floating, not large, $1\frac{1}{2}$ to 2 inches long and from oval to elliptic-oblong, obtuse, often subcordate, the stoutish petioles about 2 inches long: peduncles very stout, 2 inches long, bearing the large spike an inch or more above the water, and this oval, 1 to $1\frac{1}{2}$ inches long, fully $\frac{3}{4}$ inch in diameter, the flowers therefore very large, the fruiting perianth nearly $\frac{1}{2}$ inch long, more than twice the length of the somewhat round-obovate shining achene, which nevertheless is not quite smooth, rather distinctly lineolate toward the base and obscurely scrobiculate in the middle.

In a lakelet at 9,550 feet on San Bernardino Mountain, southern California, W. G. Wright, no other data given on the two sheets in my herbarium except Mr. Wright's herbarium number 1809. The species is remarkable for the stoutness of its peduncles and the great size of its flowers and spikes.

Possibly Coville & Funston's n. 1584 may be referred here; but it is a smaller plant, with spikes and flowers not nearly as large.

Another aquatic form of Southern California is obtained by Mr. Parish at Aguanga, San Diego Co., and needs further field study. It can hardly prove to be *P. insignis*, however.

P. FISTULOSA. Riparian, evidently, though with the foliage and several slender spikes of the properly terrestrial species; decumbent and rooting part of stem of great size, internodes 5 or 6 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch thick, hollow, strongly and coarsely striate: leaves oblong-lanceolate and lanceolate, acuminate, 2 to 4 inches long, the lowest nearly glabrous, the

others roughened with minute short strigose hairs, the midvein beneath glabrous in the lower, appressed-muricate-roughened in the upper: upper part of stem and the peduncles glandular-scabrous; spikes 2 or 3 inches long, stout; bracts muricate-scabrous on the back, not ciliate; achenes polished, chestnut color.

Crater Lake, near Flagstaff, Arizona, Aug., 1884, J. G. Lemmon. Probably an aquatic of shallow water, becoming riparian. This is a mountaineer of northern Arizona; but more southerly stations, in the heated and half-desert regions yield other species, of terrestrial habitat, which probably do not connect with this.

A diligent study of much material from almost all parts of the United States, occurring in the herbaria under the name of *Polygonum Muhlenbergii*, more recently denominated *P. emersum*, has shown that this also is an aggregate of species, some of them strongly marked, others less so. They differ one from another markedly as to leaf outline and also as to the attitude of the foliage, the leaves in some spreading away from the stem almost divaricately, but in the greater number being ascending or suberect. As to the pubescence, they exhibit not only different degrees but different kinds of hairiness; and that of the midvein beneath invariably differs from that of the superficies of the leaf. In both the form and the indument of the bracts of the spikes one finds also another set of specific characters.

There are also several instances known to me by personal observation in which these species, normally of the land, do under conditions of accidental submersion of the stem, develop floating leaves, and those different not only from those of the terrestrial state, but also very different in general from those of species normally aquatic. Future observation will probably add much to our knowledge of such dimorphic eccentricities in the genus.

I shall first give account of the few species that are marked by a narrow and spreading foliage. In this one particular they recall *P. Hartwrightii*. It has this same characteristic; but it has two other important peculiarities which these fail to exhibit. I shall indicate them later.

P. REMOTA. Stem rather slender, 1 to 2 feet long, decumbent, the nodes enlarged, internodes 1 to 2 inches long, glabrous, many-angled; leaves lanceolate, acute, about 6 inches long, thinnish, without obvious petiole and spreading away from the stem, glabrous above, except as to the midvein and veinlets, these all beset by a single series of short hair-points, lower face punctulate, the broad midvein appressed-setose and the veinlets very minutely so; margin serrulate by appressed short hairs; ocreæ sparsely strigose, the hairs long, closely appressed; spikes linear, their peduncles sparsely hispidulous; bracts with scattered hairs on the back, not ciliate.

Westbrook, Maine, July, 1897, P. L. Richter, the type in U. S. Herb. Information as to habitat, always valuable, the collectors seldom give, much to the regret of those who study plants. I have a suspicion that this plant is riparian, or else of swampy land.

P. NOVÆ ANGLIÆ. Apparently upright though slender, the internodes 2 to 4 inches long, strongly striate-angled, glabrous; leaves ascending rather than widely spreading, broadly lanceolate, 7 or 8 inches long, including the petiole (this 1 inch or more), thin, glabrous but punctulate, the midvein beset with an appressed murication especially beneath, the whole margin sharply serrulate-scabrous with well developed and closely set but short setiform hairs; spike large, linear, more than 3 inches long, its peduncle glandular-hispidulous; bracts small, nearly or quite glabrous, or perhaps sometimes quite strigose-hairy.

South Hadley, Massachusetts, A. C. Cook, 1887, the type in U. S. Herb., where also exist some mere fragments by Oakes from Wenham Pond in the same State, which may or may not belong here. Only a floral leaf is shown in the fragments, and the veins of these develop something more like a hairiness.

P. LAURINA. Of the size and the slender decumbent habit of *P. remota*, but leaves elliptic-lanceolate and about 7 inches long including the $\frac{1}{2}$ inch petiole, thin, sparsely and minutely strigose on both faces, more pronouncedly and densely so on the midvein, especially beneath; ocreæ, as also the lower internodes of the stem, sparsely appressed-hairy; spikes very slender, 1 to 2 inches long, on slender glandular-hirtellous peduncles; bracts rhombic-ovate, hairy, not ciliate.

Catawba Island, in Lake Erie, northern Ohio, 5 Sept., 1897, E. L. Mosely; the type specimens in U. S. Herb. Leaves with the outline and venation of those of *Laurus nobilis*.

P. PORTERI. Decumbent, or the basal part prostrate, the stem 2 feet long, very densely leafy with an elongated and spreading foliage; lower internodes 2, upper 1 inch long, all striate-angled and more or less appressed-hairy; subsessile leaves 5 to 7 inches long, lanceolate, acute, sparsely scabrous above both on the veins and elsewhere, especially toward the margin, this beset with long stout but appressed cilia, beneath sparsely hairy, but the hairs of the midvein much longer, setiform, appressed; ocreæ somewhat villous-hirsute; spikes linear, 1 to 2 inches long, their peduncles glandular-hispid; bracts ovate, acute, sparsely strigose on the back and bordered with long bristly cilia.

Shores of the Delaware River at Easton, Penn., 20 Aug., 1895. T. C. Porter, type in U. S. Herb. Evidently riparian, but surely no mere phase of the next, from which the long narrow subsessile spreading foliage must widely separate it.

P. COCCINEA (Muhl.), Greene, Leaf. i. 24. Commonly upright, about 2 feet high, copiously leafy with petiolate and ascending foliage; blades ovate-elliptic or elliptic-lanceolate, 5 to 8 inches long, abruptly acuminate, the upper face muriculate-scabrous on midvein and all veinlets, the lower more emphatically so, the margin minutely serrulate-scabrous, the general surface nearly or quite glabrous; ocreæ very thin, sparingly strigulose-roughened with short sharp hairs: spikes $1\frac{1}{2}$ to 3 inches long on short glandular-hispidulous peduncles; bracts with scattered short spinulose hairs on the back and along the margin.

Riparian state. Assurgent stem less than a foot high from a prostrate basal portion rooting at the nodes: leaves smaller and relatively narrower, truly lanceolate, the leaf-surface quite strigose and veins also strigose rather than muriculate: spikes slender; bracts as in the normal state.

Specimens of the terrestrial form described above have been somewhat copiously distributed from Pennsylvania, the habitat of Muhlenburg's *P. coccineum* with which this plant must doubtless be identified. In the U. S. Herb. exists a very good sheet obtained at Lily Lake, Luzerne Co., in 1889, by Mr. Small; also two by Mr. Heller, both from Lancaster Co., in 1889 and 1891. Plants exactly like these are in hand from the District of Columbia, by L. F. Ward, in 1877, and from the banks of the Ohio in Wood County, West Virginia, 1897, by W. M. Pollock. It is scarcely to be doubted that Michaux's var. *emersum* is the same.

The riparian, or perhaps rather the subaquatic state which I venture to refer here, though possibly erroneously, is from Ithaca, New York, no collector's name being given.

There is another plant, of the size and habit of the above which I dare only designate as a variety of *P. coccinea*, which I may call

Var. ASPRELLA. Rather larger than the type, especially as to foliage; both faces of the leaf roughened with a minute though not sparse strigulose hairiness, the veins and veinlets rough with an appressed bristly hairiness instead of being merely muricate-scabrous; bracts of the spike strigose on the back, and usually ciliate with longer hairs.

The best specimens of this marked variety are from Jackson City, near Washington, D. C., by Mr. E. S. Steele, Aug., 1897; and Dr. Britton has distributed nearly the same from Staten Island, N. Y.

P. PRATINCOLA. Size, habit and general outline of foliage as in the last, but pubescence more dense, that of the midvein also, of very different character, being long, very straight and closely appressed; spikes not large, also short-peduncled, surpassed by the subtending foliage: peduncles glandular-hispidulous; bracts of the spike elongated-deltoid, rather densely strigose and without obvious ciliation.

A rank weedy species of low prairies in Indiana, Illinois, Iowa and Missouri, probably also in Michigan, Wisconsin and Minnesota; notably leafy and small-flowered as compared with its eastern homologue, and by these notes, and especially by the very dissimilar pubescence of the veins beneath, easily distinguished.

P. SPECTABILIS. Size of the foregoing; leaves more elliptic-lanceolate, of firmer texture, glabrous on both faces except the veins and veinlets, these both above and beneath beset with minute slender conic and appressed short hairs, the margins appressed ciliate with longer hairs: spikes usually two, large and showy, the terminal one 2 to 4½ inches long, the other half as long; short peduncles minutely glandular-hispid, but the whole stem quite glabrous; bracts merely hispidulous and sparsely so: achenes round-ovate, bluntly short-apiculate, dark-brown and shining.

Handsome species, known to me only as in U. S. Herb., in specimens by M. S. Bebb from Fountaindale, Ill., and from Riley County, Kansas, by G. L. Clothier.

P. LONCHOPHYLLA. Leafy stem upright, or perhaps only assurgent from a decumbent or prostrate base rooting at the nodes: leaves narrowly lanceolate, 4 or 5 inches long, ascending on petioles of less than an inch, those from the lower nodes merely scabrous above, the upper and floral strigulose above, the surface beneath similarly pubescent, but the midvein more densely so, and with longer and more bristly but closely-appressed hairs; spikes about 2 inches long, linear, their peduncles neither glandular nor scabrous, but clothed with a short soft appressed though not dense pubescence; bracts ovate, acute, strigose on the back with short hairs, and ciliate with longer and stouter ones.

Near the southern shore of Lake Michigan, at Miller, Ind., 7 July, 1897, collected and distributed for *P. Hartwrightii*, by L. M. Umbach; but the plant bears no particularly close relationship to that species.

P. GRANDIFOLIA. Terrestrial state 2 or 3 feet high, slender, very leafy to the summit, the nodes abruptly swollen, the inter-

nodes about 2 inches long; leaves 5 to 8 inches long including the $\frac{3}{4}$ -inch petiole, the blades exactly elliptical as to general outline, but the narrow base subcordate, the apex acuminate, vivid though deep green above, and glabrous except a single series of minute hair-points along midvein and veinlets, beneath sparsely short-hairy everywhere, but the hairs of the midvein stouter and closely appressed, those of the veinlets more spreading, the margin also beset with longer stiffer but closely appressed hairs.

Aquatic state. Internodes longer and stem stouter, rooting at the nodes though floating: leaves cordate-oblong, 4 to 6 inches long, the largest 3 inches broad, all acute, but with broad cordate base and on stout petioles of 3 or 4 inches, in every part glabrous.

This plant is doubtless common on moist or wet wooded bottoms and shady banks of the upper Mississippi between Iowa and Minnesota and Wisconsin, where at various places I have seen it, though never in flower. My type specimens were taken near LaCrosse, 9 July, 1898, from a colony of plants growing on a stone embankment, and near the water's edge. The sheets before me are three, one showing the terrestrial state, and two the floating-aquatic condition. The three specimens are from one and the same main stem; parts of one plant!

P. VESTITA. Stoutish, ascending, 2 feet high: leaves ovate-lanceolate and lanceolate, acute or acuminate, subcordate at base, 4 to 6 inches long on stout suberect petioles of about 2 inches, both faces canescent with a dense short strigose pubescence, that of the midvein beneath longer than that of the surface but equally slender and closely appressed; ocreæ more canescent than the leaves and with a similar hairiness; internodes sparsely strigose: flowers rather small, in spikes $1\frac{1}{2}$ to 3 inches long borne scarcely above the leaves on somewhat shorter stout glandular-hispid peduncles; bracts with back and margin loosely long-hairy.

Next of kin to *P. pratincola*, but of more westerly range, and easily distinguished by its smaller stature and dense almost silvery indument. The best specimen seen is one made by my-

self more than forty years since, taken from the margin of a shallow pond near Albion, Dane Co., Wisconsin. It ranges westward into Nebraska, where Mr. Rydberg's n. 1822 (as in U. S. Herb.) well represents it and Mr. Clements' n. 2925, from an intermediate station, still in Nebraska, may be referred here, though less canescently pubescent, and with leaves not at all subcordate.

P. PROPINQUA. Near the last, more nearly aquatic and decumbent, only the growing foliage canescent, and that almost silvery; lower and mature leaves elliptic-lanceolate, not subcordate, rather acutish at base, 4 or 5 inches long, obscurely and minutely strigulose-roughened on both faces, but the mid-vein beneath beset with a stout but sharply hair-pointed muriculation rather than pubescence, neither the ocreæ nor the stem obviously pubescent: spikes thicker, and flowers larger than in the last; peduncles merely glandular-scabrous; bracts from scabro-hispid to rather obviously strigose.

Species known only from South Dakota, Rydberg's n. 986 (in U. S. Herb.) from the Black Hills, being the type; a more pubescent form having been collected by T. A. Williams at Brookings, in 1889.

P. RIGIDULA (Sheld.), Greene, Leaf. i, 24. Aquatic but rigidly erect, without floating leaves, 3 to 6 feet high; immersed internodes thick and fistulous, tapering upward from each node: leaves about 5 to 7 inches long on ascending petioles of about 3 inches, triangular-lanceolate, slenderly tapering above, broad and nearly truncate at base, glabrous on both faces, the reduced floral or uppermost finely strigulose and puncticulate; peduncles about 2 inches long, glandular-hispidulous, spikes rather longer, thick and large-flowered; bracts ovate, sparingly somewhat glandular-hispidulous: achenes orbicular, smooth, polished.

Certainly very distinct, as Mr. Sheldon has demonstrated, the leaf-outline being altogether peculiar, as also the fistulous and somewhat conical internodes of the submersed parts of the stem. The above diagnosis is based on a fine sheet of Ballard's collecting at Nicollet, cited by Mr. Sheldon. But according to U. S. Herb. the species ranges westward to the vicinity of Bozeman,

Montana, where it was obtained by Mr. Knowlton in 1887. And there is a sheet from the Little Missouri Buttes in western Dakota, in the herbarium of the late T. A. Williams; these specimens small, only a foot high, but they have the essential characters of the species.

P. PLANTAGINEA. Aquatic in shallow water, the stems only 5 to 8 inches high: leaves not floating (unless the very earliest) but polished and glabrous, very large for the plant, the blades mostly 4 or 5 inches long, subcordate-lanceolate, merely acute not acuminate, ascending on stout petioles of an inch or more, the margins often serrulate-scabrous or at least scabrous-denticulate, some small leaves under the spikes showing a strigulose pubescence, the foliage otherwise glabrous; spikes slender and elongated, 2 or 3 inches long, on stout glabrous peduncles quite as long; bracts rhombic-ovate, glabrous.

Remarkable aquatic plant with leaves even rough-margined after the manner of Old World *P. amphibia*, but spikes as long and slender as those of *Plantago major*. The type specimens are on two sheets in U. S. Herb., collected in 1887 and 1888, from along Little Cedar River in the northern part of Iowa, by Mr. G. Holzinger, and were deposited in the herbarium where I find them by Prof. J. M. Holzinger.

Its locality would be an interesting one for field study, with a view of investigating the plant's possible relationship to some terrestrial form.

P. WARDII. Aquatic in shallow water, without floating leaves, the rather slender copiously leafy stems 2 feet high or more, glabrous; leaves elliptic-lanceolate, with tapering base, or more precisely lanceolate with subtruncate but still rather narrow base, 3 to 6 inches long, acuminate, green, but not quite glabrous, a lens disclosing a minute and sparse short-hairiness on both faces, the midvein beneath clothed densely with very fine appressed hairs from a stout pustular base; peduncles short, rough with short strongly gland-tipped hairs; spikes 2 or 3 inches long; bracts ovate, acute, lightly strigose and with a stronger set of marginal hairs.

Plains of Colorado near the base of the mountains, probably

in pools along the Platte, near Denver, August, 1881, L. F. Ward, and at New Windsor, Weld Co., 31 July, 1894, Geo. E. Osterhout.

P. OTOPHYLLA. Evidently 2 or 3 feet high, suberect, slightly flexuous; very short-peduncled but ample leaves elliptic-lanceolate, abruptly acuminate, the narrow base subauriculate rounded at the insertion of the petiole, the largest 5 or 6 inches long, 2 in width, deep green above and scarcely roughened by the faint though not very sparse minute strigose hairiness, beneath paler, inconspicuously strigose with longer softer hairs, the midvein conspicuously clothed with very long comparatively soft hairs that are rather ascending than appressed; both the short thin ocreæ and the striate internodes pubescent with very straight and closely appressed hairs; short peduncle similarly appressed-pubescent and not glandular: bracts of the short spike long-hairy both on the back and along the margin; flowers small for the plant.

In swamps at Dallas, Texas, 11 Oct., 1900, J. Reverchon, distributed by B. F. Bush, to U. S. Herb., under n. 2146. Species particularly well marked by the long-soft hairiness of the midvein of the leaf beneath.

P. ABORIGINUM. Of the size of the last, rather more slender, the geniculate stems more or less decumbent; leaves narrower, exactly lanceolate, though with subcordate or subauriculate base, rather obviously soft-strigose above, more densely and silkily so beneath, where the midvein is clothed with very straight and closely appressed long fine hairs: peduncles rather densely appressed-villous without glands; spike short, not surpassing the leaves; bracts villous-strigose: flowers small; small chestnut-brown achenes orbicular and little compressed, almost apheroidal.

Species of Oklahoma and the Indian Territory, collected by Mr. Blankinship, 28 Aug., 1895.

P. LANGLOISII. Evidently upright, several feet high. the comparatively slender stems with notably short and thick nodes, the striate internodes $1\frac{1}{2}$ to 2 inches long; leaf blades elliptic-

lanceolate, acuminate, 5 to 8 inches long, $1\frac{1}{2}$ to 2 inches broad, spreading, sparsely scaberulous above, the lower face, and especially the midvein, rough with short rigid acute closely appressed hairs; petioles an inch long or more; sheaths clothed with long closely appressed bristly hairs, the summit somewhat lacerate and bristly-ciliate: spikes several, long, linear, somewhat drooping: achenes thick-lenticular, not highly polished but rather dull blackish.

Swamps along the Mississippi near its mouth in extreme southern Louisiana, 18 July, 1885, Rev. A. B. Langlois. A tall and rank member of this group, with long, half-drooping spikes. Aquatic and floating form to be sought.

P. CUSICKII. Rather slender upright amply leafy stems two feet high or more from a prostrate and submersed rooting portion quite as slender, both the submersed and aerial internodes about 3 inches long, the aerial nodes abruptly swollen and the whole stem strongly striate, glabrous: blades of the short-petioled and spreading leaves 5 to 8 inches long, oblong-lanceolate, acuminate, thin, slightly undulate, inconspicuously and finely appressed-pubescent on both faces, only the stout closely appressed hairs of the midvein beneath with a thick base: ocreæ hyaline, clothed with long soft appressed hairs; peduncles glandular-hispid, $2\frac{1}{2}$ inches long, the cylindric spikes narrow and about as long, the whole not equalling the upper leaves; bracts with long appressed dorsal and margined hairs, and some shorter gland-tipped ones at base.

Tules of the Grand Rond Valley, eastern Oregon, Aug., 1897, W. C. Cusick; the type in my herbarium under the collector's n. 1764. Evidently here, as in the case of *P. rigidula* of the upper Missouri region, we have a species truly aquatic, as to the basal parts and the roots, but with still the habit, foliage, and inflorescence of the strictly terrestrial species.

I refer to *P. Cusickii* various sheets collected in eastern Oregon, Washington, and Idaho, by Suksdorf, Leiberg, Sandberg, Elmer and others.

P. FRANCISCANA. Terrestrial state erect, densely leafy, 2 feet high, the nodes not swollen, internodes about 2 inches long,

glabrous, but the thin ocreæ appressed-villous, narrow, an inch long or more and longer than the short petioles; leaf-blades elliptic-lanceolate, acute, but scarcely acuminate, 5 or 6 inches long, the very lowest glabrous on both faces, the others rather densely but finely strigulose, the midvein beneath with longer stouter hairs gradually thickened from midway down to the base; very short peduncles copiously glandular-hispidulous with some long bristly hairs intermixed; spikes short and stout, barely 2 inches long, nearly $\frac{1}{2}$ inch thick; bracts not strongly strigose-hairy.

Aquatic state. Floating leaves long-stalked, the blade of a broad subcordate-lanceolate cut, merely acute, quite glabrous on both faces, upper leaves smaller, more lanceolate, not subcordate, the uppermost with traces of the pubescence of the terrestrial state; spikes long-stalked but otherwise as in the other state, save that both peduncle and bracts are glabrous.

Local, as far as known, at Mountain Lake, a small pond in front of the U. S. Marine Hospital, San Francisco, where I several times collected the land form from 1888 forward. I never observed it as an aquatic with glabrous floating foliage; but the types of this state were obtained from the lake by my pupils Michener and Bioletti, in June, 1891.

P. HESPERIA. Riparian, the slender stems 2 feet high from prostrate rootstocks inhabiting lake-shore mud, and forming dense colonies; herbage firm, light-green, apparently glabrous, the stem all the lower leaves truly so, except as to the leaf margins, these closely and evenly spinulose-serrulate; petioles of these 2 or 3 inches long, the broadly lanceolate merely acute blades only 4 or 5 inches; reduced uppermost leaves with a single series of hair-points along all veinlets and abundant short appressed thick-based very firm-pointed hairs; short peduncles glandular-hispidulous, as also the bracts of the stout cylindrical 2-3-inch-long spikes.

Margin of a lake near Searsville, San Mateo Co., California, 20 Oct., 1902, C. F. Baker, who distributes it under n. 1835. An exceedingly beautiful species by the contrasted vivid green

of its firm foliage, and the rich rose-red of its dense spikes. A specimen of what seems quite the same is in U. S. Herb., as collected at some unrecorded station in California by Bridges.

P. ALISMÆFOLIA. Riparian, but doubtless an aquatic at early stages and with some leaves floating; herbage of the same vivid green as the last, but leaves much larger, the blades of the lowest 6 inches long, $2\frac{1}{2}$ in breadth, cordate at base, merely acute at apex, perfectly glabrous even marginally, the reduced uppermost sparsely appressed-silky, the indument of the midvein longer but firm and soft throughout, closely appressed; peduncle strigulose, scarcely glandular: bracts of the 2-inch-long small-flowered spike ovate-lanceolate, glabrous or nearly so.

On Russian River north of Cloverdale, Calif., 8 July, 1902, A. A. Heller, being n. 5823 of his distribution as represented in U. S. Herb. I had hoped to make this out to be a probable aquatic state of *P. hesperia*, but the difference as to leaf-margins, and the pubescence of the pubescent parts of the foliage in the two are radically dissimilar.

P. COVILLEI. Stout, erect, several feet high, leafy with large lanceolate acuminate leaves ascending on short stout petioles of an inch or even less; blades of all but the uppermost 6 to 8 inches long, nearly 2 inches wide, slightly canescent on both faces with fine appressed often tortuous hairs, the midvein beneath beset with stouter appressed hairs bristly above a tubercular base: peduncles beset with very slender gland-tipped hairs; spikes 2 to $3\frac{1}{2}$ inches long, their bracts canescently strigulose and with some short gland-tipped hairs intermixed; rounded achenes slightly obovate.

Near Visalia, Calif., Coville & Funston, n. 1266 of the Death Valley Exp., and there are older specimens in U. S. Herb., one obtained by Newberry on Williamson's Exp., the other taken on the Wilkes' Exp., both from the Sacramento Valley.

P. OPHIOPHILA. Evidently riparian and more or less decumbent as to the leafy and floriferous stems, these a foot high; leaves of unusually firm texture, the lowest somewhat triangular-lanceolate, with a subtruncate base and a long stout ascending petiole of 2 inches, the blades 4 or 5 inches, glabrous, or

with traces of muriate-scabrous hair-points on the veinlets and near the margin, those next above closely muricate-scabrous both superficially and on the midvein as well as veinlets, the others narrower and elliptic-lanceolate, more taper-pointed, somewhat, silvery-strigulose on both faces, the midvein beneath with coarser and even slender-conical appressed hairs: peduncles 2 inches long, sparsely beset with ascending short gland-tipped hairs: spikes remarkably narrow, 3 or 4 inches long, the flowers small; bracts canescently strigose, not ciliate: achenes round-ovate, unusually thin and compressed, not highly polished, of a light chestnut-brown.

Rattlesnake Tanks, Arizona, 1 Aug., 1891, D. T. McDougal, in U. S. Herb. Remarkable for long and slender small-flowered spikes, with canescent bracts.

P. ROTHROCKII. Rather slender, erect, very leafy with a short-petioled ascending thin and taper-pointed foliage; the internodes and even the ocreæ glabrous: leaves of lanceolate outline but slender-pointed, above either glabrous or with scattered and inconspicuous hair-points, especially on the veinlets, beneath less roughened superficially but more so on the unusually prominent veinlets, the hair-points of the midvein subulate-spinulose, appressed: spikes and glandular-scabrous peduncles both short, little exceeding the leaves; bracts of the short cylindrical spike spinulose-ciliate and with scattered hair-points on the back.

Shores of ponds, streams and ditches of the hot and arid regions along the Mexican boundary; good type-specimens being Rothrock's n. 670 (as in U. S. Herb.); Toumey's "*Polygonum incarnatum*, Ell." from along an irrigating ditch at Tucson; a sheet by Dr. Palmer from "Arizona, 1869"; while for older and more classic but poor material one may cite Charles Wright's n. 1779, besides a couple of fragments in U. S. Herb. from the Mexican Boundary Survey, these mounted on a sheet with a larger specimen of another species, all under n. 1184.

In a general way unlike the foregoing group in habit, being of lower stature, denser leafiness, with usually sessile and spreading leaves, is an aggregate which has passed under the

name of *Polygonum Hartwrightii*; most of the species exhibiting salverform ocreæ, this organ consisting of the usual thin sheath surmounted by a distinct herbaceous spreading border. The type of this group bears the marks subjoined.

P. HARTWRIGHTII (Gray), Greene, Leaf. i. 24. Low densely leafy stems with short internodes of less than an inch, naked for one-third their length, otherwise invested by the ocreæ, these appressed-bristly-hairy, the limb bristly-ciliate; leaves oblong to oblong-lanceolate, $3\frac{1}{2}$ to 5 inches long, acutish at both ends, glabrous above, or with a few hair-points toward the minutely spinulose-serrulate margin, beneath glabrous except some scattered spinulose hairs along the midvein; both peduncle and bracts of the oval spike minutely and sparsely hirtellous.

Original specimens from Penn Yan, N. Y., by Dr. Wright, justify the above diagnosis. Quite the same has been distributed from Pownal, Vt., by Mr. Eggleston, and from near Lake Grinnell, N. J., by Porter & Britton.

P. ABSCISSA. Size and habit of *P. Hartwrightii*, with similar leaf-outline but leaves more spreading, their pubescence very different, upper face sparsely strigose, the hairs more copious along midvein and veinlets, marginal hairiness strong but appressed, midvein and veinlets beneath either merely muricate-scabrous or the murications bearing each a long hair: ocreæ short, thin, almost hyaline, terminating very obliquely and with no trace of herbaceous border; peduncles of the oval spikes short, stout, hirtellous; bracts also strigose or hirtellous.

Chelmsford, Massachusetts, 20 Sept., 1885, C. W. Swan, in my herbarium, labelled *P. Hartwrightii* and imitating that, but differing from it entirely as to nature of pubescence, as well as by the oblique wholly sheathing ocreæ.

P. ASCLEPIADEA. Terrestrial state; flowers unknown. Stout, decumbent, the several tufted stems a foot long, densely leafy; nodes not swollen, internodes only $\frac{3}{4}$ inch long, completely invested by the cylindrical striate hirsute sheaths, these all with a very broad spreading foliaceous erose and hirsute-ciliate border; leaves apparently sessile, the petioles not produced, lanceolate, acute, 3 inches long, glabrous on both faces, only the midvein

beneath and the margins with some scattered bristly hairs; foliage widely spreading.

Riparian state? (provisionally *P. Nebrascensis*). Leaves ascending, more remote, distinctly short-petioled, the internodes twice the length of the sheaths, the rim of the latter quite narrow; peduncle of the short oblong spike with a few delicate gland-tipped hairs, bracts thinly somewhat hirsute-hairy.

The terrestrial type is known to me only as collected by myself on the open prairie at Prairie Junction in southeastern Minnesota, 7 July, 1898. It is exceedingly well marked in habit and foliage, much resembling some alternate-leaved asclepiads. The riparian plant, very likely distinct, is typified in Mr. Rydbergs' n. 1649 from central Nebraska, as in U. S. Herb.

P. AMMOPHILA. Terrestrial, and even of rather dry sandy soil. Decumbent stems a foot or two long in fertile plants and loosely leafy, lower, with short internodes and a dense leafiness in the sterile state: leaves lanceolate, 3 to 5 inches long, acute, only the uppermost with midvein hirsute beneath, this in the lowest quite glabrous and the leaf-surface scarcely roughened with scattered hair-points, ocreæ with very thin villous sheath and broad toothed and bristly-ciliate border: spikes mostly 2, oblong, their peduncles beset with a few short gland-tipped hairs and fewer long bristly ones; bracts hirsute-ciliate, otherwise nearly glabrous: achenes small, somewhat obovate, black and shining.

The fertile type of this has been sent me by Mr. Holzinger from Winona, Minn., where he collects it on high sandy banks of the Mississippi. Sterile specimens were taken by myself on dry sandy banks of the same river, at LaCrosse, Wis., 8 July, 1898.

P. MURICULATA. Stout, decumbent, the somewhat branching stems 2 feet long, densely leafy, with a foliage at length widely spreading, the internodes barely an inch long and nodes swollen: leaves elliptic-lanceolate, 4 or 5 inches long including the short stout petiole, merely acutish at both ends, sparsely scabrous and strigose above, marginally short-ciliate with appressed setose

hairs, glabrous beneath except as to the strongly muricate midvein; ocreæ also muricate and more or less hirsute, the very broad herbaceous border crisped and setose-hairy; peduncle of the short thick cylindric spike glabrous, sharply many-angled; flowers pale, merely pink.

Near New Windsor, Colorado, 26 July, 1901, Geo. E. Osterhout, the type in his herbarium. A luxuriant ally of *P. Hartwrightii*; leafy but sterile branches overtopping the solitary spikes.

P. HOMALOSTACHYA. Aquatic state seen only in shallow water, with stems barely a foot long; nodes not swollen, internodes 1 to 2 inches long: leaves thin, oblong-elliptic, 2 to 3½ inches long, on petioles of an inch, acute or obtuse, the base rarely subcordate; ocreæ hyaline, without border: spikes commonly 2, short-peduncled, oval or oblong, narrowly cylindric.

Moist-land state much larger, often 2 feet high, copiously leafy, the leaves from elliptic to lanceolate, the largest and elliptic 4½ inches long, 1¾ in breadth, commonly glabrous on both faces, the more lanceolate often 5½ inches long, sparsely rough-hairy above, more densely so beneath; the midvein distinctly and harshly hirsutulous, all short-petioled, the ocreæ scaberulous, ending in a broad lobed and crenate as well as hirsute-ciliate herbaceous rim: spikes quite as in the aquatic state, never elongated and linear, short-peduncled, never even nearly equalling the foliage.

Sterile dry-land state a foot high, decumbent, densely leafy, much more strongly pubescent, the elliptic-lanceolate subsessile ascending leaves 2 to 5 inches long, rather bright-green but scabrous-strigose on both faces, the midvein beneath sparsely but stiffly hirsute, with slightly retrorse hairs; ocreæ very hirsute, their broad rim as in the floriferous terrestrial state.

The type specimens of this fine species consist of seven mounted sheets collected by myself in and around a large shallow lake near Perry's in Pine Valley between Palisade and Eureka, Nevada, 25 July, 1896. Different though the three distinct phases of this appear, both as growing, and as mounted in the herbarium, my types in two instances show the aquatic

and almost floating branch, and the riparian firm and leafy one growing from the same half-submersed and half-emersed prostrate main stem.

From other parts of Nevada, and from Utah, material mostly fragmentary exists in the herbaria under the name of *P. Hartwrightii*, a part of which seems referable to the present species.

P. VILLOSULA. Riparian or subaquatic, a foot high, with oblong-lanceolate acutish 5-inch-long lower leaves glabrous throughout and probably at first floating, though short-petioled; the upper nearly as large, far surpassing the flowers, oblong obtuse, with subcordate base, sparsely and rather softly hairy on both faces, the midvein beneath hirsute with long spreading hairs; ocreæ, petioles, even the upper part of the stem villous-hirsute, not glandular; spikes small, oval; bracts hirsute.

Granite Station, Kootenai Co., Idaho, 30 July, 1892, J. H. Sandberg, in U. S. Herb. under the collector's n. 807. The herbaceous border of the ocreæ present but narrow.

P. CHELANICA. Riparian, with the subsessile spreading foliage of *P. Hartwrightii* but destitute of the herbaceous rim: leaves small, the largest 3 or 4 inches long, lanceolate, subcordate, very short-petioled, not canescent though sparsely and finely strigulose on both faces, the midvein beneath clothed with coarser straight appressed hairs, these short, not thickened at base; ocreæ more densely and coarsely strigose; peduncle glandular-hispidulous, about 1 inch long, the narrow and linear spike somewhat longer; bracts sparsely bristly-ciliate and with a few short bristly hairs on the back.

On sandy bars along Lake Chelan, Washington, July, 1897, A. D. E. Elmer, n. 857 as in U. S. Herb., named *P. Hartwrightii*, but its relationship to that species not is manifest.

P. GRANDIFOLIA, Greene, Leaf. i. 37. Without the least knowledge of its inflorescence or flowers, and upon characters of foliage and pubescence, I published this with the fullest confidence in its validity as a species. And now, from only a short distance above La Crosse, the station for my sterile type spec-

imens, namely, from the shores of the Mississippi at Winona, Minnesota, I have the aquatic state in flower, communicated by Professor Holzinger of the State Normal School at that place, who collected it in 1897. The leaves, evidently floating, at least the lowest, are not quite as large as in my specimens, but are as perfectly glabrous, only the margins being either merely scabrous-serrulate, or with the hair-points developed into what approaches the spinulose-serrulate. The spikes are linear and about 2 inches long, of a rich rose red; the bracts uncommonly long-pointed, cuspidately however rather than acuminate, the very apex being blunt. The peduncles are slender, and very delicately glandular-hirtellous. The specimens give no hint of any close affinity for that other long-spiked aquatic of northern Iowa, *P. plantaginea*.

The Neckerian Cactaceous Genera.

In this exclusively American family of plants at least five of the genera now everywhere recognized as such are pre-Linnæan. *Melocactus*, *Cereus*, *Opuntia*, *Phyllanthus*, and *Peireskia* had all been published anteriorly to the year 1753, in which year Linnæus reduces them all to one genus, assigning it a new name, *Cactus*. Moreover, among the twenty-two so-called species enumerated in the Species Plantarum of that date are the types of four other genera now everywhere accepted as such, namely, *Mamillaria*, *Pilocereus*, *Nopalía* and *Phyllocactus*.

Thus the types of nine distinct genera, as men now perceive, were embraced within the *Cactus* of Linnæus.

There were two botanists of the time who entered each his own protest against this jumbling together of incongruities Adanson and Miller. The former of these did not so greatly improve the situation, distributing as he did all the Linnæan species between the two pre-Linnæan genera, *Opuntia* and *Cereus*; though on an excellent type which Linnæus had ignored, he proposed a new genus *Hariota*, the equivalent, I think, of the more recent *Rhipsalis*. It is also to be noted that he rejected as being the mere synonym that it truly is, the Linnæan *Cactus*.

Miller, at almost the same time, in preparing a new edition of his Dictionary restored two more of the pre-Linnæan genera, setting forth in that rank, *Cereus*, *Opuntia*, *Peireskia* and *Melocactus*, but to this last he assigned the Linnæan synonym of *Cactus*; perhaps wishing to conciliate, by a mere name, the popular botanist whose system of cactaceous plants he had so boldly revised.

Some twenty years or more after Miller's restoration of the old genera, Necker went over the ground in his own peculiar fashion, reaffirming that in the *Cactus* of Linnæus there are four distinct genera; and there is reason to think that this was an independent proposition of his own, not suggested by Miller, whose Gardener's Dictionary he may not have seen. At all events, to three of his four proposed genera of cactaceous plants he assigns names so entirely new and strange, that they can not be identified at a glance and by name with the old genera, and a critical study of his diagnoses becomes necessary to the determination of his types.

Comparing his descriptions one with another, we ascertain readily that the author subscribes to an opinion, even then antiquated, that only the globose and cylindric species of cacti have stems, and that the compressed joints of such things as the *opuntia* and *phyllanthi* are not branches but leaves; so that, while the globose and simple sorts are described by him as caulescent, the kinds exhibiting any manner whatever of flattened vegetative organs are classed as acaulescent, though the plants be tall and large in certain cases. But in this error we find one clew, and a sure one, to the identification of his cactaceous genera. Another is given us in connection with the fruits; for he denominates a *bacca* the smooth soft-pulpy small-seeded fruit of some, and as an *achena* that of those which as in *Opuntia* have a firm fleshiness and contain larger and bony seeds.

These few items of Neckerian cactaceous terminology are enough to enable one to determine with certainty the identity of each of his four genera *Cactus*, *Cirinosum*, *Carpophillus* and *Phyllanthus*.

CACTUS, Neck. Elem. ii, 83. Of this he describes the fruit as being an "olive-shaped many-seeded berry." The only Lin-

næan cacti whose fruits are so small, rounded or elongated and smooth as naturally to be called berries are his *C. mamillari* and *C. Melocactus*. Necker's *Cactus* is then exactly that of Miller as to its type species. Both authors retain the Linnæan genus name, restricting the genus of that name to the first group of species enumerated by that author; and inasmuch as Miller is the first author of this restricted *Cactus*, the type-species of the genus must evidently be sought of Miller. In a word Necker's *Cactus* is synonymous with that of Miller.

CIRINOSUM, Neck. l. c. 84. This is evidently the equivalent of *Cereus*, the spelling of which, in the earliest mention of these plants, I find to have been *Cirius*, meaning the wax taper of church altars. Even the French name given by Necker is *Cierge de Perou*, which in English would be Peruvian Wax Taper, the Latin equivalent being exactly what Linnæus adopted from earlier authors, *Cereus Peruvianus*, which is therefore naturally to be taken as the type of *Cirinosum*.

CARPOPHYLLUS, Neck. l. c. 84. This synonym, if it must need have been made, should have been written *Carpophyllum*; and still it would have been a mere synonym of *Peireskia*, of which the character of a "globose leafy 3-seeded fruit," assigned by Necker is quite the same given by Father Plumier, who founded the genus. Even the Neckerian name is meant to indicate this curious character of a leafy berry. Some of us who are unwilling that the pre-Linnæan founders of modern botany should be deprived of the credit of their genera, will deem it fortunate that Miller restored *Peireskia*; but for which fact, it seems that *Carpophyllus* would now have been forced into the place of the Plumierian name; and that too by some who are willing to assert that in botanical nomenclature "The principle of priority is fundamental."

PHYLLARTHUS, Neck. l. c. 85. The name means leaf-joint, or jointed leaf. The vegetative character attributed to the genus is that of compressed and jointed leaves in the place of stem and branches. It embraces, therefore, both *Opuntia* and *Phyllarthus* of earlier authors. It is not a genus which as to limits will ever in the future meet with approval. It does not differ from Linnæus' fourth group of *Cactus*, and is in fact exactly coexten-

sive with it; Adanson's *Opuntia* being the same group amplified by the admission into it of *Peireskia*.

I account it a happy outcome of the present study, that I am able to say Necker's names for cactaceous genera are all mere synonyms.

North American Species of Amarella.

The Old World *Gentiana lutea* being typical for the genus *Gentiana*, it has long been clear to me that in the New World we have no plants congeneric with it, and that the very name *Gentiana* ought to disappear from American indigenous botany; and I have no doubt that will come to pass in the books of some not far distant future. An initiative in this, which I conceive to have been the right direction, was made by Rafinesque before the middle of the nineteenth century; and Mr. Small now, in the beginning of the twentieth century, reasserts such a proposition. But why, in his *Flora*, he should have adopted the comparatively recent name *Gentianella* instead of the much older AMARELLA, I do not comprehend.

Even from the Linnæan date as initial Gilibert restored the genus and the name AMARELLA some thirteen years anteriorly to the publication of *Gentianella*.

The following are some of our AMARELLA species, over and above those transferred by Rafinesque: *A. AURICULATA* (Pall. Fl. Ross. ii, t. 92, f. 1), *PLEBEIA* (Cham. in Bunge, Gent.), *HETEROSEPALA* (Engelm. Trans. Acad. St. L. ii, 215, t. 8), *WRIGHTII* (Gray, Syn. Fl. ii. 118), *TENUIS* (Griseb. Gent. 250), *STRICTIFLORA* (Rydb. Fl. Mont. 309), *ANISOSEPALA* (Greene, Pitt. iii, 309), *WISLIZENI* (Engelm. l. c.), *ARCTOPHILA* (Griseb. l. c.), *AMARELLOIDES* (Michx. Fl. i, 175), *OCCIDENTALIS* (Gray, Man. 1 ed. 359), *PROPINQUA* (Rich. App. 734), *DISTEGIA* (Greene, Pitt. iv, 182), *MICROCALYX* (Lemmon).

The following may be indicated as new:

A. COPELANDI. *Gentiana Copelandi*, Greene, in Baker distr. of 1903, n. 3849. Erect, sparingly branching, 2 to 8 inches high, floriferous throughout, only sparsely leafy, the internodes 1 to 2 inches long and leaves small, the lowest cuneate-obovate,

obtuse, nerveless $\frac{1}{2}$ to $\frac{3}{4}$ inch long, the upper oblong-linear and obtuse to linear and acute: flowers large for the genus, $\frac{3}{4}$ inch long, many on long naked slender pedicels of 1 to 2 inches; calyx cleft far below the middle into 5 unequal lance-linear erect segments, the longest four times the length of the turbinate tube setaceous crown of the purple corolla conspicuous, the longer setæ nearly equalling the corolla.

On Mount Eddy, Siskiyou Co., California, at 6,000 feet, 6 Sept. 1903, E. B. Copeland. Remarkable for the large and commonly long peduncled flowers.

A. CALIFORNICA. Erect, strict and simple but for some short axillary flowering branches, 1 to 2 feet high, rather naked-looking, the internodes in large plants $2\frac{1}{2}$ or 3 inches long, terete though with frequent traces of sharp angles: leaves ovate-lanceolate on the stem, $1\frac{1}{2}$ inches long, sessile by a subcordate base acutish, conspicuously 1-nerved, the basal ones smaller, spatulate-obovate, obtuse: flowers both few and small for so large a plant; seldom more than $\frac{1}{2}$ inch long; calyx short, deeply cleft into oblong lanceolate acute lobes, the sinuses acute: limb of corolla of acutish segments half as long as the tube; crown of copious setæ.

Sierra Nevada in Plumas and Butte Counties, California, Mrs Austin.

A. LEMBERTI. Very slender, only 6 inches high, commonly much branched from the base, all the branches floriferous throughout: cauline leaves lanceolate, obtuse or only acutish, $\frac{1}{2}$ inch long, the internodes not much longer, obtusely angled corolla hardly $\frac{1}{2}$ inch long, calyx short, very deeply cleft into oblong-linear acute lobes, the sinuses acute: segments of the corolla long, acute; crown of delicate setæ not inconspicuous.

Yosemite Valley, California, J. B. Lambert, 1893.

A. MACOUNII. Nearly simple erect and strict, 1 to 2 feet high the internodes commonly 2 and 3 inches long: leaves ovate-lanceolate with subcordate base, or the upper lanceolate, all acute 3-nerved: flowers rather few on short axillary branchlets and pedicels: corolla rather more than $\frac{1}{2}$ inch long; calyx half as long as the corolla, very deeply cleft into oblong-linear acute segments, the sinuses though narrow ending obtusely: segments o

the corolla ovate-oblong, acute, half as long as the tube; fringe of the crown copious, rather short.

Along the Pacific seaboard from Vancouver Island, Macoun, 21 July, 1893, southward into Washington and Oregon.

A. CONFERTA. Stout and rigid, erect and simple, with only very short fascicled flowering branches and pedicels in the axils of the leaves and not exceeding them; internodes an inch long more or less, subterete, with only traces of angularity: leaves rather succulent, oblong, not subcordate, an inch long or less: flowers less than $\frac{1}{2}$ inch; calyx large, nearly or quite equalling the corolla-tube, not very deeply cleft, the segments oblong and lance-oblong, acute, delicately but closely scaberulous on the margin, the sinuses open and obtuse, segments of the corolla oval, obtuse; crown conspicuous.

Chaplin, Assiniboia, 28 Aug. 1895, Mr. Spreadborough, specimens communicated by Mr. Macoun, but the label bearing no number. Species strongly marked in both habit and character.

A. SCOPULORUM. Stoutish, simple or with many branches from the base, mostly 6 to 12 inches high, the stem faintly angular, internodes in larger plants 1 to 3 inches long: middle-stem-leaves oblong, obtuse, 1 to $1\frac{1}{2}$ inches long, 3-nerved, the lowest obovate and spatulate, the uppermost oblong-linear, acute: flowers several in each axil, usually on a short branch, more numerous at summit, commonly about $\frac{3}{4}$ inch long; longer sepals of the very deeply cleft calyx almost equalling the corolla-tube, all of them linear, acute, the sinuses obtuse: ovate-lanceolate segments of the corolla acute, the appendages deeply and finely fimbriate.

Common species of the Rocky Mountain region from Colorado to Montana; often collected and everywhere distributed in the herbaria.

A. REVOLUTA. Near *A. scopuloram*, but smaller, only 5 or 6 inches high, much more densely leafy and floriferous, the internodes mostly less than an inch long, the ovate-lanceolate revolute leaves nearly as long: corolla little more than $\frac{1}{2}$ inch long: calyx-segments shorter than the corolla-tube, two of them spatulate-linear, two oblong or oblong-linear, the sinuses obtuse:

oblong-ovate teeth of the corolla abruptly acute, nearly equalled by the not very copious fringed appendage.

Southern New Mexico, in the White Mountains, collected and distributed by Mr. Wootton in in 1897, under n. 552.

A. COBRENSIS. Stout, erect, either simple or with copious and very strict axillary flowering branchlets in all but the lowest axils, often 18 inches high; stem distinctly obtusely angled: leaves oval to subcordate-ovate, closely sessile, the largest 1½ inches long, obtuse or acutish, 1-nerved: pale yellowish flowers fully an inch long; short turbinate calyx-tube 10-nerved, the segments lanceolate, acute, finely and closely scabrous-serrulate, the sinuses rather acute; teeth of the corolla nearly ovate, mucronulately acute, fringed appendages long, not copious.

Type specimens collected by myself at Santa Rita del Cobre, southern New Mexico, 11 Oct. 1880. The plant resembles, at first glance, the pale-flowered *A. strictiflora* of middle Colorado, but it is very distinct.

Seven New Apocynums.

An extensive and good collection of specimens of *Apocynum* gathered in the vicinity of Southington, Connecticut, in the seasons of 1902 and 1903, by Mr. Luman Andrews, resident there, and sent to me for determination, affords material compelling the recognition of two New England species hitherto undescribed. To the description of these I add diagnoses of a number of western species of the genus, all but one of which were collected during the years 1902 and 1903 by Mr. Carl F. Baker, whose specimens have already been distributed to many herbaria under the names here used.

A. DIVERGENS. Stem upright, branches widely spreading, the plant 2 or 3 feet high; leaves also spreading ovate and lance-ovate, 2½ to 4 inches long, rounded at base, acute and cuspidately mucronate, above dark-green and glabrous, the veins light-colored, beneath pale and glaucescent as well as villous-arachnoid, along the veins especially: flowers in terminal leafy bracted cymes, sepals lance-ovate; corolla large, campanulate pale flesh-color; follicles 4 inches long, widely divergent, the

pair either horizontally extending or nearly or quite erect, never deflexed.

The type specimens are from the vicinity of Southington, Connecticut, and were collected in July and August, 1903, by Mr. L. Andrews. The species has the habit of *A. androsaemifolium*, the inflorescence, however, not of that but of *A. medium*, while its flowers are larger than those of the former, even. The foliage is remarkably elongated, and the pods are, as in no other known species, horizontal or suberect, the members of each pair diverging at an angle of nearly or quite forty-five degrees.

A plant common in Wisconsin and Minnesota, with erect pods, and less elongated foliage, is provisionally referred to the present species.

A. ANDREWSII. Smaller than the preceding, 1 to 1½ feet high; herbage light-green; leaves elliptic-lanceolate, 3 inches long, ¾ inch broad, subsessile, acutely mucronate, glabrous on both faces, those of the spreading branches smaller: cymes small and few flowered at the ends of all the branches: sepals lanceovate: corolla small campanulate, flesh-color: follicles not seen.

This also is from about Southington, Conn., by Mr. Andrews, copiously collected in flower in August, 1902, and July, 1903, by the collector taken to be *A. medium*, Greene, from which its long narrow foliage completely distinguishes it. The plant has, by this character, much likeness to the *A. cannabinum* group, though in mode of growth, position of branches, and character of flowers, it is wholly of the *A. androsæmifolium* alliance.

A. CALOPHYLLUM. A foot high, stout, parted from near the base into several densely leafy spreading branches ending in a panicle of 3 or more stout-peduncled densely-flowered compound cymes: leaves firm, the lowest round-ovate or oval, 1 inch long or more and retuse, the others 1½ inches or more and ovate, very obtuse, all saliently mucronate, glabrous, very glaucous and pale beneath, above of the darkest green but the veins and veinlets white; sepals ovate-lanceolate, short; corolla large, deep flesh-color, narrowly campanulate, deeply cleft, the segments ovate-oblong, very obtuse, somewhat spreading: follicles stout, 3 inches long.

An exceedingly beautiful species, of sandy slopes among the mountains of Washoe Co., Nevada, collected by C. F. Baker, 14 Aug. 1902, and distributed by him under n. 1461.

A. TOMENTELLUM. Size of the last, equally stout, branched from the base, with looser ampler inflorescence, the peduncled cymes arising both terminally and from all the upper leaf-axils: leaves all smaller, subcordate-ovate, obtuse, mucronulate, both faces, as well as the whole plant, even to the calyx cinerously tomentulose: sepals ovate, acute, short: corolla flesh-color, middle-sized, with cylindrical tube and deep ovate-oblong obtuse segments: follicles not seen.

King's Canon, near Carson City, Nevada, 1 July, 1902, C. F. Baker; distributed under his n. 1209. This and all the foregoing are allies of *A. androsæmifolium*, while all the following are allies of *A. cannabinum*, with the possible exception of *A. oliganthum*.

A. OLIGANTHUM. Two feet high or less, with the pale hue of *A. cannabinum*, but foliage less upright and somewhat spreading, the branching not dichotomous, rather fastigiate, each branch ending in a small few-flowered cyme shorter than its subtending pair of leaves, the cyme terminating the main stem little surpassed by those terminating the subequal branches: herbage glabrous, the oblong cauline leaves $2\frac{1}{2}$ inches long, subcordate, short-petiolate, of a vivid green above, the slender whitish veins conspicuous, underneath pale and glaucous, those of the branches half as large, exceeding the internodes, all mucronate-acute: sepals ovate-trigonous, not half the length of the tube of the small cylindrical erect white or pinkish corolla.

Borders of thickets in King's Canon, Ormsby Co., Nevada, C. F. Baker, 20 Aug. 1903. Distributed under n. 1508, and described by Mr. Baker as being a rather low broad bushy plant which would indicate kinship with the *A. androsæmifolium* group.

A. PALUSTRE. Related to *A. cannabinum*, stouter, 3 to 4 feet high, somewhat dichotomous; leaves of main stem 3 or 4 inches long, 2 to $2\frac{1}{2}$ in breadth, oval, obtuse, only the smaller and sub-elliptic rameal ones cuspidate-mucronate, all vivid green and

white-venulose above, paler and sparsely pubescent beneath, with short curved hairs; cymes many-flowered and dense, especially the terminal one, which is far surpassed by all the others; branches of the cymes, the pedicels, and often the calyx pubescent; sepals lanceolate, acute, of more than half the length of the small corolla, this yellowish white, often tinged with flesh-color.

Frequent in the salt marshes of Suisun Bay, California, the type specimens by Mr. Baker, n. 3247, from near Suisun, 6 June, 1903. The plant enters into the composition of the *A. cannabinum* of my Manual, but it is far enough from being the same as the eastern plant.

A. MYRIANTHUM. About 3 feet high; pale-green, glaucous; simple below, dichotomously branched at summit; the very large and dense terminal paucule of cymes greatly surpassed by the smaller lateral ones; leaves oblong-lanceolate to elliptical, the cauline about 4 inches long, all tapering abruptly to a short petiole, and abruptly though hardly mucronately acute; the venation not conspicuous above, somewhat so beneath; flowers very small, little more than a line long, greenish; sepals lanceolate, equalling or exceeding the tube of the cylindric corolla.

Known only as collected by myself along the Humboldt River at Palisade, Nevada, 24 July, 1893.

Affinities of the Cichoriaceae.

There is before me printed evidence of mental disquiet over the fact that in certain books of recent publication the Cichoriaceae are not placed "after the Compositae proper," but before them (*Rhodora*, vi, 62); and as there is little room for doubt about my being responsible as having suggested not only to the late lamented author of the *Flora of Pennsylvania*, but also to the writers of two or three more extensive and influential treatises the advisability of receiving this group of plants in the rank of a Natural Family apart from the Compositae (*Pittonia*, i, 295, and *Bay-Region Manual*, 219), it belongs naturally to myself to direct the attention of any mind openly professing to be exercised about these matters, to some part at least, of the much that has been written in times past relating to them.

But first, let me acknowledge that I take a lively interest in the reviewer's speculations as to the origin of the cichoriaceous corolla, which, by the way, is erroneously spoken of as "asymmetrical;" for it was long since established in the terminology of our science that the word symmetrical applies only to the numerical relation between the floral circles, and is predicable of nothing less than the flower as a whole. Neither an asymmetrical or a symmetrical corolla, considered apart, can exist; and the kind of corolla in question is irregular, very irregular; that is all.

Now, while for reasons, some of which were given years ago, others of which I may here adduce, I find it impossible to think of the Eupatoriaceæ and Cichoriaceæ as being of one and the same natural family, or in anywise intimately related, I should never think to look for indications of the evolution of the ligulate corolla of the latter from the tubular one of the former group. I have, indeed, in the careful investigation of fresh flowers of many species of Lobeliaceous plants—between which group and the Cichoriaceæ all systematists of the last hundred and twenty-five years have acknowledged the real affinity—I say I have sought again and again in those lobeliaceous corollas that are split down on one side, in some to the very base, to find the prototype of the cichoriaceous ligule. But it is sometime since I abandoned that line of research as hopeless. The ligule derived from any bilabiate corolla with a split down between the two small lobes, would be expected to present at its apex little if anything more than the three teeth of the lower lip; the remains of the two small upper lobes, if any there should be, ought to be small, very small, and in a manner lateral teeth. But the fact is, that the cichoriaceous corolla exhibits a truncate apex distinctly and equally, often sharply, five-toothed. In my own speculations this one hard irrefragable fact has demolished what was once a favorite hypothesis as to the derivation of the chicory ligule. Those ten sharp equal teeth all terminating in a line, as we may say, must indicate an origin in some perfectly regular pentamerous corolla-type, not even necessarily sympetalous; possibly, or even plausibly, from one in which all

the segments were deep and narrow, as now seen in many a campanulaceous flower.

The theory of the origin of a ligule from a regular pentamorous deeply cleft or parted sympetalous corolla naturally presupposes one of two distinct modes of transformation. It is conceivable that, by the gradual congestion into a dense head of a loose campanulaceous inflorescence, the deeply cleft corolla might loose, one after another or little by little, all of its segments save one; but we should not expect a ligule thus derived to be toothed at all at apex. And what is more, in the curious campanulaceous genus *Jasione*, in which the flowers are crowded into a dense head, involucrate like that of composites, there is still no reduction or alteration of the corolla, this consisting of five narrow-linear equal segments; and the supposition that the ligule of the chicory came about by elimination of segments seems precluded.

The other natural hypothesis, to me seems this: that there was a cohesion of the five segments beginning at the tip and proceeding downwards, until, by a natural tension, a rupture of the incipient apical tube by the uppermost of the five sutures favored a complete union of the segments downwards by the other sutures, until finally the five-toothed—equally five-toothed—ligule become established.

The anthological phases of another campanulaceous genus, *Phyteuma*, illustrate remarkably well the possibilities of the descent of the chicory ligule along such a line, and by such gradual modifications of a regular and deeply five-parted corolla. In some species of this genus there are the five linear rotate-spreading segments of a kind not unknown in other related genera. In some such it has long been noted by botanists that before the full expansion of the five narrow segments, they cohere lightly at tip, the expansion thus seeming to proceed from the base in such wise that at the tips the segments are finally forced apart by the tension to which they yield at last somewhat suddenly. In others of this genus, the tips are never sundered at all, but form a permanent five-toothed tube which reaches down to the middle of the corolla, or near it, or below it, and below this tubular part, the portion of the segments still

disunited bulge out, as it were to admit air and insects to the generative organs, so that this part of the corolla is inflated and described as fenestrate, or with window-like openings. Of course if this tension of the lower and free portion of the segments may be supposed in some ancestral type—and it easily may—to have caused a rupture of this tube by the upper suture, in such a case, the tension which held separate the fenestrated parts being relieved, the complete union of the segments throughout would easily have followed, and the ligule of the Cichoriaceæ would have come into existence by a process of development exactly the reverse of that of the splitting down from the top of a corolla that was already united and tubular from the base to above the middle.

In Europe where exist not only such suggestive, if not instructive types as *Jasione*, *Phyteuma*, and some others; where from immemorial time, and long before the rise of botany, people detected likeness in aspect and likeness in quality to the extent of using as salads having the same taste, both cichoriaceous and campanulaceous plants; in Europe, I say, it is not strange that really affinity was conceded by the most noted systematists to subsist between these two groups of plants, a good while before the close of the eighteenth century. And it was this fact which, with every noted botanist of the nineteenth century, prevented the placing, in books, of the whole rank and file of the "Compositæ proper" in between the cichoriaceæ and their next of kin. But this movement, which is either blindly or else stubbornly retrogressive—surely retrogressive—which interposes nearly or quite a thousand genera, and probably twenty thousand species between groups of plants as closely related, at least, as are the Crucifereæ and the Capparideæ, or the Ranunculaceæ and the Papaveraceæ—this has been undertaken by men whom our reviewer looks up to as promulgators of a "Modern and very philosophic system of plant arrangement." The author of such a phrase does not, I think, in this instance know well his topic. His "modern and very philosophic German system of plant arrangement" surely is not modern; and that it is philosophic, they who know much about the plant world by long experience

may be permitted to question. Certainly also, the inexperienced, if they will, may make phrases in laudation of inexperience.

What a certain one of the reviewer's "great European systematists" has had to say respecting the Campanulaceæ and Cichoriaceæ as allied, I have read. The reading does not take long; and the writing would seem to have been that of a man who had not himself made any study of the plants themselves from this point of view; even whose reading of what the forefathers, Jussieu, De Candolle, Lindley and Bentham have said, had been but partial, and cursory at that; such a perusal as neither deeply instructed him, nor at all deterred him from assigning the Cichoriaceæ a place which, although I dare say he knew it not, is just that given them two hundred years ago by the authorities of that period, Tournefort, Ray, Haller and others.

We have no great American systematists. But there is hope in our future, so long as we have two or three who, like the late Dr. Porter and the living authors of the most complete and valued manuals of East American botany, dare dissent from what I am wont to think of as German artificialism, in so far as to locate the Cichoriaceæ where nature indicates that they belong.

Some Western Buckthorns.

RHAMNUS FASCICULATA. Shrub with very stout and rigid branches dark-colored, glabrous after the first season, the growing ones pubescent; densely leafy and the foliage of the smallest, deciduous though perhaps tardily so: leaves obovate-oblong, oblong and elliptical, the smaller $\frac{3}{4}$ inch long, the largest $1\frac{1}{4}$ inches, obtuse or acutish, firmly and rather sharply serrulate, green above, yellowish beneath, sparsely pubescent on both faces, the hairs spreading and hirtellous, especially along the midvein beneath: flowers not seen: fruit small, 2-seeded.

White Mountains, New Mexico, 25 July, 1897, E. O. Wooton, allied to *R. Smithii*.

RHAMNUS URSINA. Rigid shrub with many divergent branches and rather loosely leafy, deciduous, the growing branches and the leaves beneath whitish with a minute and dense tomen-

tulose pubescence : leaves oval to ovate-oblong, 1 to 2 inches long, firm, strongly veined, sharply serrulate, mostly acute, the upper face only obscurely puberulent and of a deep green : umbels of immature fruit on peduncles exceeding the half-inch-long petioles.

On Bear Mountain near Silver City, New Mexico, 17 June, 1903, O. B. Metcalfe; also by the same near Mangas Springs, in the same region. The species is not rare in the mountains of the western part of New Mexico and adjacent Arizona.

RHAMNUS CASTOREA. Shrub with rather flexible branches and a subcoriaceous but deciduous foliage, both growing branchlets and lower face of leaves minutely and densely whitish-tomentulose; leaves mostly elliptical, 1 to 2 inches long, on stout petioles and traversed by a prominent and very broad midvein beneath, the margins obscurely and often remotely serrate, berries large, usually 3-seeded, the seed nearly orbicular.

Beaver Creek, northern Arizona, Aug. 1883, H. H. Rusby, n. 550 of my set of Dr. Rusby's plants. The specimens have for twenty years been allowed to pass for those of *R. tomentella*, though the character by which it is distinguishable from that exclusively Californian species are obvious.

RHAMNUS CUSPIDATA. Allied to the last two and to *R. tomentella* but smaller, the tomentose pubescence different, coarser, looser and with longer and hirtellous hairs intermixed rather copiously, especially along the veins: leaves $\frac{3}{4}$ to 2 inches long, oval to elliptical, abruptly and often cuspidately acute, sharply saliently and closely serrulate, those of vigorous shoots with even some coarse serratures below the cuspidate apex: flowers very copious, in dense cymes from all the axils, 5-merous, the triangular calyx-teeth longer than the tube: fruit not seen, said to be well flavored and edible.

Foothills of the mountains in Kern Co., California; the type specimens from near Tehachapi, by the writer, 22 June, 1889.

RHAMNUS OBTUSISSIMA. Deciduous shrub with short rigid densely leafy and finely puberulent branchlets, these dark red-purple the first season, afterwards grayish and glabrate: leaves small, $\frac{3}{4}$ to 1 $\frac{1}{4}$ inches long on very short and slender petioles, of a light green on both faces, thin, glabrous above, puberulent on

the veins beneath, these prominent, of elongated obovate outline cuneately tapering at the base, at apex very obtuse, even often almost truncate, minutely serrulate: umbels nearly sessile, each maturing a single dark-purple fruit large for foliage, 3-seeded.

The type of this new species, allied to *R. rubra*, is by Copeland, from Sisson, Calif., 15 Aug. 1903, distributed by Mr. C. F. Baker under n. 3833. There are traces of the same from Butte Co., by Mrs. Austin.

New Species of *Ceanothus*.

The study of a new *Ceanothus* from New Mexico allied to what is commonly known in California as *C. integerrimus* has recalled to my mind what I learned at Kew ten years ago, but have never yet published, as to the real identity of the common shrub of California.

In the summer of 1888 Dr. C. Parry brought to me for inspection a *Ceanothus* from the Santa Cruz Mountains unlike any which either he or I had seen before, which he believed to be new, and I could not gainsay it. He therefore soon after published it as *C. Andersonii*, dedicating it to our friend Dr. C. L. Anderson, of Santa Cruz. I adopted the species readily in the *Flora Franciscana*, without any critical study of it; nor did I doubt its validity until, at Kew Gardens in 1894, while examining types in this genus, I discovered that the originals of Hooker and Arnott's *C. integerrimus* were precisely what Dr. Parry had published as new under the name *C. Andersonii*.

Consulting the original description by Hooker, we find that that alone, duly regarded, would have saved both Dr. Parry and myself this error; for the leaves are described as "oblong-elliptical," a character which the foliage of the common shrub of the mountains of the interior never exhibits, its leaves everywhere showing something of the ovate in outline; being even very commonly ovate.

The types of *C. integerrimus* were of course, taken by Douglas in just that region whence we have the so-called *C. Andersonii*.

And yet, in the original diagnosis, there is some indication that the broad-leaved species had in some shape confronted the authors referred to; for the phrase "foliis 3-costatis" is not true of the specimens to which I refer. That is a mark of the other shrub that has so often been collected and which has usurped the name *C. integerrimus* in the herbaria, and in the books. But the originals of the species so named, as preserved at Kew, and with leaves unvaryingly narrow-oblong, have only a delicate and strictly pinnate venation. The necessary displacement of the name *C. Andersonii* by its reduction to synonymy involves the restoration of Dr. Kellogg's *C. Nevadensis* for the beautiful shrub that so abounds in the foothills of the interior of the State.

C. INTEGERRIMUS, Hook, & Arn. Bot. Beech. 329, not of American authors. *C. Andersonii*, Parry, Proc. Davenp. Acad. v. 172; Greene, Fl. Fr. 81. Leaves thin, narrowly oblong or oblong-elliptic, very obtuse, delicately pinnate-veined, glabrous.

C. NEVADENSIS, Kell. Proc. Calif. Acad. ii. 152. fig. 45. *C. integerrimus*, Greene, l. c., and of American authors generally, not Hook. & Arn. Leaves firm, oval, obtuse or acutish, obtuse at base but not subcordate, 1 to 1½ inches long, veins beneath white and prominent, the lowest lateral pair long and nearly parallel with the midvein, both faces appearing glabrous; a very fine pubescence on the petioles and along the veins beneath.

Chiefly of the Sierra Nevada, Calif., and at middle elevations; good specimens in U. S. Herb. from Grant Springs, Mariposa Co., L. F. Ward, 1895, Calaveras Big Trees, Brandegee, 1891, Placer Co., Mrs. Hardy, 1893. From the higher elevations of the Coast Range we have what appears the same in Baker's n. 3004, and Heller's 5841 and 5886.

C. PUBERULUS. Nearest *C. Nevadensis*, the leaves as large, more oval and obtuse, finely and often even silkily pubescent on both faces, most so on the veins beneath, these far less prominent than in the last.

Peculiar to the mountains of southern California, the oldest

specimen in U. S. Herb., being a sheet from San Bernardino Mountains, by G. R. Vasey, 1880. In 1891 Coville & Funston took good material from Frazier Mountain to the westward of the San Bernardino range, listing it as *C. integerrimus*; but our finest specimens are from Mr. Parish, nn. 3083 and 3085, taken from altitudes of 4000 and 5000 feet in the San Bernardino Mountains in 1894. The pubescence is permanent, being as obvious on mature fruiting specimens as on those young and barely in flower.

C. MYRIANTHUS. Leaves subcoriaceous, oval-oblong, $1\frac{1}{2}$ to 2 inches long, very obtuse at both ends, deep-green and glabrous above, glaucescent beneath, sparsely pubescent on the prominent whitish nerves, of which two are prolonged, yet not making the leaf conspicuously triple-veined: flowering branches angular, light-green, not warty or glandular; thyriform inflorescence 6 to 8 inches long, rather rigid, paniculately branched and dense with innumerable small white flowers.

Fort Huachuca, Arizona, May, 1890, Dr. Edward Palmer. Related to *C. Palmeri*; remarkable for large rigid leaves and a notably compound inflorescence for this group. It might almost as well be described as a close panicle.

C. MOGOLLONICUS. Allied to *C. Nevadensis*, smaller, more slender, with smaller foliage, the oval obtuse leaves mostly less than an inch long, the largest $1\frac{1}{2}$ inches, deep-green, triple-nerved, paler beneath, nearly or quite glabrous, the margins usually entire, often 3-toothed at the summit, rarely with a few lateral teeth; inflorescences short for this group, simple and few-flowered.

On Mogollon Creek, in the Mogollon Mountains, New Mexico, at 8000 feet, 16 July, 1893, O. B. Metcalfe.

C. PEDUNCULARIS. Leaves firm, oval-oblong, obtuse at base, mucronately acute at apex, triple-nerved, pubescent on both faces, an inch long or more; thyrus short and simple, only 2 or 3 inches long, on a terete and pubescent leafy-bracted peduncle of 6 or 7 inches; bracts of the peduncle $\frac{1}{2}$ inch long, oblong or elliptic, acute, appressed-pubescent above, silky on the veins beneath; bracts of the umbellules ovate or lanceolate, acuminate, silky-villous.

North side of Mount Hood, Oregon, 1898, H. D. Langille, in U. S. Herb. Allied to *C. Nevadensis*, which is frequent also in Oregon; but this Mount Hood shrub, with its obvious pubescence and peculiar long peduncles, with short inflorescences, is quite distinct.

C. MACROTHYRSUS. *C. thyrsiflorus*, var. *macrothyrsus*, Torr. Wilkes Exp. 263; *C. integerrimus* of recent writers and collectors, not Hook & Arn. Growing parts silvery-silky, the mature foliage thin, pubescent on both faces: leaves ovate to oval and oblong-oval, acute or obtusish, commonly subcordate, notably veiny, not emphatically triple-veined, the largest 3 inches long, usually entire but those on vigorous shoots lightly serrate, the scattered pubescence marking both faces, but veins beneath villous: thyrsus 6 to 8 inches long, short-peduncled, the peduncle with but few and scarcely reduced leaves.

The original of this excellent species is from the Umpqua Valley, in Oregon, but very good recent specimens have been distributed by Mr. Heller, Mr. H. E. Brown, and Dr. Edward Palmer, from the foot-hills of Butte Co., Calif., about Chico.

The Genus *Pneumonanthe*.

The group of perennial herbs well represented in America by what we call the Closed Gentians and their immediate kindred, and having its Old World counterpart in what Linnæus denominated *Gentiana Pneumonanthe*—perhaps including his *G. Cruciata* and *asclepiada*, perhaps not—was first published as a genus by Valerius Cordus in the year 1561. His name for it originates by simply turning into Greek the name of Lungflower, by which the plant was known to the common people, who held a decoction of its herbage to be efficacious in diseases of the lungs.

Considering that the original and typical Gentian, *G. lutea*, has yellow corollas deeply cleft and almost rotate, most like those of a *Swertia* or a *Frasera*—to which genera it is really more related than to any of our blue or purple so-called gentians—it is not remarkable that Cordus' proposition that the blue-flowered gentians having deep-tubular corollas are of

another genus, became at once popular; and most of the herbalists for about a century thereafter both describe and figure it under the name PNEUMONANTHE.

Two authors of that period, however, and both of them far more than herbalists, declined to give their sanction to that name, though both admitted the type to be distinct from *Gentiana*, and the genus a valid one.

In the year 1583, or twenty-two years after the publication of PNEUMONANTHE, Caesalpino, whose book is venerated by all who know the merest outlines of botanical history, as having been the first book of Systematic Botany ever published, devotes a chapter to this gentianaceous type, but holds the opinion that this is the genus *Vincetoxicum* of antiquity, and so, maintains that name.

The other exception to the use of PNEUMONANTHE as a genus name, is that made by Renealmus, in the year 1611. This, too is a most significant exception; for, if Caesalpino less than thirty years before had inaugurated the era of Systematic Botany by defining all genera, and arranging them in family groups, Renealmus anticipated by three centuries that which seems sure of becoming the twentieth-century idea of the limits of a genus. In Systematic Botany the gifted authors have not been few whose ideas have waited a half-century, or a whole century and even more, before obtaining general recognition and full acceptance. But Renealmus thought and wrought out his views and printed them three centuries ahead of time. And he was the first great specialist in the study of the Gentianaceæ; and proposed, in 1611, every segregation from the aggregate *Gentiana* that has yet in these recent times been offered, besides some which, if not yet reinstated, perhaps only wait for a general recognition that may be accorded them in some future, either near or distant. More than one century had passed before such of his gentiana segregates as *Chlora* and *Erythræa* obtained their places in books of botany as good genera; and *Erythræa* was published over and over again at least seven times under seven different names between the years 1753 and 1853; so that only within the last half-century has it come into possession of its rightful name as assigned it by Renealmus almost three hundred years ago.

As to generic nomenclature there was no conservatism with this author. He rejected all the old names, even *Gentiana* itself renaming the type of that genus *Asterias* in allusion to its star-shaped yellow corollas. To *Pneumonanthe* he gave new name *Cyana*. To the group of species with tetramerous but closed corollas, a group typified by what Linnaeus long afterwards called *G. Cruciata* he gave the name *Tretorrhiza*; and what is perhaps the most showy and beautiful member of this alliance, the type subsequently denominated *G. asclepiadea*, Linn., he placed in generic rank under the name *Dasystephana*.

This last name has now of late come to the front, in Mr. Small's Flora, as the scientific appellation for our group of Closed Gentians. The recognition of this group as a genus is, in so far, a distinct advance upon the long undisturbed taxonomy of the gentians; but the taking up of *Dasystephana* as the name is doubtless ill advised, and this not only as violating that principle of priority which is said to be fundamental, but also because no proper *Dasystephana* occurs within the limits of Mr. Small's Flora. What is known as *G. frigida*, Haenke, of the far West and Northwest is about the only American plant which authors who have insisted on a segregation of the Linnæan *Gentiana* have found congeneric with the *G. asclepiadea* of authors. But, if the types of both *Pneumonanthe* and *Dasystephana* are to be received as congeneric, then the former name is to hold by virtue of its priority over the latter. It was upon this principle that all or nearly all authors of the eighteenth and nineteenth centuries who accepted the Closed Gentians in the rank of a genus, found *Pneumonanthe* the rightful name for them and employed it. Here is a partial list of them: Gilibert (1781), Necker (1790), F. W. Schmidt (1796), S. F. Gray (1821), G. Don (1836), Rafinesque (1836), and by one or more much more recent authors.

Our North American species of PNEUMONANTHE, in so far as known, bear names and synonyms as follows :

P. GLAUCA, Schm. Roem. Archiv. i. 1, 10. *Gentiana glauca*, Pall.; P. NEWBERRYI. *Gentiana Newberryi*, A. Gray; P. SETIGERA. *G. setigera*, A. Gray; P. CALYCOSA, *G. calycosa*, Griseb.; P. PARRYI. *G. Parryi*, Engelm; P. BRACTEOSA. *G. bracteosa*, Greene; P. PLATYPETALA. *G. platypetala*, Griseb; P. MENZIESII. *G. Menziesii*, Griseb; P. SCEPTRUM. *G. sceptrum* Griseb; P. OREGANA. *G. Oregana*, Engelm; P. AFFINIS. *G. affinis*, Griseb; P. FORWOODII, *G. Forwoodii*, Gray; P. BIGE-OVIL. *G. Bigelovii*, Gray; P. RUSBYI. *G. Rusbyi*, Greene; P. INTERRUPTA. *G. interrupta*, Greene; P. REMOTA. *G. remota*, Greene; P. PUBERULA. *G. puberula*, Mx. *Dasystephana puberula*, Small; P. SAPONARIA. Schm. *G. Saponaria*, L.; *D. Saponaria*, Small.

P. CLAUSA. *Gentiana clausa*, Raf. Med. Fl. i, 210 (1828); *G. Andrewsii*, Griseb. Gent. 287 (1839); *D. Andrewsii*, Small. A comparison of the two descriptions, that by Rafinesque in English, and the eleven years later one in Latin by Grisebach leaves no room for doubt as to the identity of the two. Of the two diagnoses, that by Rafinesque is the fuller, and the name *clausa* is the better of the two, besides having the priority.

P. OCHROLEUCA, Don. *G. ochroleuca*, Froel. This is *Dasystephana villosa* [L.], Small, under the hypothesis that it may be *Gentiana villosa* L. But names should not be founded on suppositions. What *G. villosa* L. was, or is, no one can tell. Nothing answering to the brief account of it exists, in so far as can be ascertained; which is enough to discredit the use of the name.

P. LINEARIS. *G. linearis*, Froel.

P. FLAVIDA. *G. flavida*, A. Gray (1846); *G. alba*, A. Gray (1848); formerly supposed to be *G. alba*, Muhl., which is a nomen nudum and ought never to have been promulgated.

P. PUBERULA. *G. puberula*, Michx. *D. puberula*, Small; P. DECORA. *G. decora*, Pollard. *D. decora*, Small; P. PARVIFOLIA. *Dasystephana parvifolia*, Small; P. LATIFOLIA. *D. latifolia*, Small. P. PORPHYRIO. *G. Porphyrio*, Gmel; *D. Porphyrio*, Small. P. SPATHACEA. *G. spathacca*, Kunth.

A Rare *Swertia*.

While of late inspecting with some degree of carefulness the North American specimens of *Swertia* in the National Herbarium, my attention was held by a very fair specimen from Montana which presented at first glance a marked unlikeliness to all others in one peculiarity of its foliage. The leaves of the bulk of the specimens of whatever species, are remarkably thin when dry, and devoid of any apparent venation beyond what is represented by a single often quite prominent midvein. But this Montana plant presents leaves evidently of a particularly firm texture, their upper face showing five almost equally prominent parallel nerves, so that, in case of my finding it undescribed, I had purposed calling it by a name that would have been in allusion to plantain-like parallel-nerved foliage.

In looking into the earlier bibliography of the genus, I very naturally encountered the name of *S. fastigiata*, Pursh, published by that author ninety years ago, on a plant from the upper Missouri near the Rocky Mountains, therefore from the identical region whence this specimen had come. And in his diagnosis of his species, brief though it be, mention is made of just the two characters my own first inspection of the specimen in hand had revealed as those warranting the proposal of a species, namely, the conspicuously nerved foliage, and the excessively long sepals, these nearly equalling the corolla; and Pursh says "corollis longitudini calycis" while in all other American *Swertias* the calyx is notably shorter than the corolla. The corollas of our specimen appear also to have been of a light blue, whereas in the common *Swertia scopulina*, Greene, of the whole Rocky Mountain region the flowers are of a dark blue-purple, very dark. Yet even as to color we have here another mark of Pursh's *S. fastigiata*, the flowers of which are said by him to be "sky blue."

The specimen made the subject of these comments is by Rydberg and Bessey, their n. 4699 as in U. S. Herb., obtained by them in Jack Creek Cañon, Montana, 15 July, 1897. There is no doubt that in this, at least as seen on sheet n. 390,186, we have the rediscovery of a plant long lost, and very likely somewhat rare, *S. fastigiata*, Pursh.

New Plants From Middle California.

The greater part of the species herein defined form a portion of a most interesting collection made this year in the mountains of Tulare County, California, Mr. J. D. Culbertson, and the specimens were communicated to me for determination by Mr. Carl F. Baker, who has in hand the distribution of them to herbaria.

The series of diagnosis begins with a small list of new members of the difficult genus LUPINUS.

L. CULBERTSONII. Low perennial, not alpine, neither depressed nor compactly tufted, but subacaulescent, 6 to 10 inches high, with decidedly thinnish foliage and scarcely canescent with a sparse pilose or villous hairiness; petioles long and slender, leaflets 5 to 7, almost elliptic oblong, cuspidately acute, $\frac{1}{2}$ inch long or more; peduncles scapiform, bearing the long raceme just above the foliage commonly with a solitary leaf toward the base: racemes 2 to 4 inches long, crowded and obscurely verticillate; corolla rich purple, less than $\frac{1}{2}$ inch long, banner little shorter than the other petals, keel narrow, slightly falcate, retrorse-ciliolate.

Forks of the Kaweah River, at 8,000 feet, July, 1904, Mr. J. D. Culbertson, With the habit of the familiar *L. minimus*, but totally different foliage and pubescence. From Summit Lake, at a higher altitude Mr. Culbertson has the same more pubescent (n. 4552).

L. DASYPHYLLUS. Perennial, the stout simple stems strongly striate, villous, very leafy; leaves large, short-petioled, the lance-linear leaflets (basal ones cuneate-oblong, very obtuse) 2 inches long, acute, rather loosely villous-hirsute on both faces: racemes sessile, 4 to 6 inches long, the large flowers obviously verticillate, their long linear densely villous bracts not caducous: calyx and pedicels densely long-villous: corolla $\frac{1}{2}$ inch long, purplish, banner smaller than the other petals, keel narrow and little curved, naked, or with a few loose hairs above the middle.

Farwell Gap, at 10,000 feet, 3 Aug. 1904, Mr. Culbertson, n. 4272 of Baker's distribution. Species uncommonly well marked, its near affinities not obvious; the specimens too fragmentary.

L. HYPOLEUCUS. Small tufted alpine perennial, the multicapitose caudex scarcely woody, the long petioles and scarcely longer stems slender, canescently villous, as also the leaves above: leaflets 7 to 9, unequal, somewhat elliptical, the largest $\frac{1}{2}$ inch long, densely white-villous beneath and that face somewhat concave: racemes short, of about 3 whorls of middle-sized deep-purple flowers, the petals subequal, keel not much curved, retrorsely villous-ciliolate from below the middle almost to apex.

Near the summit of White Chief Peak, Mr. Culbertson, 16 July, 1904, being n. 4416 of Baker's distribution somewhat like *L. Danaus* as to size and habit, but with shorter peduncles, shorter racemes, and foliage remarkable for a dense white indument covering the lower face only. The same is in U. S. Herb. from Mt. Goddard, by Hall & Chandler, n. 707, collected in July, 1900.

L. HYPOLASIUS. Low alpine perennial not caespitose, the stoutish stems very leafy and suberect from the branches of the short caudex; petioles slender, leaflets 5 to 7, very unequal, all broad and obtuse, cuneate-oblong, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, appressed-villous above, densely villous-tomentose beneath: racemes short, subsessile, the short peduncles stout; whorls of flowers 3 or 4: corolla purple, $\frac{1}{4}$ inch long, petals equal, keel falcate, retrorse-ciliolate above the middle.

Farwell Gap, Calif., at 10,000 feet, C. A. Purpus, 1897, his n. 5221 as in U. S. Herb. Well distinguished from all other alpine lupines of the district by its stout upright habit, subsessile racemes and broad leaflets.

LOTUS CUPREUS. Low slender flaccid and nearly glabrous perennial, the decumbent stems only 5 to 8 inches long, leafy throughout: lowest leaves of but 3 cuneate-obovate truncate or retuse leaflets, the leaflets of the others 5 to 7 and cuneate-oblong, acutish; stipules of all small, herbaceous, more or less distinctly ovate: umbels little exceeding the leaves, the lowest bractless and only 1 or 2-flowered, the others with 3 or 4 flowers subtended by an unifoliate bract quite like the ordinary leaflet: calyx turbinate, the triangular-subulate teeth shorter than the tube: corolla short, not longer than the breadth of the broad

banner which greatly surpasses the other petals, these all at first dingy-yellow but at length copper-color.

Hackett's Meadows, at 8600 feet, July 18, Baker's n. 4373. The plant by habit is next of kin to *L. formosissimus* (*Hosackia gracilis* Benth.) of the Californian seaboard, but the flowers are extremely different.

SIDALCEA RANUNCULACEA. Stems 1 to 2 feet high, mostly solitary, terminating a slender superficially seated horizontal rootstock, retrorsely hirsute from the decumbent base to near the middle; herbage of a very light green, the long petioles and upper part of stem sparsely hirsute-hairy: leaves orbicular, the lowest 7-cleft and the segments with 2 or 3 obtuse lobes, the cauline more deeply cleft and their segments acutely 3 to 5-lobed, those near the spike 5-parted, the segments lance-linear, entire: spikes very short and dense, and flowers rather large: calyx and pedicels densely villous-hirsute: fruit unknown.

In Hackett's Meadows at 8600 feet, Culbertson; n. 4318 of C. F. Baker's distribution. The same, but in poor specimens, was collected by Dr. Edward Palmer, in the same region, in 1888 (n. 203) and distributed for *S. spicata*, from which the species differs essentially by its broad oval spikes, large flowers, and a peculiar foliage recalling that of some Ranunculi.

SIDALCEA INTERRUPTA. Size of the last, much more slender, apparently also rhizomatous, the stem and petioles loosely pilose with firm spreading hairs; herbage deep-green, but cut of the leaves much as in the last; flowers much smaller, in elongated and often interrupted spikes, or even with solitary flowers scattered up and down below the terminal spicate cluster: pedicels and calyx-tube stellate-pubescent only, but teeth of the latter pilose: fruit much depressed, the nutlets nearly or quite glabrous, obviously though not strongly reticulate.

Habitat of the last, nearly but at a lower altitude, 8000 feet, and by the same collector, being numbered 4255 by Mr. Baker.

SILENE APERTA. Perennial, slender, erect, 2 feet high or less, with but a single pair of cauline leaves near the middle, these narrowly linear and about 3 inches long, the innermost

basal ones similar to these, but the outer short, oblanceolate, acute; both stem and foliage retrorsely puberulent: calyx cleft below the middle, and at least in anthesis expanding to open-campanulate, only the segments herbaceous and even these with scarious margin, the broad and nearly saucer-shaped tubular part scarious, but with several green nerves: corolla greenish, twice the length of the calyx and salverform, the petals as to their expanded portion cuneate-obcordate: fruit not known.

Hackett's Meadows, at 8600 feet, 16 July, n. 4498 of Baker's distribution. Species with calyx so deeply cleft and so remarkably open as to render doubtful the propriety of its consignment to this genus.

AQUILEGIA PAUCIFLORA. Scarlet-flowered and an ally of *A. truncata*, but subacaulescent, little exceeding a foot in height, only the subligneous and fibrous-coated caudex leafy, the nearly naked and very erect pedunculiform stem bearing from 1 to 5 flowers near the summit: leaves of half the height of the flower-stalk or less, pale and minutely hirtellous beneath, very dark-green and glabrous above, the pedicels and spurs glandular-pubescent: flower $1\frac{1}{2}$ inches long from tip to tip of spurs and anthers; sepals oval, obtuse, spreading or reflexed, not equalling the spurs; blade of petal distinct but short; filaments puberulent.

Hackett's Meadows, 16 July, in flower only; Baker's n. 4460. The almost stemless habit and peculiar pubescence of the lower leaf face distinguish this subalpine plant well from its large widely branched and many-flowered kindred of the coast.

DELPHINIUM LUPORUM. Root apparently woody-fibrous: solitary stem more than a foot high, slender, sparsely leafy except at base, very light-green, glabrous and shining; lowest leaves 5-parted, the segments round obovate and with 2 or 3 broad rounded and rather deep lobes, those of the stem with more cuneiform divisions and acute lobes, or the divisions simple and entire and oblong-lanceolate cut in those next below the rather naked peduncled raceme; this very lax, made up of only 5 to 7 large flowers on long and slender ascending pedicels; the pedicels and the long straight slender-conical spur loosely villous-pubescent:

sepals all deep-blue purple, each with a very prominent though narrow apiculation; ovaries canescently villous.

On Coyote Creek, 30 July; Baker's n. 4392. The aspect of the species suggests affinity for *D. decorum* and its kindred; but the root is of another structure entirely.

BISTORTA SCABERULA. Tall and with large foliage, but the root unknown: basal leaves upright, a foot long, the oblong blade little longer than the stoutish petiole, mostly obtuse at base, more than an inch wide, thinnish, neither revolute nor crisped, of a vivid green above, the veins there inconspicuous, beneath paler and glancescent, the midvein broad, neither flattened nor striate, the veins and veinlets, especially the latter, muriculate-scaberulous: stem stoutish, 2 feet high, glabrous, striate, the sheaths $1\frac{1}{2}$ inches long, bearing each a sessile acute leaf about as long: spikes barely in flower and ovoid, scarcely $\frac{3}{4}$ inch long.

Hackett's Meadows, at 8600 feet, Culbertson, 18 July, 1904, distributed by Mr. Baker under n. 4384. The muriculation of the reticulate veinlets is a peculiar character.

ERIOGONUM JUNCEUM. Suffrutescent, the woody and densely leafy branches only a few inches high, loosely cespitose, white-tomentose, as are also the small obovate or obovate-elliptic leaves: slender peduncles 5 to 9 inches high, perfectly glabrous, of a vivid green and reedy-looking, usually but once forked, bearing the involucre $\frac{1}{2}$ to $\frac{3}{4}$ inch apart, these sessile, narrow-campanulate, glabrous, obtusely toothed: perianths white, the segments with red-brown midvein, all obovate and very obtuse.

Kern River Cañon, 2 Aug. 1904, Culbertson, being n. 4396 of C. F. Baker's distribution. Related to *E. Wrightii*, distinguished by slender glabrous and reedy peduncles, glabrous involucre, and smaller perianths with relatively broad segments. A specimen of what appears the same is in U. S. Herb. from Mt. San Jacinto, 11 Aug., 1897, by H. M. Hall, named *E. Wrightii*.

SWERTIA COVILLEI. Stout-stemmed, rather few-flowered, 6 to 16 inches high; basal leaves in the largest plants 6 inches long, thin and flaccid, not indistinctly 3-nerved, the oblong-lanceolate

acutish blade tapering to a long and broadly winged petiole; flowers on stout pedicels, one in the axil of each bract; sepals lanceolate, acute or acuminate, of scarcely more than half the length of the corolla, this 5-parted, the lobes oval or oblong-obtuse, much exceeding the short stout-subulate filaments, their glands with a lacinate margin, some or all the laciniæ slenderly setaceous-pointed; color of corolla blue-purple but not dark: seeds broadly winged.

Crabtree Meadows, at 11,000 feet, 18 Aug., 1904, Culbertson; these specimens in fruit. The flowering specimens used in making the diagnosis are Coville & Funston's n. 1629 of the Death Valley Expedition.

CASTILLEIA TRISECTA. Stems tufted on a tap-root, erect, simple, a foot high, loosely leafy, the whole herbage sparsely pubescent and somewhat clammy, light-green; leaves about 1½ inches long, of a broadly linear or quadrate undivided portion, terminated by 3 narrowly linear unequal segments, the middle one largest; spike lax, its trifid bracts scarlet: calyx deeply cleft on the upper side, the 4 short subequal lobes scarlet; corolla with only the long straight ascending galea exerted.

Hackett's Meadows, at 8,600 feet, 18 July; Baker's n. 4431. Allied to Nuttall's *C. angustifolia*, but with different foliage, and flowers rather more like those of *C. linariifolia*.

CASTILLEIA CULBERTSONII: Slender subalpine perennial, the stems not tufted, each from its own very slender horizontal rootstock, erect, 4 to 6 inches high, both stem and small narrowly lanceolate acuminate entire leaves minutely and sparingly hirtellous: spike short but flowers rather large; bracts trifid, the lowest green and leaf-like, the others red-purple; calyx villous, unequally cleft, the teeth shorter than the tube; galea of the corolla prominent, but shorter than the tube.

Crabtree Meadow, at 11,000 feet, near Mt. Whitney, 17 Aug.: Culbertson. In a stouter and more pubescent state the plant occurs in U. S. Herb. as collected by Hall & Chandler, at 10,000 feet in the mountains of Fresno Co., July, 1900, the label bearing the name *C. Lemmoni*, which species differs widely from this in habit, its stems being tufted upon the subligulous crown of a tap-root.

PENTSTEMON CEPHALOPHORUS. Subspecific to *P. procerus*; low and stout, herbaceous save as to the horizontal superficially seated subligneous rootstock, the strongly decumbent flowering stems 4 to 8 inches high, glabrous below, as are also the obovate or spatulate subcoriaceous basal leaves, but upper part of stem and the inflorescence, even to the corollas, sparsely and slenderly glandular-hairy: cauline leaves in 3 pairs, all of oblong outline, rather larger than the basal ones, all entire, the middle pair usually with a few flowers in the axils, the summit of the stem crowned with a dense globose and capitate cluster: sepals thin lance-linear: corollas less than $\frac{1}{2}$ inch long, straight and narrowly tubular, with a small limb of short subequal rounded segments; color purplish.

Summit Lakes, at 11,000 feet, Culbertson, 19 Aug., 1904, Baker's n. 4551.

APOCYNUM CARDIOPHYLLUM. Small and rather slender, only 8 or 10 inches high, very erect, branching from near the base, stem and lower face of leaves very glaucous, the whole plant glabrous; leaves short petioled and all deflexed, mostly about 1 inch long, at base subcordate or occasionally only truncate, at apex very obtuse, mucronate, dark-green and pale-veiny above; flowers rather many, terminal and from the axils of the upper leaves, of large size but in small clusters: sepals short, ovate, acuminate, of about one-fourth the length of the large, deeply flesh-colored corollas, these broad-cylindric, about $\frac{1}{3}$ inch long, their at length spreading lobes very short and obtuse; fruit not seen.

Hackett's Meadows, at 9,000 feet, Culbertson, 18 July, 1904, Baker's n. 4472. Very near that more northerly dwarf with decumbent stems, broader leaves, and more deeply cleft corolla, now called *A. pumilum*.

CRYPTANTHE INCAÑA Annual, freely branched from near the base, the branches ascending, a foot long or less; whole plant cinerous-hispidulous and with a different minute strigose hairiness underneath the more copious hispid indument: flowering branches loosely spicate, bractless except at base: calyx small, the sepals short, narrow throughout, not with attenuate or pro-

longed apex: nutlets apparently 4, or sometimes 2 only, a half-line long, elongated-ovate above a truncate base, rather abruptly and obtusely pointed, the ventral groove forked at base and closed throughout, the whole surface greyish mottled with dark-brown, smooth and polished.

On Nine-Mile Creek, at 5,800 feet, Culbertson, 30 Aug., 1904; Baker's n. 4537.

GALIAM CULBERTSONII. Rigid herbaceous perennial, with, nearly simple stems about a foot high from horizontal subligneous rootstocks at least partly subterranean: angles of the stem as well as margin and midvein of the leaves, minutely villous-hispid, a more minute and partly appressed pubescence between the angles of the stem: leaves in fours, of firm texture, less than $\frac{1}{2}$ inch long, oval, but ending in a very prominent cusp: flowers few, minute, greenish: fruits (immature) apparently baccate, on deflexed pedicels of $\frac{1}{4}$ to $\frac{1}{2}$ inch long, to the unaided eye appearing glabrous, but under a lens seen to be sparsely and minutely hispidulous-hairy.

South fork the Kaweah River, 20 June, 1904, J. D. Culbertson. The near affinities of this *Galium* are not obvious to me.

CHRYSOTHAMNUS VULCANICUS. Shrub allied to *C. Parryi* of Colorado, more slender, the leaves very narrowly linear and very acute, indistinctly 3-nerved throughout, glabrous, or when young obscurely glandular and viscid; heads forming a narrow thyriform panicle, the head little more than $\frac{1}{2}$ inch high, narrow, mostly 5-flowered, its bracts about 10, thin, lanceolate-subulate, slender pointed, the outermost more herbaceous, and woolly on the margin at the base: corollas rather deeply cleft, the teeth always erect: pappus copious, achenes silky-villous.

On Volcano Creek, above Volcano Falls, at 8,000 feet, 9 Aug. *C. Parryi* has much broader foliage, a more leafy thyrus, and broader involucre with flowers twice as numerous.

CHRYSOTHAMNUS ASPER. Resembling the last, though stouter, the wooliness of the stems more loose and white; leaves as narrow but firmer, rather strongly glandular-scabrous under a lens, this indument extending to the outer bracts of the involucre: heads sessile, forming a more strictly thyrusoid in-

florescence, most 10 or 12-flowered; bracts oblong-linear, slender-pointed, none with woolly margin: corollas and achenes as in the last.

This is n. 1690 of the Death Valley Expedition from the Sierra Nevada in Inyo Co., listed in the report as *Bigelovia Bolandri*, which type can not, I think, have been known by him who made this reference; and, in the U. S. Herb. the sheet was long since placed in the cover of *C. Parryi*, which it is like in habit, though different in character.

MACRONEMA BOLANDRI. *Linosyris Bolandri*, Gray, Proc. Am. Acad. vii, 354. *Chrysothamnus Bolandri*, Greene, Eryth. iii, 114. My remarks in Erythea, as to the seeming desirability of removing this type to *Macronema*, seem now more than ever forcible; for, in looking over the numerous sheets of *Macronema discoidea* now in the U. S. Herb., I detect something like a half-dozen specimens of the Bolandrian shrub, some of them from the original station, that have by others been taken for, and labelled as *M. discoidea*. It is even hardly more than a subspecies of this genus; for it differs from that one with which people so easily confuse it, by no clearer characters than those of a rather narrower and more pointed leaf, and slightly narrower heads more numerous and apt to be crowded together. And there are two or three other forms under the aggregate *M. discoidea* that might almost as well be distinguished as this one.

Certain West American Cruciferae.

The Californian cruciferae in general, and perhaps more especially that extensive list of species that have been variously referred to *Arabis*, *Streptanthus*, *Caulanthus*, *Stanfordia*, and *Thelypodium* have occupied a good share of my most careful and critical attention during the last quarter-century.

Fifteen years ago, having in preparation the Flora Franciscana, I could see no alternative between dividing the *Streptanthus* series into two or three genera, or restoring to it *Caulanthus* and *Stanfordia*; and I decided in favor of the latter course. It was not satisfactory; and it has for some years seemed to me

that something like the restoring *Caulanthus* as a genus and the merging in it of the perennial *Streptanthi* of the Rocky Mountains and the Great Basin had been a better course. But the most needful thing to be done, as I now view the case, is the complete segregation from *Streptanthus* of many, if not all the Californian plants that have been so referred; for in their floral characters they are extremely different from the typical species belonging to the flora of distant Texas and Arkansas. Whether, however, these annuals and perennials of California were better placed as constituting one new genus or two three, is a matter concerning which there might easily be diversity of opinion, and upon which my own might change under more light.

Most of the Californian species were first really described by myself; this being said not only of the many kinds that were discovered and first published by me, but also of most of those named and imperfectly or even falsely described by earlier authors. For that particular group which Nuttall indicated as sub-generic under the name *Euclisia*, and which I here propose in the rank of a genus of the same name, the characters of the species reside chiefly in the calyx; the corolla in all being extremely different from that of true *Streptanthus*, as has been indicated by many authors; but the corolla of *EUCLISIA* is in no particular different from that of all *Caulanthus*, *Stanfordia*, and a great proportion of the species at present referred to *Thelypodium*.

On the calyx alone, then, unless the flatness of the pods, and the absence of broad more or less rounded bracts replacing leaves upon the stem, *EUCLISIA* must seem to rest; and those marks of the calyx I have presented fully, in the diagnosis of species in the *Flora Franciscana*, and in the *Bay Region Manual*. It is, on the whole, a bilabiate calyx, in at least, the typical species, three of the sepals being connivent together at tip behind the corolla on the upper side; the individual sepals sharply carinate, also never green, but white or else deeply, usually, even darkly colored. I append a partial list of species.

E. GLANDULOSA. *S. glandulosus*, Hook. Ic. c. 40 (1836), as to original specimens, but figures false. *S. peramænus*, Greene,

Bull. Torr. Club, xiii. 142 (1886), also Fl. Fr. 261, and Man. 17. I did not believe that the plant with the remarkably irregular calyx described by me could be that which had been intended by Hooker's figure until I had seen the originals of *S. glandulosus* at Kew. Such falsification of the characters of a species is not publication; and this beautiful plant was truly first described, and therefore first published, as *S. peramanus*, which name ought to be continued in use, and Hooker's suppressed as being worse than a nomen nudum.

E. MILDREDÆ. *Streptanthus Mildredæ*, Greene, Fl. Fr. 260.

E. BIOLETTII. *S. Biolettii*, Greene, Pitt. ii 225.

E. PULCHELLA. *S. pulchellus*, Greene, l. c.

E. NIGRA. *S. niger*, Greene, Bull. Torr. Club. xiii 141.

E. ASPERA. *S. asper*, Greene, Pitt. iii 225.

E. ALBIDA. *S. albidus*, Greene, Pitt. i. 62.

E. SECUNDA. *S. secundus*, Greene, Fl. Fr. 261.

E. HISPIDA. *S. hispidus*, A. Gray, Am. Acad. vi. 184.

E. VERSICOLOR. *S. versicolor*, Greene, Eryth. iii. 99. In publishing this species now nearly ten years since, I expressed dissatisfaction with it and its allies as members of *Streptanthus*. The corolla in this one is extremely bilabiate.

E. VIOLACEA. Doubtless annual and larger, perhaps two feet high or more, but only the upper leaves and flowering branches known, these perfectly glabrous, glaucescent; leaves lance-linear and sagittate-clasping, remotely dentate: racemes several, slender, the flowers slenderly pedicellate: calyx bilabiate, the 3 upper sepals connivent together at tip, obtusely keeled, of a rich violet or red-purple; corolla as strongly bilabiate, the large upper petals with white-margined and rather wide limb, the corolla otherwise like the calyx as to color: stamens in 3 very unequal pairs; upper pair of filaments completely united and anthers greatly reduced: pods 3 inches long or more, straight, ascending, very narrow.

Solitary upper and widely branched part of a plant otherwise unknown, collected somewhere in middle California by Dr. Edw. Palmer, in 1876; specimen in U. S. Herb. sheet 4297. Three specimens in U. S. Herb. from San Luis Obispo, by M.

E. Jones, in 1882 are probably the same; smaller plants, glabrous throughout, the upper filaments not quite so completely joined.

E. ELATIOR. Stout annual, erect, branched above, commonly 2 feet high: lowest leaves 2 to 4 inches long, laciniately lobed or pinnatifid, the lobes not gland-tipped, both faces of leaf as well as base of stem hispid, not even the narrow auriculate-clasping cauline ones glabrous, but these merely dentate: racemes lax: bilabiate calyx and corolla red-purple: upper pair of filaments united to above the middle, their anthers much reduced: pod 3 inches long, ascending, straight or slightly curved upwards.

The type, with large lacinate and pinnately foliage is from the Santa Lucia Mountains, California, occupying sheet 4, 295 in U. S. Herb., G. R. Vasey having obtained it in 1880. Certain specimens distributed from Santa Lucia Mountains, as *S. glandulosus*, by R. A. Plaskett, seem to belong here, though their foliage is not as ample and is more slightly and regularly rather than laciniately lobed.

E. BAKERI. Habit of *E. glandulosa*, and about as large, stouter, more sparsely hispidulous and the hairs much shorter; leaves and their teeth equally gland-tipped: calyx shorter, its sepals less acute and less connivent, colored very dark and dull purple: petals narrow, also dark purple save as to the white and strongly crisped narrow margin: upper pair of stamens exerted quite beyond the petals, united to near the summit by the filaments, their anthers of less than one-third the size of the other four, these last on very short filaments and borne scarcely beyond the summit of the calyx.

Near Bethany, on the plains of the upper San Joaquin, 27 April, 1903, C. F. Baker; distributed by him under n. 2785, and under my manuscript name *S. Bakeri*. Pods not known. Calyx of the size and blackish coloring of that of *E. Biolettii*, but the sepals wanting the sharply keeled character they have in that species.

E. AMPLEXICAULIS. *Caulanthus amplexicaulis*, Wats. Proc. Am. Acad, xvii 364. With the inflorescence and flowers of *Euclisia*, at least as to the texture, coloring and peculiar irregu-

larity of the calyx, I readily refer this plant here, notwithstanding that its foliage and bracts no less than its narrow pods would relegate it to the next genus, were not the calycine characters to be regarded the most essential in deciding the genus.

For a considerable group of species, among which those that I regard as most typical of a genus are mainly Californian and biennial, I propose the generic name PLEIOCARDIA, in allusion to what gives them an aspect decidedly their own when compared with members of *Euclisia*, namely, the presence of large more or less rounded sessile and cordate bracts—disciform organs—taking the place of ordinary leaves upon the flowering branches, often numerously subtending the racemes. By this striking vegetative character these plants may seem related to *Euclisia*, in some such degree as the Old World *Lepidium perfoliatum* and its kindred, with their pinnatisect true leaves, and round disciform phyllodes subtending the racemes, are related to more genuine *Lepidium*. But these with the “perfoliate” discs in place of upper cauline leaves were segregated from *Lepidium* under the name *Candis* by Adanson, and have been maintained in that rank by later authors under one or more later names. I should not hesitate to accept them as a genus.

But this vegetative character is not essential to PLEIOCARDIA. While it suggested the generic name I admit to the genus a few species that have not that mark; and even the original species of *Streptanthus* have broad and cordate-clasping upper leaves, though the transition to them is not abrupt as it is in the Californian plants of the proposed new genus.

The essential characters of PLEIOCARDIA are those of flower and fruit. Its calyx is (1) regular, not bilabiate as in *Euclisia*, (2) closely fitting up to the corolla and stamens, not distended and as it were inflated between base and summit; (3) tips of sepals dilated, recurved and scarious-edged as in neither *Streptanthus* nor *Euclisia*; (4) petals not radiating cruciformly as in *Streptanthus* but diverging in opposite pairs as in *Euclisia*; (5) stamens in 3 unequal pairs, all distinct as in *Streptanthus* (in

which though distinct they are equal); (6) receptacle mostly enlarged under the fruit as in *Thelypodium*, but in neither *Euclisia* nor *Streptanthus*; (7) pods in certain species narrow and torulose as in *Thelypodium*, and with small but plump seeds wingless and even marginless.

PLEIOCARDIA, then, has a calyx peculiarly its own, a corolla nearest that of *Euclisia*, though in several species with petals showing a well developed limb, thus inclining to *Streptanthus*, stamens half way between those of the two genera, and often with the pods and seeds of *Thelypodium*, though nearer in floral character making any approach to the type of that genus.

In arranging the sequence of species my custom is to place those first which seem to me to have the clearest claim to represent a genus; and therefore these stand as its type.

P. TORTUOSA. *S. tortuosus*, Kell. Greene, Fl. Fr. 258.

P. FOLIOSA. *S. foliosus*, Greene, Pitt. iii. 226.

P. ORBICULATA. *S. orbiculatus*, Greene, Fl. Fr. 258.

P. SUFFRUTESCENS. *S. suffrutescens*, Greene, Erythea, i. 147.

Doubtless flowering at first as a biennial, after that enduring for several years and becoming suffrutescens.

Those next following are, I think, all mere annuals, most of them in at least one particular as well fitted as the preceding group to stand as typical of a genus. I even apprehend their being placed, by and by, in the rank of a separate genus on account of their having the pods and seeds of *Thelypodium*.

P. BREWERI. *S. Breweri*, Gray, Greene, Fl. Fr. 259.

P. HESPERIDIS. *S. hesperidis*, Jeps. Erythea, i. 14.

P. GRACILIS. *S. gracilis*, Eastw. Proc. Cal. Acad. 2 Ser. ii. 285. I have not seen this plant, but Miss Eastwood's diagnosis leaves no room for doubt as to its being a genuine *Pleiocardia*.

P. FENESTRATA. Low slender glabrous glaucous annual, branched from the base, 6 inches high; proper foliage wanting in the very mature specimens, a few small ovate cordate-clasping entire bracts on the branches: calyx very small, deep-purple: corolla large for the plant, the petals with well developed broadly obovate limb and slender claw, the whole of a faint rose-color beautifully fenestrate with delicate dark-red veins:

Pods slender, straight, acute, 1 to $\frac{1}{2}$ inches long, spreading or deflexed, not strongly compressed, lightly torulose: seeds oval, thickish, marginless.

Tehipite Valley, Fresno Co., Calif. Hall & Chandler, July, 1900, distributed under n. 492; type in U. S. Herb.

P. MAGNA. Stout glabrous glaucous annual branched from near the base; 2 feet high: lowest leaves spatulate-obovate, 3 inches long, $1\frac{1}{2}$ broad, coarsely dentate, the broad triangular teeth not callous-tipped, those subtending the branches shorter, cordate-ovate, obtuse, entire or nearly so: flowers not seen: fruiting raceme long, lax, the pedicels 1 to $1\frac{1}{2}$ inches long, stoutish, ascending: pods very long and slender, 3 to $4\frac{1}{2}$ inches long, subterete, scarcely torulose, straight and ascending or subfalcate-recurved, tipped with a prominent style: seeds small, oblong-linear, marginless.

This plant, truly remarkable for its size among members of this group, was sent me many years since, by W. G. Wright, of San Bernardino, for my opinion as to its being *Streptanthus Breweri*, to which, in habit and foliage it bears no slight resemblance; and I am confident its place is near it. It was found by Mr. Wright at an elevation of 4900 feet in the San Bernardino Mountains, in 1889.

Ecologically connecting with the last, as well as more or less truly allied to it by the long narrow pods and nearly or quite wingless seeds, are several streptanthoid plants of southern California which for several reasons I decline to refer to *Pleiocardia*. They are still further removed from *Euclisia*. They are perennials also, and have their congeneric affinity, I am persuaded, with such plants as Nuttall's *Streptanthus cordatus* and my own segregates of that. Here also I would place that plant of northern California that is called *S. barbatus*. It falls into none of the genera proposed in this paper; and the whole group of these perennials, every member of which is, I think, foreign to *Streptanthus*, needs to be studied carefully in connection with all those embraced within Mr. Watson's confused and illogical *Cau-*

lanthus. The species have a wide range from away among the Rocky Mountains, throughout the Great Basin, several reaching California, and many are as yet undescribed. They demand an investigation that I can not now give.

There are a few more Californian annuals belonging partly to middle elevations in the Sierra Nevada and partly to corresponding elevations in the inner Coast Range which, in so far as known have permitted to figure as members of the impossible *Streptanthus* of Gray and of Watson. Nor can I consistently refer any one of these to either of those new genera already outlined. One of them is *Streptanthus diversifolius*, Wats. After the manner of typical *Pleiocardia* it bears a few heart-shaped though commonly long-pointed bracts near the inflorescence, though in habit and aspect it is again most unlike these, being tall and paniculate-branched, and exhibiting a most peculiar foliage. The lowest leaves are perfectly entire and linear-filiform. In the middle of the stem are borne a few that are pinnatisect, made up of a filiform rachis along which are scattered a few filiform segments. So far, as also as by the perfect smoothness of and the bluish bloom covering all parts of the plant, it promptly recalls my genus *Sibara* of the Lower Californian coasts and islands. But the flowers have all the general characteristics of the allies of *Streptanthus* when compared, with those of the *Arabis* alliance. The calyx, as to its form, is that of *Pleiocardia*, but the texture of it is that of *Euclyisia*; also the upper pair of stamens are united. The pods are very long, slender, straight and deflexed, and the seeds are wing-margined, the valves being flattened. As representing a genus, I name this fine type

MITOPHYLLUM DIVERSIFOLIUM. *S. diversifolus*, Wats., doubtless including *S. linearis*, Greene; for among the best specimens of the latter, I now perceive one bearing in the midst of its array of long filiform leaves a single pinnatisect one. The segments are so remote and narrow as to easily blind one to the

pinnate character of a solitary leaf, at least in the pressed specimens.

Corresponding to the last in habitat, but having a more northerly range in the Sierra, and still passing for a *Streptanthus*, though of floral character most anomalous in the cruciferæ, is what I wish to designate as

MICROSEMIA POLYGALOIDES. *S. polygaloides*, Gray. The remarkable peculiarity of one large colored banner-like sepal standing nearly upright in expansion, and in bud folded down over all the others and enclosing them, was first described by the writer, Pittonia, ii. 46, and again in the Flora Franciscana, p. 262. Among fifty accomplished taxonomists, perhaps not one, with a mere spike of such flowers before him, and without other evidence, would guess this plant to be a crucifer, or believe it to be such until he had dissected it. It belongs, indeed, in the same tribe of crucifers as *Streptanthus*, but is as remote from that genus as is possible within such tribal limits.

Not as much can be said of the following type, which is apparently as peculiar to the Coast Range as *Microsemia* and *Mitophyllum* are to the Sierra Nevada. The type species is my *Streptanthus barbiger*; and there are two congeneric species known to me that are hitherto undescribed.

These plants have a glabrous glaucescent herbage, and all except the very lowest and somewhat lanceolate and toothed leaves are narrow and entire. The habit, and the spicate flowers are points of contact with *Microsemia*; but the calyx is perfectly that of *Pleiocardia*, being quite as herbaceous and close-fitting, with tips of sepals even more prolonged, recurved and white-margined, but there is no more hint or trace of the rounded bracts subtending the inflorescence here than there is in *Microsemia*, in which latter I am persuaded the plants have, as I think, their nearest ally despite the fact that none of the species show any sign of that strange metamorphosis of sepals characteristic of that type.

Alluding, in the generic name, to habitat of this little group, I name the type species

MESOREANTHUS BARBIGER. *S. barbiger*, Greene, resting it

upon the original plant with hirsute sepals, and excluding what I had guessed to be a glabrous form of it.

M. FALLAX. Slender glabrous glaucous annual freely branched above the base, 1 to 2 feet high: leaves unknown; flowers subsessile and fruiting spikes long and lax: flowers small, the spreading or recurved tips of the sepals very long, equalling or even exceeding the small dark-red white-edged petals: only the upper pair of stamens equalling the sepals, their filaments united to summit, their anthers very small: pods very narrow, compressed but slightly torulose, $1\frac{1}{2}$ inches long, curved downwards on very short spreading pedicels: seeds oval, little compressed, marginless.

Hills above Napa Valley near St. Helena, collected by the writer in July, 1891, and then believed to be a form of the preceding; but the few flowers remaining on one specimen which was at the time given to the U. S. Herb. show clear specific characters, as I now perceive. The other specimens taken were copiously fruiting, but otherwise naked.

M. VIMINEUS. Size and habit of the last, equally glabrous and glaucous: lower leaves narrowly oblanceolate; upper lance-linear, those of the branches narrowly linear, all entire: flowers more showy in long loose spikes: calyx with comparatively short and white-petaloid tips greatly exceeded by the rather ample white petals; pods unknown.

Near Lakeport, Cal., 3 May, 1903, C. F. Baker, the specimens distributed by him under n. 3059 as *Streptanthus vimineus* Greene, n. sp. Here described from two sheets of specimens in my own herbarium.

Laothoe.

Part III of Rafinesque's *Flora Telluriana* must be among the more scarce of that author's publications; and it is one which I do not recall having seen until recently. Consulting that part of the brochure in which he discusses certain gentians, I read on beyond those pages, and came at length to a paragraph in

which he proposes as a new generic type De Candolle's *Scilla pomeridiana*, which I knew to be a familiar Californian plant, commonly called *Chlorogalum pomeridianum*. This last generic name I recalled as certainly not published until a later date than this LAOTHOE of Rafinesque; and a subsequent comparison of the dates results in a showing of seven years of priority for LAOTHOE; and I find that Mr. Jackson both gave this name a place in the Index Kewensis as a synonym, and also remarked its right of priority over the name assigned by Kunth in 1843.

At Rafinesque's date of 1836, only one species was known; but now there are a half-dozen, all having been published under the name of *Chlorogalum*, which can have no other status by right than that of a synonym of LAOTHOE, the recognized species of which are

- L. AUGUSTIFOLIA. (Kell. Calif. Acad. ii. 104).
- L. DIVARICATA. (Kunth. Enum. iv. 682).
- L. LEICHTLINII. (Baker, Gard. Chron. for 1874, p. 689).
- L. PARVIFLORA. (Wats. Proc. Am. Acad. xiv. 243).
- L. POMERIDIANA. (Ker.) Raf. Fl. Tell. iii. 53.
- L. PURPUREA. (Brandg. Zoe, iv. 159).

On Certain Gentianaceae.

Regarding my interpretation of the habitat of Pursh's *Swertia fastigiata*, given on page 72 preceding, I have been persuaded by Mr. C. V. Piper that Pursh must be understood as meaning not on this side, but the other side of the Rocky Mountains; and I have little reason to controvert such an opinion in the presence of one who, like Mr. Piper, has lived and travelled along the route of the Lewis and Clarke expedition, and has particularly studied that route. Admitting, then, the correctness of Mr. Piper as to where the gentianaceous herb in question must have been gathered, it may have to be conceded that Pursh's *Swertia* probably is what high authorities have maintained that it is, namely, *Frasera thyrsiflora*, Hook. Against this view it may be objected that, inasmuch as Pursh

knew the genus *Frasera* and admitted it as good, he could not reasonably have referred to *Swertia* so close an ally of typical *Frasera* as *F. thyrsoiflora*, plainly is. Again: since the *Swertia* of Linnæus which Pursh cites as identical with his own, has pentamerous flowers, Pursh must needs have placed his *S. fastigiata* in *Frasera* on account of its tetramery, if be the same thing as *F. thyrsoiflora*.

Nevertheless, allowance must be made for superficiality and carelessness everywhere; and if Pursh erred as to the plant's having come from the Missouri Flats, he may have failed to examine it closely enough to discover that its flowers were tetramerous and that it was a *Frasera*. Very likely what he saw was at best a mere scrap or two.

But while I should not be surprised were the Montana plant spoken of by me heretofore to be proven, some day, to be Pursh's plant, I will now at least give the type before me a diagnosis, and therewith a provisional name as possibly new.

SWERTIA PARALLELA. Stem simple, stout for the genus, 12 or 14 inches high, with two pairs of cauline leaves, those from the root or rootstock of half the length of the stem, elliptic oblong as to the blade, this tapering to a long petiolar base, all traversed from base of broad petiole to near the end of the blade by about 5 conspicuous whitish parallel veins: inflorescence somewhat congested, its more terminal portion almost thyrsoid: subulate-lanceolate sepals nearly equalling the lurid-purplish not dark-colored corolla: filaments much flattened and oblong-liguliform, obtuse at apex behind the anthers: fruit not known.

Jack Creek Canon, Montana, 15 July, 1896, Rydberg & Bessey, n. 4699 of their distribution as represented in U. S. Herb. (sheet 390186,. Plant more than other swertias resembling a *Frasera*, especially by its notably parallel-veined foliage

Botanizing among the hills of Monroe County, Wisconsin, in early October last, the sight of no autumnal flower of the region was more welcome to me than that of what in boyhood we

were taught to call *Gentiana quinqueflora*. I had not seen it, except in the herbaria, for several decades of years; and my first glance at the plant awakened something like a regret for having, not many weeks before, been betrayed by false descriptions of it in the books, into placing it as a congeneric with those *Amarella* species of the farther West, the memory of whose floral characteristics was and is still vivid.

Those western plants, genuine *Amarella* species, have a corolla-limb that is rotate when expanded, or nearly rotate, so that the corolla is salverform, or nearly that, and, at all events, the limb expands. The same is said to be true of the *G. quinqueflora*, but it is not so. Its corolla is not even truly funnel-form, for its limb is never expanded at all, in the proper use of that term. The whole corolla is tightly closed during almost the whole period of its existence; and the only writer who describes it as if he had seen it with the eye of a botanist, calls it clavate. That is much nearer the truth than any one else has come; a not indistinct angularity of both tube and closed limb being the only obstacle to its being described as clavate.

At the time when these plants are at their best, showing their corollas at full development and at the height of their intensity of purple coloring,—the time when you would take them for the making of the most perfect herbarium specimens—they are not in flower, but long past that period, the corollas already being filled with full grown capsules. At actual flowering the corollas are much smaller, the tips of their segments are separated just far enough to let air and small insects pass within; they do not spread even so far as to become erect; and then, immediately after fertilization of the ovary, the corolla closes, never again to open, but, immediately proceeds to increase to about twice the size it had at actual anthesis.

These things are said confidently and for a certainty, only of the western plant, at page 53 preceding denominated *Amarella occidentalis*; but they probably hold good, in at least some general way, for the other members of what, if I mistake not, is both a good genus, and one embracing several species.

In part III of the Flora Telluriana, page 21, Rafinesque succinctly characterizes this type as a genus, and names it *ALOITIS*; and while feeling compelled to agree with him, even as to the species which he segregates, I must add the characters of several more.

ALOITIS OCCIDENTALIS. *Amarella occidentalis* (Gray), Greene, Leaf. i. 53. Calyx-segments usually lanceolate or oblong-lanceolate, foliaceous, half the length of the corolla, merely acute, by their breadth often nearly or quite closing the sinuses.

Prairie regions of Iowa, Wisconsin, Minnesota and westward.

A. MESOCHORA. Larger plant than the last, with larger foliage and larger flowers but of less branching habit, large plants often simple save as to the axillary pedunculiform branches: calyx with extremely narrow tube, the unequal segments partly linear, partly lanceolate, all setaceously acuminate, the longest of notably less than half the length of the corolla, the sinuses not closed, acute: corolla-lobes with unusually long and slender acumination.

Northern Indiana, also adjacent Michigan and westward to Illinois and Iowa.

A. FOLIOSA. Habit of the last, with very ample foliage: leaves $2\frac{1}{2}$ inches long, half as broad; umbellate flower clusters all subtended by a pair of well developed leaves like an involucre; flowers smaller than in the last; calyx-tube broader, segments partly subulate, partly exactly lanceolate, all very acute, the longest half as long as the corolla, sinuses open, rather obtuse: segments of corolla with short setaceous point.

Known only from along Vermillion River, northern Ohio; E. L. Moseley, 1898.

A. DIVARICATA. Plant very large, evidently about a yard high, widely and almost divaricately branching, copiously floriferous but the flowers often solitary, or in pairs or threes: calyx the smallest in the genus, with very short tube, and not long subulate and subulate-lanceolate acute teeth, the whole less than one-third the length of the not large corolla, this apparently

little or not at all accrescent over the growing ovary, its teeth hardly more than acute.

Borders of woods about Knoxville, Tenn., A. Ruth, October, 1898. Just this plant is figured in the Botanical Magazine at t. 3496, where the reader of the text accompanying the plate will at first read it as if the representation were that of a plant from New York; and this is true partly, but only as to the uncolored dissections of a flower occupying the base of the plate. At the end Sir William informs us that the drawing of the main figure was by Dr. Short, whose type must naturally have been this southern species, as indeed, it shows for itself on a comparison with specimens. In this plate, also, may be seen just what approach to expansion the *Aloittis* corolla makes at its perfection.

Two New Batrachia.

BATRACHIUM BAKERI. Annual in Californian ponds and pools that go dry in summer: stems a foot long or more, nearly naked below, the lower nodes remote, marked by a solitary simple lance-linear leaf or phyllode; proper foliage rather sparse and small, the submersed leaves with short narrow-linear widely divergent on almost divaricate segments not collapsing when withdrawn from water, the uppermost (perhaps also submersed) with truly filiform or capillary segments, these also rather firm, hardly collapsing; stipules of the uppermost broad, appressed-pubescent: flowers very small: carpels 12 to 20 in a depressed-globose head: styles linear but short.

Pools among the hills of the Coast Range near Stanford University, 8 May, 1902, C. F. Baker, distributed under n. 786. Habitat like that of *A. Lobbii*, and strongly marked by a most peculiar and strikingly usneoid foliage.

BATRACHIUM PEDUNCULARE. Stout and low annual, spreading beneath the water in slow streams of the Californian Coast

Range: all the internodes short and whole plant copiously leafy with a capillary-dissected foliage quite exceeding the internodes and not collapsing; peduncles very stout, of half the diameter of the stout branches that bear them, about an inch long, falcate-curved in fruit; petals of the small flowers remarkably long oblong; carpels small, glabrous, sharply keeled and rugulose, tipped with a slender-subulate style and forming a depressed-globose head of about 12 to 20 in each.

Near Lakeport, Lake Co., 9 May, 1902, C. F. Baker: distributed under n. 3062. Remarkable for the stoutness of the whole plant and the prominence of the long thick curved peduncles. Mr. Baker reports that the plants grow singly, not forming masses, in the beds of streams.

Two New *Sophia*.

SOPHIA OBTUSA. Evidently large and freely branching, but root and main stem not seen: branches, foliage and calyx canescently stellate-tomentulose: larger leaves simply pinnatifid, their 7 to 11 lobes oblong, obtuse, commonly entire, now and then crenate-serrate; racemes sessile, short and loose in fruit: pale-yellow petals minute, hardly equalling the sepals: pods very slender, straight, more than $\frac{1}{2}$ inch long, torulose, acute, on ascending pedicels of less than $\frac{1}{2}$ inch and almost filiform.

In the Black Range, southern New Mexico, 1904, O. B. Metcalfe, to be distributed under n. 1074.

S. SERRATA. Bright-green and appearing glabrous, but very sparingly and minutely pubescent under a lens: stem-leaves not seen, those of the branches cut into narrow and remote pinnæ all very acute and serrate-incised: racemes sessile, short and dense: sepals glabrous, thin, yellowish, much surpassed by the yellow petals: pods only 4 lines long, on filiform pedicels of $\frac{1}{2}$ inch or more, commonly incurved, acute, very slender, somewhat torulose.

Same region as the above, and by the same collector; his n 1069.

A Proposed New Genus, Anotites.

Never since thirty-five years ago, when I first began to learn the flora of the Rocky Mountains, was I reconciled to the doctrine that what was then, and is still called *Silene Menziesii*, is truly of that genus. There is no member or group of *Silene* with which it comes at all near being at accord, whether viewed as to its habit or characters; and it would be a *Stellaria*—or *Alsine*—but for the fact that its capsule is five-toothed rather than three-valved; and that one character of the capsule alone seems to have determined its place among the *Silenes* in the book in which it was published; the author at the same time conceding that it was not well in place as a member of that genus. Hooker, as it seems, virtually admitted it to be *sui generis* when, being about to publish it as tentatively a *Silene*, he says: "This species is totally unlike any other with which I am acquainted, somewhat resembling a slender state of *Saponaria ocymoides*; nor indeed does it accord with any of the divisional characters given by Dr. Candolle" (Hook. Fl. Bor. Am. i. 91).

As an excellent generic type, its characteristics may be briefly indicated as follows:

ANOTITES. Perennial herbs of low stature growing singly in tufts, or forming extensive colonies by means of connected long horizontal rootstocks. Leafy stems usually freely dichotomous, the flowers scattered or else in leafy-bracted cymes; the whole habit, inflorescence, and small white flowers those *Alsine* (or *Stellaria*). Petals bifid, without appendages. Capsule subcrustaceous, equalling the calyx, 5-toothed. Seeds small, numerous.

By modes of growth, peculiarities of inflorescence, forms of foliage, characters of pubescence, etc., a number of species bespeak recognition, each from its own geographic and climatic province within a vastly extensive region—almost the whole of far-western North America.

* Species of the Pacific Coast; British Columbia to California.

+ Pubescence retrorse.

1. A. MENZIESII. *Silene Menziesii*, Hook. Fl. i. 90, t. 30. The several stems a foot high or more, firm, nearly upright, loosely leafy and not very many-flowered; leaves oblanceolate to elliptic-lanceolate, acute or acuminate, $1\frac{1}{2}$ to 2 inches long, the internodes as long; stem usually canescent below with a retrorse villous pubescence, this more sparse on the pedicels and branches of the cyme, and interspersed with short spreading gland-tipped hairs; both faces of foliage with a minute and short stiff pubescence mainly retrorse; pedicels an inch long, often not equalling the leaves; calyx delicately hirtellous, its triangular acute or acuminate teeth of more than one-fourth the length of the tube; lobes of the petals linear or oblong-linear, entire.

British Columbia, Washington and Oregon, chiefly or altogether westward and along the seaboard, though there are specimens from Northern Idaho that must also be referred here. Nuttall's *Silene stellaroides* may be distinct from this, but I cannot identify it by his description.

2. A. LATIFOLIA. Plants evidently forming colonies through a system of superficially seated not slender rootstocks: stoutish stems only 6 or 8 inches high, very leafy and with a reduced and very leafy cyme: leaves $1\frac{1}{2}$ inches long and twice the length of the internodes, $\frac{3}{4}$ inch broad above the middle, cuneate-obovate to oblong-obovate and broadly elliptical, cuspidately acute, loosely hirtellous beneath, above almost glabrous, margin runcinate-ciliolate; stem retrorsely pubescent throughout, not even the pedicels with either spreading or glandular hairiness: the few slender pedicels not half the length of the leaves: calyx loosely villous, the oblong-obovate teeth obtusish.

In woods at Yale, B. C. Macoun, 17 May, 1889. U. S. Herb. and Canad. Geol. Surv. n. 61,314.

3. A. VISCOSA. Tufted stems ascending from a geniculate

base, 6 or 8 inches high, leafy below, the cyme nearly naked: leaves deep green, oblanceolate-elliptic, acute, 1 to $1\frac{1}{2}$ inches long, surpassing the internodes and suberect, both faces somewhat glandular and retrorse-hirtellous: stem clothed throughout with very viscid gland-tipped hairs widely spreading, but the lower internodes with also a minute glandless deflexed pubescence under the other kind: cyme contracted, the short pedicels subtended by small bracts: calyx-teeth deltoid-ovate, merely acute or scarcely so: petals small.

Blue Mountains, Columbia Co., Washington, R. M. Horner, 17 July, 1896; type in U. S. Herb.

4. *A. DIFFUSA*. Low, diffusely branched from the base, rather rigid, the plant 5 or 6 inches high, 7 to 10 in breath, not depressed, internodes shorter than the leaves, the latter broadly oblanceolate to elliptical, acute, spreading, bright green and glabrous or merely scaberulous above, beneath rough with short retrorse hairs, these more numerous on midvein and margin; lower internodes rather densely retrorse-pubescent, all from the middle parts of the plant upwards as densely glandular-hirtellous only; leafy bracts of the copious inflorescence not small, elliptic-lanceolate, surpassed by the filiform pedicels; mature calyx turbinate, the tube 10-angled; teeth deltoid, acute.

Type specimens in my own herbarium from Sugarloaf Hill, Modoc Co., Calif., 1894; younger material from the same place in 1895; both by Mrs. Austin.

5. *A. ALSINOIDES*. Low, compact, diffuse, the branches 5 to 8 inches long, very leafy below, floriferous from below the middle, the inflorescence leafy with only small leaves or bracts; stem and branches all weak and slender, retrorsely villous, the pedicels minutely glandular and hirtellous: stem leaves oblong-lanceolate to elliptic, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, those of the cyme less than half as large, obovate, all acute, thin, nerveless, glabrous on both faces, marginally retrorse-ciliolate: pedicels very short, mostly of twice the length of the calyx, this large for the plant, hirtellous, the deltoid acutish teeth villous-ciliate: lobes of the petals broad, nearly obovate.

At 8000 feet in the Soldier Mountains, Idaho, L. F. Henderson, 16 July, 1895. U. S. Herb. Species curiously simulating in a degree, the common Chickweed.

+ + Pubescence spreading.

6. *A. COSTATA*. Low, stoutish, rather rigidly ascending, much branched and with short internodes twice exceeded by the firm light-green ascending foliage; stem with hirtellous and gland-tipped hairs intermixed, none retrorse: leaves oval to ovate-elliptic, faintly feather-veined, scabro-puberulent above, almost hirtellous beneath, minutely and closely hispid-ciliolate; inflorescence terminal and contracted, pedicels less than $\frac{1}{2}$ inch long: calyx-tube 10-ribbed; teeth ovate-deltoid, acute or acuminate: lobes of petals broad, each with a lateral tooth.

Extreme northern California and adjacent Oregon. Species based primarily on my n. 900 from Yreka as in my own herbarium. I have it also from Butte Co., by Mrs Austin, and Kellogg & Harford's n. 83 from Oregon may in part be referred here. It is the only species in which ten quite prominent ribs occur in place of the usual nerves or angles of the calyx.

7. *A. NODOSA*. Stems 6 or 8 inches high, much branched dichotomously from toward the base, all the internodes slender but the nodes more than usually swollen, the many flowers borne above the main foliage: leaves 1 to $1\frac{1}{2}$ inches long, firm, spreading, elliptic-lanceolate, acute, sparsely beset on both faces and more closely so on the margin with spreading mostly gland-tipped short hairs, the stems more densely so clothed and with no retrorse pubescence: slender pedicels and rather long calyx viscid-hirtellous, teeth of the latter deltoid and short: corolla large for the plant; lobes of petals oblong, obtuse.

Wenatchee, eastern Washington, in damp ground along Beaver Creek, Kirk Whited, 17 July, 1896, U. S. Herb.

8. *A. MACILENTA*. Herbage of a vivid green, thin and delicate in texture, but the plants large, a foot high or more, branched from the base, amply leafy and loosely floriferous; the stem with no retrorse pubescence, scantily and delicately hirtellous and

glandular-hairy: leaves very thin but large, elliptic to oblong-lanceolate, $1\frac{1}{2}$ to 3 inches long, acute, sparsely muriculate-punctate above, the points apt to develop short hairs, beneath sparsely soft-hairy, the midvein scantily hirtellous and margin obscurely ciliolate: pedicels filiform, all but the uppermost shorter than their subtending leaves, though more than an inch long: calyx thin, obovoid, deeply cleft, the teeth triangular, acute or acuminate: lobes of the petals oblong: seeds short-reniform, delicately reticulate, the meshes forming an ill defined transverse lineolation.

Moist shades by streams in Eastern Oregon and adjacent Idaho, Leiberg, n. 2443 from Malheur Co., and 867 from Wasco Co., Oregon; but finest specimens by Henderson, Hatwai Creek, Idaho; all as in U. S. Herb.

* * Species of the Great Basin; none with retrorse pubescence.

9. A. HALOPHILA. Stems low, 5 to 7 inches high, sparsely floriferous almost from the base, and very leafy throughout, with thin and delicate but ample foliage; leaves obovate-oblong to elliptical, merely acute, 1 to $1\frac{3}{4}$ inches long, spreading, of nearly twice the length of the internodes, only punctulate above, beneath with a few short hairs, the margin hispid-ciliolate; lower joints of the stem villous and viscid with spreading hairs, the upper and the pedicels minutely glandular-hairy: calyx large, cleft well toward the middle, the lobes triangular, acuminate: petals apparently small.

Desert plains of southeastern Oregon, near Alkali Lake, H. E. Brown, 30 Sept 1896, U. S. Herb.

10. A. DORRii. *Silene Dorrii* Kell. Proc. Calif. Acad. iii. 44 f. 12. Upright, a foot high or less, the slender stems subterete, straw-colored and somewhat shining, only minutely and sparingly hirtellous and glandular, nowhere retrorse-villous, leafy throughout and sparsely floriferous: internodes mostly far longer than the leaves, $1\frac{1}{2}$ to 2 inches long; leaves obovate-

oblong to elliptical, merely acute, thin, light-green, both faces with scattered minute straight hairs, the midvein-beneath and the margins more or less retrorsely hispidulous: calyx strongly 10-nerved, the nerves hirtellous, the teeth long-pointed from a deltoid base.

Exclusively of the Great Basin, chiefly in western Nevada; fine specimens in U. S. Herb. from near Reno, by M. E. Jones, June, 1897; also by L. F. Ward, from Aquarius Plateau, Utah, 29 July, 1875; also at other stations in western Utah by M. E. Jones, in 1894.

* * * Species of the Rocky Mountain region; all with some retrorse pubescence.

11. A. JONESII. Decumbent, widely branching 6 or 8 inches high, the cyme rather distinct but copiously leafy-bracted, lower internodes retrorsely hirtellous (not-villous), all the upper ones clothed with spreading hairs all tipped with an uncommonly large gland: leaves obovate-elliptic to elliptic and elliptic-lanceolate, $1\frac{1}{2}$ to 2 inches long, acute, thin, deep green, conspicuously and closely muriculate-punctate, the points rarely ending in a short hair, both faces usually glabrous, only midvein beneath, and margins uncinat-aculeolate; the ovate and lanceovate small bracts of the cyme glandular-scabrous, as also the short pedicels and calyx; teeth of the latter deltoid, acute, the tube not strongly nerved.

Mountain districts of northeastern Utah and to middle Colorado and northern Wyoming; the type in U. S. Herb. by M. E. Jones, American Fork Cañon, Utah, 28 July, 1880; fragments of apparently larger specimens from Ogden, 1885, by Letterman.

12. A. BAKERI. Low, slender, diffuse though a little rigid and wiry, the tufted stems 3 to 5 inches, mostly simple up to the small and few-flowered but distinct cyme; internodes short, less than an inch long, rough with short stiff deflexed hairs: leaves longer, spreading or ascending, narrowly oblanceolate, acute or acuminate, more or less muriculate-scabrous, the mid-

vein on both faces, also the margin uncinat-aculeolate: pedicels slender, short, rigid, glandular-hirtellous, as also the narrow calyx, this with deltoid hardly acute teeth: limb of petals only deeply obcordate, the lobes being short and rounded, the base of the limb marked by a pair of small scales representing the crown.

Southern Colorado, Baker, Earle & Tracy, n. 37, Mancos, 1898. Also fine specimens from Middle Park, 1891, by Beardslee & Kofoid, in U. S. Herb., and again by Frank Tweedy, from Ridgway, 1895.

13. *A. DISCURRENS*. Low, decumbent, forming colonies by an extensive system of rootstocks all connected, the very slender weak stems decumbent or more depressed, very leafy, with internodes much shorter than the long narrow leaves, the lower villous with more or less definitely retrorse hairs, the upper with a firmer viscid spreading pubescence, but gland-tipped hairs wanting or obscure: leaves thin, oblanceolate, acute, 1 to 1½ inches long, sparsely roughish-pubescent or merely punctulate, but midvein and margin uncinat-hispidulous: flowers very few among the upper leaves, on filiform pedicels not surpassing the foliage: calyx-teeth triangular-lanceolate, almost acuminate: petals bifid, their lobes round-obovate and with a tooth on the side.

Gunnison, Colorado, 23 July, 1901, C. F. Baker, n. 559; also perhaps the same is the Los Pinos plant of Mr. Baker's 1899 collection sent out under 'n. 312.

14. *A. ELLIPTICA*. Extensive underground growth as in the last, the rootstocks stouter, less prolific of aerial stems, these mostly simple, 2 to 5 inches high, retrorsely short-pubescent, the uppermost, as well as pedicels and calyx densely viscid-glandular: leaves thin, elliptical, ½ to 1 inch long, acute, smooth and glabrous on both faces, only the margins and midvein beneath beset with very short uncinat hairs: calyx-teeth ovate, obtuse, ciliolate, the subcylindric tube hirtellous-glandular.

Alpine in the mountains of southern Colorado, on Bob Creek, west of Mt. Hesperus, July, 1898, Baker, Earle & Tracy, n. 272 as in my herbarium.

15. *A. VILLOSULA*. Tufted stems ascending, barely 3 inches high, sparingly branched, few-flowered, the internodes quadrangular whitish-villous with long deflexed hairs; leaves thin, ascending or spreading, $1\frac{1}{2}$ inches long, oblanceolate-elliptic, acute, clothed above with a minute but rather harsh pubescence, beneath especially along the midvein hirsutulous, the margin uncinat-hispidulous: pedicels long, little or not at all surpassing the foliage, villous but not glandular: calyx with hirsutulous tube and deltoid acute teeth.

Dry rocky beds of the Gros Ventre River, Wyoming, 13 Aug. 1881, Dr. W. H. Forwood. Also the same, but less villous, from banks of Wind River, 20 July, same year and same collector; all in U. S. Herb.

16. *A. TENERRIMA*. Very slender, with thin and delicate light-green foliage and long filiform branches and pedicels, the whole commonly 8 or 10 inches high and upright or ascending: stems quadrangular, above sparsely beset with minute spreading gland-tipped hairs, the lower internodes retrorsely villous: leaves mostly $1\frac{1}{2}$ to 2 inches long, ascending, oblanceolate to nearly elliptic, very acute, sparsely and minutely retrorse-aculeolate on midvein beneath and on margin; pedicels and calyx hirtellous and glandular, the latter narrowly turbinate, cleft deeply, the teeth triangular-lanceolate, acute.

Medicine Hat, Assiniboia, J. M. Macoun, June, 1894, n. 3090, Herb. Geol. Surv.; also by the same on Red Deer River, Alberta, 1881, and young specimens at Blackfoot Crossing, Alberta. In slender habit, delicate herbage and scanty pubescence, this far northern plant invites comparison with the still very dissimilar *A. Dorrii* of Nevada and Utah.

17. *A. DEBILIS*. Much branched from the base and low, young plants beginning to flower only 3 or 4 inches high, very leafy and deep green, the stems and branches very slender and weak, obviously if not sharply quadrangular and retrorsely aculeolate, only the short lowest internodes somewhat villous retrorsely: leaves narrowly lanceolate to lance-linear, 1 to $1\frac{1}{2}$

inches long, very acute, aculeolate marginally and along mid-vein beneath, otherwise almost or quite glabrous: only the earliest pedicels seen, these filiform and half the length of the leaves: calyx-tube hirtellous; teeth triangular, acute.

Farewell Creek, Cypress Hills, Assiniboia, J. M. Macoun, 27 June, 1895. Specimens young, but showing very characteristic habit, foliage and pubescence. Seen only in Canad. Geol. Surv. Herb., n. 10124.

18. A. TERETICAULIS. Slender, rather firmly erect, 10 inches high, freely dichotomous from the middle, the inflorescence ample but leafy: stems with no trace of angularity, the lower internodes with but a faint trace of pubescence but that retrorse, all the upper and the pedicels glandular-puberulent: leaves 1 to 1½ inches long, narrowly elliptical, spreading, those of the cyme the same and not much smaller, all sparsely hirtellous on both faces and not more so on the margin: pedicels 1 inch long, filiform: calyx not deeply cleft, the deltoid-ovate teeth abruptly acutish.

Waterton Lake, Alberta, J. M. Macoun, 29 July, 1895, Geol. Surv. n. 10123.

Some New England Persicarias.

Acting upon suggestions made at pages 24 to 50 of these LEAFLETS, Mr. Luman Andrews, of Southington, Connecticut, during the season of 1904, made a collection of perennial Persicarias, such as perhaps no other individual has gathered in a lifetime, viewed from the standpoint of its utility as helping toward the solution of hard problems first shown to exist, and await solution, in the pages just indicated. His gatherings, with the exception of one day's collecting at Springfield, Massachusetts, all were made within the State of Connecticut and near Southington.

To the copiousness of the very admirably made specimens,

Mr. Andrews had added many notes throwing full light upon the habitats and the habits of such of these plants as have been found within his own field of observation. These field notes I shall here print, under quotation marks; having in mind not only their eminent usefulness as helping to understand the forms of *Persicaria* in the Connecticut valley, but also models of field-note making for any who, in other sections of the country, may interest themselves in the study of the group.

P. FLUITANS (Eaton), Greene, Leaflet, i. 26. Quite typical specimens, taken from Flander's Pond, Southington, 6 Sept., 1904. Mr. Andrews remarks: "The plants were all growing in the water of an artificial pond, the leaves and stems all floating. Even when starting near the shore, or at the water's edge, they invariably took to the water and not to the shore. There were no muddy-shore plants or indications of them."

This interesting note gives not the least promise of any fulfilment of the prediction which I hazarded in my last paragraph upon this species on page 27.

P. COCCINEA (Muhl.), Greene, Leaflet, 35. The straggling riparian state described at the top of page 35 is sent by Mr. Andrews, from about Tyler Pond, Southington, 4 Sept. 1904. "Only one colony, on the border of a small natural pond; the soil a sandy loam. This colony was growing on ground dry at the time, but well within the limits of the water when the pond is at its height. In other years I have known this colony to extend quite around the pond and to flower profusely."

More noteworthy, however, is a series from Springfield, Mass., 18 Aug., 1904, all the plants sterile, the interest centering in some obviously prostrate branches which, by certain familiar characteristics of the leaf, would at first view seem to make it certain that they had been floating leaves. We had hitherto met with no such prostrate branch with aquatic-looking foliage in this common species. But here is Mr. Andrews' distinct attestation that these were not, as he found them, floating leaves: "Shores of water shop pond; some growing on a grassy border, some on the muddy shore; but none were seen in the water

or very near its edge. Those that grew on the muddy shore can easily be recognized." What makes these so readily recognizable is, of course, their smooth and glossy oblong unpointed foliage on elongated petioles; just the contrast one notices between leaves of aquatic and those of terrestrial growth in these plants. Now these branches and foliage are so precisely aquatic, in aspect, that without my correspondent's word to the contrary, I should have believed them to belong to some other plant than *P. coccinea*, which species is not otherwise known to me as having an aquatic state, though in a considerably altered riparian condition it is not rare. Scrutinizing one of the best of these specimens from end to end and leaf by leaf, by aid of a lens, I read its history; and the reading at once verifies my correspondent's statements as to what he saw on a certain day, and yet reveals another fact confirming my strong impression that what I had before me was practically an aquatic branch, at least, as to a part of its growth. The specimen is 10 inches long and has 7 well developed leaves. The 3 leaves occupying the lower half of the stem have all the marks of the aquatic *Persicaria*. They are perfectly glabrous beneath, even to the midvein, and they have the long slender petioles usual to floating *persicaria* foliage. These 3 leaves of the branch were developed earlier, and manifestly at a higher stage of the water in the pond, so that for the time this branch and its leaves were floating in shallow water. From the middle of the branch it changes from the horizontal in direction, curving upwards, and its leaves lose one by one that peculiar outline which the aquatic ones have, become more and more like the terrestrial leaf-form, and they acquire as gradually the traces of pubescence, even on the midvein beneath. Here, then, is clearly written the history of a subsidence of the waters of the pond in the later summer, so that what had been aquatic branches with floating leaves, were found to be riparian in the autumnal season.

This aquatic foliage of *P. coccinea* presents some points of clear divergence from that of any other; but I shall reserve the diagnosis for some future time, hoping, meanwhile, for a

repetition in some other locality of Mr. Andrews' very interesting discovery.

P. NOVAE ANGLIAE, Greene, l. c. 34. This was practically founded on a single Massachusetts specimen, and that without a word or hint on the label, as to either the habitat of the plant, its height, or anything else that would have helped an investigator; but the long petioles, the great size and thin texture of the leaves, together with the absence of pubescence, were characters precluding the idea of its being a state of *P. coccinea*, or of any other recognized species, and so I had to assign it specific rank.

Mr. Andrews collected it from Lily Pond, Southington, 23 Sept., 1904, copiously; and while the specimens were taken late in the season and therefore exhibit a well matured foliage somewhat firmer in texture, and not quite so nearly glabrous, yet in other points the type specimen is perfectly matched in not a few of these; and the collector's account of the strange habitat and extraordinary dimensions of the species tends to confirm it in the rank of a species. There were sent me, for study, 18 sheets of specimens, along with the following information: "All these plants were growing in the water with upright stems, some reclining upon bushes and attaining a height of 4 or 5 feet or more, the bright flowers appearing at the top above the bushes, some nearly 30 or 40 feet from the shore. There was no indication of floating stems or leaves. None were along the muddy shore, but all were growing in the water. The pond is a natural one, with no inlet or outlet, maintained by springs. Its waters are clear, and vary but little in depth throughout the season."

P. HARTWRIGHTII (Gray), Greene, l. c. 46, apparently to include *P. abscissa*, Greene, l. c. Mr. Andrews makes several collections of this, both in flower and sterile. The first of these is from Cusent Lake, at Southington, which is said to be "an artificial lake on trap soil," and the "plants grew in grass land, but within reach of high water." The flowering specimens are remarkable as being destitute of that rim to the ocrea which has been supposed to mark most clearly *P. Hartwrightii*;

but on all the sterile plants it is fairly developed.

The second collection is a copious one, showing wide diversity of foliage, pubescence, and ocrea-rim, and, most welcome of all, some aquatic stems with floating foliage; this a new thing for *P. Hartwrightii*. The locality and conditions are thus described: "Shuttle Meadow Lake is a body of water some 200 acres in extent, owned by the city of New Britain and used for municipal purposes. In one section are several small colonies of this plant, all on dry ground, growing with other vegetation, but within reach of high water. No plants were seen, either on the muddy shores that were two or three rods away, or in the water. You will notice that some of the stems have leaves of a different form, but nothing like the floating leaves of other localities."

In the ample series from this station, while there are flowering stems with well developed herbaceous border to the stipule, there are others in which it is much reduced, and some in which it completely fails; and, while all these Connecticut specimens are much farther from being glabrous than are the originals from the New York habitat, and in so far approach *P. abscissa*, yet I doubt, now, altogether, the validity of that species.

The specimens to which Mr. Andrews adverts as having different leaves were certainly, at an earlier date and when the lake was higher, submersed as to their stems, and the leaves floating; and these leaves that once floated have the long slender petioles and glabrous shining blades usual to this state; but here in *P. Hartwrightii* such foliage tapers to the petiole, instead of being truncate or subcordate as in the aquatic state of every other known to me.

P. ANDREWSII. Flowering stems a foot high, upright, but from a prostrate base that takes root at the nodes: leaves ascending on short petioles, not large, mostly 3 or 4 inches long, exactly lanceolate, acute, rather firm, glabrous above, or else scabrous toward the margin, this always scabrous, as also the midvein beneath, with short appressed hair-points; ocreae rimless, rough with a short strigose hairiness: spike mostly solitary,

short, as also its peduncle, this very rough with short strigose points and glandless.

Sterile low riparian state with leaves no larger, thinner, altogether glabrous except us to margin and the midvein beneath, these much less emphatically scabrous than in the flowering plants.

Aquatic state sterile, the floating leaves larger, 4 inches long or more, subcordate-oblong, acutish, glabrous in every part, even marginally; petioles stouter than in aquatic states of other species but 2 inches long.

This is the smallest species of the group that I have seen, as to the height of the land plant, the size of its leaves and also of its spikes. It is even smaller than many of the common annual *Persicaria*s as to foliage, inflorescence, and even as to stem. It is from what Mr. Andrews calls Misery Swamp, near Southington, 21 Sept., 1904, which my correspondent describes as "a wet meadow of possibly six acres, with a small slow stream running through it. This meadow is so wet as to require the use of rubber boots to get about in it; there being many pools of water of varying size, and the land between them very wet. The plants were quite numerous all about the meadow, some standing in the pools of water, some on the drier land, others along the banks of the stream where they often extend down into the water and assume a floating form of stem and leaves. But very few flowers were found."

I must add that under the same cover containing the new species, were a number of sterile stems of *P. Hartwrightii*, showing that this also inhabits the same swamp.

What is *Nuttallia Davidiana*?

In a lately offered recension of *Osmaronia* (Pitt. v. 309) I made no note of *Nuttallia Davidiana*, not being able to identify it as a species of that genus. The name makes its first appearance in the *Kew Index*, where it is credited to Baillon;

but this is merely inferential. That author did indeed describe, from insufficient herbarium fragments, what he called "*Exochorda? Davidiana*" (Adansonia, ix. 149), concerning which he said, at a later date (l. c. xi. 328) that it ought to be referred to *Nuttallia*; that the seeds of the shrub as grown in the Paris Garden, and which he had been told had come from Mongolia through the hands of the Abbé David, had really been received from the United States.

Considering the shrub to be a *Nuttallia*, it is evident M. Baillon did not believe it to be the one species up to that time recognized, *N. cerasiformis*; and from the characters assigned the foliage it can not have been that; for the leaves are to be glabrous on both faces, and their margin crenulate. This last character is one of a nature to throw doubt upon the correctness of referring the shrub to the North American genus; for the foliage of ours is entire, though with the exception that in very young leaves of one of the newly proposed species, *O. demissa*, the margin is narrowly revolute and crisped, even appearing somewhat erose. The foliage in M. Baillon's type fragments was that of the flowering period, consequently not half grown. Very possibly, then, *Nuttallia Davidiana* of the Kew Index and my *O. demissa* might be proven identical; but the evidence is wholly insufficient; and so I declined, in my recent paper, to cite the Kew Index name at all.

Three New Heucheras

H. PACHYPODA. Rhizome stout, subligneous, strongly invested by a coat of dead leaf-bases: leaves very small, in a compact tuft, firm, more or less pubescent on both faces, suborbicular, hardly $\frac{1}{2}$ inch broad, the petioles about as long: slender wiry scapes 6 or 8 inches high including the inflorescence, purple, scaberulous and slightly glandular: panicle 3 to 5 inches long, subracemose and more or less definitely unilateral, the few flowered branches remote: calyx somewhat gibbously turbinate,

the tube glandular, this and the oblong obtuse green-tipped segments of about equal length: stamens and petals of about equal length and well exerted.

Lone Pine, Inyo Co., California, 1897, at 7,000 feet; M. E. Jones. Type in U. S. Herb.

H. VERSICOLOR. Rhizome short, stout, fleshy rather than ligneous: leaves all nearly orbicular, slightly longer than broad, the basal sinus open but not rounded, $1\frac{1}{4}$ to $1\frac{3}{4}$ inches broad, thin, glabrous above, nearly so beneath, the margin sparsely and unequally setaceous-ciliate; petioles sparsely hirsute: scapes slender, naked, short, bearing the inflorescence only a little, or even not at all, above the foliage, the whole plant, though of large parts, only 6 or 8 inches high; thyrsoid and narrow inflorescence completely unilateral, 3 or 4 inches long, the small bracts simple or trifid, of linear-lanceolate cut, purplish: calyx turbinate, the segments longer than the tube, ovate-oblong, pinkish and green-tipped, after flowering changing to rose-red: petals minute or wanting; several stamens apt to be infertile and the filament wide and petaloid.

On damp shady bluffs in the Black Range, New Mexico, 9500 feet, 3 Aug. 1904, O. B. Metcalfe, n 1203. Both these Hencheras are allies of *H. rubescens*.

H. LEPTOMERIA. Rhizome stout, fleshy rather than ligneous, leaves subreniform-orbicular to orbicular or slightly elongated, $1\frac{1}{4}$ to $1\frac{3}{4}$ inches broad, glabrous above, sparsely setulose along the veins beneath and around the margin; petioles loosely hirsutulous and minutely glandular: scapes slender, naked, a foot high, glabrous; rachis of the narrow but open panicle and the pedicels sparingly minute-glandular: calyx acute at base and narrowly turbinate, the segments little more than half as long as the tube, ovate-oblong, obtuse: petals as long as the stamens, the blade linear on a long filiform exerted claw.

Organ Mountains, New Mexico, 17 Sept., 1893, E. O. Wooton, as to the type specimens in U. S. Herb. Other specimens, but with stouter peduncles, and calyx a little less narrow, were obtained in the same range of mountains by Mr. Wooton, 1 Sept., 1897.

The Genus *Radicula*.

It has always been with reluctance, and under a mental protest, that I have in recent years employed the generic name *Roripa*; for I have known that this genus of the yellow water-creesses obtained its first recognition as a type distinct from the common water-cress, with Dillenius; and that this author assigned it the generic name RADICULA (Dill. gen. 121 (1719); Hill. Brit. Herb. 264 (1756); Moench, Meth. 262 (1794). This name, then, by law of priority, is the only name the type can claim under that law; and, as I long since determined to employ this name in a monograph of the North American Cruciferae, which I may hope to issue in no very distant future, the present paper, in which I shall merely indicate the names of our species under the rightful generic caption, will be in nature allied to several others already published in the current volume.

Of course, the "R." initial to each of the following paragraphs stands for RADICULA. When there is occasion to cite *Roripa* its synonym, it will be cited in full.

There is no need of repeating here the species listed under the correct name by Moench.

R. SINUATA.	Nutt. in T. G. under <i>Nasturtium</i> .	
R. SESSIFLORA.	Nutt. l. c.	" "
R. LYRATA.	Nutt. l. c.	" "
R. OBTUSA.	Nutt. l. c.	" "
R. POLYMORPHA.	Nutt. l. c.	" "
R. LIMOSA.	Nutt. l. c.	" "
R. CURVISILICUA.	Hook. Fl.	" <i>Sisymbrium</i> .
R. SPHAEROCARPA.	Gray, Pl. Fendl. under	<i>Nasturtium</i> .
R. CURVIPES.	Greene, Pitt. iii.	" <i>Roripa</i> .
R. OCCIDENTALIS.	Greene, Fl. Fr.	" <i>Nasturtium</i> .
R. DICTYOTA.	Greene, l. c.	" "
R. MULTICAULIS.	Greene, Pitt. iii.	" <i>Roripa</i>
R. TENERRIMA.	Greene, Eryth. iii.	" "
R. CALYCINA.	Engelm. Warren Rep.	" <i>Nasturtium</i>

R. NUTTALLII.	Rydb. Fl. Mont.	under	<i>Roripa</i>
R. ALPINA.	Rydb. l. c.	“	“
R. WALTERI.	Ell. Sk.	under	<i>Sisymbrium.</i>
R. COLUMBIAE.	Howell, Fl.	under	<i>Roripa.</i>
R. PACIFICA.	Howell, l. c.	“	“

Segregates of the Genus *Rhus*.

No taxonomic problem is easier, no fact more thoroughly established, than the identity of the original species, i. e., the type species of the genus *Rhus*; because during more than a dozen centuries before even Tournefort, the species was but one, and that familiar to all writers about plants as the variously useful shrub of the whole Mediterranean region commonly called *Rhus*, but also long before Linnæus written of under the binary name of *Rhus coriaria*, which name he also adopted. The genus was all this while supposed to be monotypical; *Rhus coriaria*, the only *Rhus*. This fact is so easily apparent in bibliography, that there is no room for any controversy as to what is the type of the genus; and neither Tournefort nor Linnæus, with the genus in view, could well have done otherwise than they did in placing it first in the list of species; placing it as the type.

In the seventeenth century the genus received two indubitable accessions from North America in the shrubs now known as *Rhus hirta* and *R. glabra*. Nobody questioned or doubted that these were of that genus. But along with these importations from our shores came the Poison Ivy; a type which no authority did at first, or for a long time after, think of as possibly to be associated with *Rhus* congenerically.

Tournefort, before the end of the seventeenth century, proposed for the two forms known to him the rank of a genus, which he very fitly named *Toxicodendron*. Linnaeus suppressed the genus; but Philip Miller promptly restored it; and several more since Miller's time have insisted on its validity as a proper genus, so that now it bids fair for permanent recognition in the taxonomy of coming years.

A recension of the species of TOXICODENDRON is no easy task; so far from easy, I find it one of the most difficult I have hitherto undertaken. The best treatment of the genus extant, as to the early and typical species, is that of Dillenius in 1732. Linnæus twenty years later, as his custom was, reduced the genus to *Rhus* and confused the species. Philip Miller sixteen years after this restored the genus, and also the Dillenian species of it, adding excellent descriptions of two or three new ones. In these two classic revisions of Tournefort's TOXICODENDRON, and not at all in Linnæus, lie the means of identifying all the species early recognized.

The following represents my present understanding of the names and principal synonymy of the known species.

T. VULGARE, Mill. Dict: (1768); Moench, Meth. 73 (1794.)

Hedera trifolia Canadensis, Cornut. Canad. 96. Toxicodendron vulgare latifolium, Dill. Elth. 389 (1732).

Rhus radicans, Linn. in part. excel. vars. β or γ ; Small, Fl. 727 in part.

This type species of the genus will have to rest, in the future, as it did with Tournefort, with Dillenius, with Linnæus and and with Philip Miller, on Cornut's Hedera or trifolia Canadensis, of which the Cornutian description is fair, and the figure excellent. According to all the authors down to and including Miller, it is a shrub that is often upright and rootless above ground, but sometimes fixing itself to rocks, walls and fences, though never climbing high on trees; its leaflets ovate, perfectly entire, glabrous, or very nearly so; always with a large fruit and this peculiarly depressed-globose, being distinctly broader, even by its least diameter, than high. This last character is clearly brought out in Cornut's plate, though I am to be the first to mention this mark; and there is no other species in which this fact holds.

Miller seems to have declined to adopt for this the Linnæan name *radicans*. There were two reasons for this course. The Linnæan "species" was an aggregate of three or more; and Dillenius' name *vulgare* had priority in its favor. In Miller's early day they had not learned that the law of priority was a dead letter anterior to the year 1753.

I must not be understood as reasserting the statements of early authors that in *T. vulgare* the leaflets are always entire. In the herbaria they are shown to be prevailingly so, but with occasionally entire and somewhat toothed leaflets on the same branch, or on the same leaf.

T. vulgare seems to be the common species in Canada, New York and New England, extending also both southward in the mountains, and westward toward the valley of the Mississippi.

T. GLABRUM, Mill. l. c.

Toxicodendron rectum, foliis minoribus glabris, Dill. Elth. 389, t. 291. *Rhus radicans* var. γ . Linn. Sp. 266.

According to both Dillenius and Miller this is a shrub with strictly upright stems, never rooting or attaching themselves to any support, and with a foliage smaller and leaflets narrower than in *T. vulgare*. It is not always low. With Miller it grew to the height of 6 or 7 feet. It should be distinguished from *T. vulgare* by these marks and by its small fruits more nearly globose, not at all depressed-globose, and by being cuspidate-mucronate.

The habitat of *T. glabrum* is probably northeastern, and that of *T. vulgare* approximately or altogether the same. From the name *glabrum* alone, the authors of the Kew Index seem to have inferred—but very erroneously—that this must be a synonym of *Rhus glabra*, Linn. They might have escaped this error either by reading Miller's description of *T. glabrum*, or by consulting his account of *Rhus* in the same volume; for the real *R. glabrum* is found in its place and with that name.

T. PUBESCENS, Mill. Dict. (1768), excluding the synonym "T. triphyllum glabrum, Tourn.," also Moench, Meth. 73.

Rhus Toxicodendron, Linn. Sp. 266, hardly of Small, Fl. 727.

A common shrub of the northern and middle Atlantic states, distinguished from both the foregoing by its more constantly sinuate-lobed leaflets, perhaps, but by the hirsute pubescence of the growing parts, especially of the leaves along the veins beneath. It is plain that Miller inadvertently cited the wrong Tournefortian species under his *T. pubescens*. It should have been—and I doubt not he meant it to be—not the first but the

second of the two Tournefortian species, the one quoted by Linnæus himself under *R. Toxicodendron*, of which species Miller's *T. pubescens* is meant to be an exact synonym. He was unable to perpetrate a duplicate binary name; and I also leave that task to whomsoever it may be a welcome one. That the species is to be identified with some dwarf plant of the southern seaboard (see Small, Fl. 727) is a proposition for which I can find no warrant. Miller, whose knowledge of these shrubs was far more perfect than that of Linnæus, says that the present species "grows naturally in many parts of North America;" also that it is among the larger kinds. Even Linnæus gave it a range from Virginia to Canada.

T. RYDBERGII. *Rhus Rydbergii*, Small, in Rydb. Fl. Mont. 268, in part. Well distinguished by Mr. Small, for the plant of Montana, occurring in Wyoming, mountain districts of Colorado, southward even to New Mexico, apparently, but hardly including that of Washington and Oregon.

T. MACROCARPUM Apparently low, upright, not very stout, the small leaves on slender elongated petioles, all parts wholly glabrous: leaflets subequal, small, the terminal one with petiole more than $\frac{1}{2}$ inch long, the laterals almost sessile, all three of equal size and ovate, either abruptly acute or subtruncate at base, acute at apex, entire or with a few coarse teeth, the largest not exceeding 2 inches long, of a light dull green and a firm texture: panicles small and reduced to little more than a simple raceme, not erect, the rachis being slender and the fruits, though few, the largest in the genus almost exactly globose, the epicarp uncommonly thin and fragile, not wrinkled, almost free from the usual striæ.

Known only from extreme Western Kansas well upon the arid region of the Rocky Mountain basal plain; the type specimens in U. S. Herb. from near Syracuse, 11 July, 1893, by C. H. Thompson.

T. NEGUNDO. Branches of the season red-brown and hirtellous, the older dark-brown, glabrate, closely and minutely lenticellate: leaves very large, the terminal 5 or 6 inches long, 3 to 5 in breadth, ovate, abruptly acuminate, with a few coarse

teeth or small lobes about midway, otherwise quite entire, dark green above and there glabrous except a minute but rather dense curled pubescence on all primary veins, beneath paler, the veins by no means sparsely hirsute with straight and rather coarse spreading hairs: fruits uncommonly small, subglobose but the length distinctly greater than the thickness, not umbilicate, capitellate-mucronate, very smooth and shining, neither obviously striate nor wrinkled.

Low woods in Riley Co., Kansas, J. B. Norton, 28 Sept., 1895, as in U. S. Herb., a fine fruiting specimen; also the same in flower, from the same station, 1896, the date not given. Fine species with altogether peculiar small fruit, and very large foliage strongly recalling that of *Negundo*.

T. LONGIPES. Leafy branches reddish loosely puberulent and obviously lenticellate, the older brown, glabrous and the lenticels obscure: leaves small, on remarkably elongated petioles, these very firm and erect, 4 to 5 inches long, the length of the leaflets less than 2 inches, the terminal mostly on a petiole conspicuously shorter than that of the laterals, all the leaflets broadly ovate, cuspidately acute, coarsely and quite regularly serrate-dentate from near the base up to the apical cusp, dull pale green on both faces, wholly glabrous beneath, almost so above, but with a few strigose hairs on the surface, becoming more numerous at the margin: fruits of middle size, spherical, neither striate nor wrinkled nor shining but straw-colored and unpolished.

Species from a cañon south of Glenwood, Utah, collected by L. F. Ward, 12 June, 1875, as in U. S. Herb., and a remarkable one in respect to characters both of foliage and fruit.

T. HESPERIUM. Stems and foliage in every way twice the size of those of *T. Rydbergii*, the petioles greatly elongated: branches of a fine pinkish brown the first season, glabrous or nearly so, striate-angled, closely and finely lenticellate: leaves of very firm texture and vivid-green, the leaflets commonly round-ovate, 3 or 4 inches long, 2 or 3 in width, subtruncate or rounded at base, cuspidately acute, either quite entire or coarsely toothed, the teeth more often inclining to crenate than serrate,

the upper face glabrous, the lower also except a few hirsute hairs along the larger veins: fruits large but not of the largest, distinctly round-oval, even almost acutish at summit, shining, striate but not wrinkled.

The common, and, perhaps, the only member of this group in eastern Oregon, Washington and adjacent Idaho, the type being Kirk White's n. 241 from Wenatchee, Washington, 16 Aug. 1896, as in U. S. Herb. When *T. Rydbergii* approaches the dimensions of this, as it rarely does, it is readily distinguished by two characters of its fruits, for they are globular, not ovoid, and are turgid and strongly wrinkled irregularly instead of being smooth and striate.

T. DIVERSILOBUM. *Rhus diversiloba*, Torr. & Gray, Fl. i 218. This represents a peculiar type of *Toxicodendron* belonging exclusively to the Pacific coast. The leaflets and their lobes are in general rounded and obtuse rather than angular and acute; the panicles in the original as well as in most of the specific segregates, lax and pendulous, each fruit suspended on a rather long and slender pedicel.

But several inland species have their panicles as rigidly erect as in the Atlantic type of the genus. Typical *T. diversilobum* is from the lower Columbia, and is figured well in Hooker's Flora. The species seems to extend along the seaboard southward throughout western Oregon and California to about Monterey, exhibiting much diversity as to the lobing of the leaf, though the general outline of it remains the same. But south of Monterey other well defined species appear, and still more of them away inland among the mountains bordering arid regions in California, Oregon and Washington. Some of these, of which fair specimens occur in the herbaria, are here named and defined.

T. LOBADIOIDES. Evidently upright, stont, not angular, the bark of growing branches velvety-puberulent, of the older glabrate, lenticellate: leaflets all round-ovate, acute, evenly serrate above the middle, below it entire, $1\frac{1}{2}$ to 2 inches long, 1 to $1\frac{1}{2}$ inches wide in the middle, dark green and with scattered appressed hair-points above, beneath paler and more or less hairy

along the veins: flower-clusters many, simple and racemose, or slightly paniced; fruiting panicles spreading but not pendulous or even nodding: fruit not seen.

A remarkable species, as seeming ambiguous between the Atlantic and Pacific types of the genus. Mr. Suksdorf, who collects it in rocky places along the Columbia east of the Cascades, and therefore on the borders of the arid region, distributes it for "*R. diversiloba*," which it certainly is far from being. Its foliage is that of *Lobadium*, i. e. *Schmalzia*.

T. CORIACEUM. Very stout rigidly upright stems minutely and sparsely puberulent and minutely lenticellate: leaves subcoriaceous or almost hard-coriaceous, dark olive green, pale beneath, both faces almost or quite glabrous; leaflets very large, ovate to round-ovate, obtuse or acutish, usually quite entire, only here and there a leaflet with a serrate tooth or two on one side, the largest and broadest $2\frac{1}{2}$ inches long, $2\frac{1}{4}$ inches broad, none much shorter and none narrow: panicles merely ascending, the branches and pedicels short and rigid: fruits of the largest, depressed-globose; epicarp polished and striate, and under a lens minutely, sparsely, but distinctly hispidulous.

A single excellent specimen in U. S. Herb. exhibits all the above pronounced specific characters. Its home must be at least on the borders of arid eastern Washington, where it was collected by Mr. Suksdorf in 1885, but just where, the label fails to indicate.

T. COMAROPHYLLUM. Stems upright, leafy branches light red-brown, obscurely puberulent, well marked with small elliptic lenticels: leaflets obovate-deltoid, the terminal 1 or 2 inches long and petiolulate, the laterals half as large, sessile, all entire except around and across the nearly truncate apex which is almost as broad as the leaflet's length, here crenate-toothed, the upper face dark-green, the lower pale, both glabrous: fruit in loose pendulous clusters both notably compressed and elongated, being round-oval, but obtuse, the epicarp very thin and fragile, delicately puberulent: putamen strongly striate.

From Tighe's, near San Diego, Calif., Dr. Edw. Palmer, 1875. The inverse-deltoid leaflets, dentate across the summit, are much like those of most strawberry leaflets; hence the name.

T. ISOPHYLLUM. Stoutish upright striate stems velvety-puberulent not only the first but also the second and third seasons: leaves palmately trifoliolate, the leaflets being equal in size and all three sessile, 1 to 1½ inches long, of somewhat obovate general contour but pinnately sinuate-lobed, the rounded lobes not deep, but in about 3 always opposite pairs, dark green above, yet dull and with a glaucous hue, paler beneath, with very few and scattered appressed hair points on both faces, but between the veins, not along them: fruits small, the epicarp not polished but dull and muriculate-punctate as well as somewhat pubescent, the roundish but notably compressed putamen ribbed and striated.

River banks near San Jacinto in southern California, 9 March, 1898, J. B. Leiberger, n. 3117 as in U. S. Herb. Most distinct from all others by the sessile terminal leaflet; the lobing also not imitated by any other forms in the *T. diversilobum* aggregate.

T. OXYCARPUM. Twigs smooth, free from angles and lenticels, slightly puberulent: leaves thin, very large, the terminal leaflet 3 to 4½ inches long, oval, coarsely and evenly crenate-lobed, the laterals smaller, inquilateral, entire on the narrower side, on the other lobed like the terminal, deep green and glabrous above, beneath paler, with a few hirtellous hairs along the veins and on the margin: inflorescence paniculate but the branches of it only two or three and very short: fruit on slender pedicels and pendulous, notably compressed and of singularly oblique-rhomboid outline, tapering turbinate from above the middle to the base, the upper part more abruptly acute, epicarp not striate, but irregularly sharply and deeply wrinkled, minutely hirtellous-puberulent.

Vicinity of Santa Cruz, Calif., July, 1884, John Ball; type in U. S. Herb. Also from the Salinas Valley, back of Monterey, Aug., 1880, G. R. Vasey. I suspect the shrub of having the climbing habit. Its habitat is in the redwood forest.

T. DRYOPHILUM. Dendrophilous, climbing trees to the height of 20 feet: branches puberulent, knotted by salient protuberances under the insertion of the leaves: foliage large, 6 to

8 inches from the base of petiole to apex of terminal leaflet, the leaflet $2\frac{1}{2}$ to 4 inches long, often 3 in width, of oval or ovate outline, coarsely but not deeply crenate-lobed but the lobes all abruptly acutish, the texture thin even in autumnal maturity, of a deep rich green above, paler beneath and with slight pubescence along the veins: inflorescence a simple raceme in the axil of every leaf, never paniced, the fruits seldom more than 2 or 3 to each raceme, but pedicels slender and drooping: striae of fruit indistinct, obscured by a strong very irregular wrinkling of the whole epicarp.

Little Chico Creek, Butte Co. Calif., Mrs. R. M. Austin, 1896, both early summer and late autumnal specimens, reported to sustain itself to the height of 20 feet on oak trees.

T. VACCABUM. Stems slender, upright, the branchlets not striate, obviously knotted by small infrapetiolar protuberances, densely puberulent: leaves of the smallest, the leaflets from $\frac{1}{2}$ to 1 inch long, rather deeply and angularly 5-lobed, dark green and glabrous above, paler and pubescent beneath especially along the veins: inflorescence a simple ascending and rather long raceme in the axil of each leaf: staminate flowers very small, with short subquadrate anthers on still shorter filaments: fruit unknown.

Cow Creek Mountains, Shasta Co. Calif., Baker & Nutting, 1894. This shrub can be compared with no other species of the genus. It is unequivocally of the *diversilobum* group, but, with its long slender upright racemes of small flowers, and its sharply angled foliage, it looks more like a currant bush.

T. DIVARICATUM. Branches only sparsely leafy, elongated and curved, the shrub, perhaps, reclining or trailing but not rooting, the bark greenish-gray, minutely hirtellous: leaves elongated and long-stalked, the whole 6 to 10 inches long; leaflets subcoriaceous, entire, deep-green and glabrous above, beneath with villous midvein but otherwise nearly glabrous, the terminal ovate, acuminate, 2 to 4 inches long, the pair remote from it, smaller, very inequilateral: panicles small, sessile, neither erect nor ascending but spreading divaricately: fruits very small, depressed-globose: epicarp polished, not wrinkled, only faintly striate.

A Lower Californian species, collected by Purpus and distributed for a variety of *T. diversiloba*, to which it is in no wise related. It may represent a Mexican type of the genus, and one farther removed from the Californian type than is even Atlantic slope *Toxicodendron*.

T. PHASEOLOIDES. Akin to the last, but at least sometimes rooting at the nodes and climbing, the internodes not elongated but leaves and flower-clusters approximate: leaflets rhombic-lanceolate, abruptly acuminate, entire or coarsely dentate: panicles short, ascending: fruits larger, spherical, not depressed.

Turucahi, Sonora, Mexico, C. V. Hartman, n. 102, of the 1894, collection, as in U. S. Herb. No. 589 of the same collection, from St. Diego, 1891, is probably the same.

T. LAETEVIRENS. Stems long and slender, not upright, more or less geniculate, rooting at some nodes, the bark light gray, puberulent: foliage copious, large, of a peculiarly vivid light-green: leaflets thin, ovate-lanceolate to lanceolate, acuminate but the very apex obtuse, entire or more or less plainly sinuate-lobed, the terminal 2 to 3 inches long, the laterals shorter and unequal-sided, both faces glabrous but the petioles pubescent: panicles slender, ample and many-flowered, erect or ascending: fruit unknown.

Santo Catalina Mountains, Arizona, 5 May, 1894, J. W. Toumey.

T. ARIZONICUM. Slender as the last, the branches tortuous but not geniculate, neither showing only aerial roots: leaves larger, dark green, firm and subcoriaceous, the leaflets elongated-oval, abruptly tapering to an apex, nevertheless, very obtuse, the terminal $2\frac{1}{2}$ to $4\frac{1}{2}$ inches long, the pair not very inequilateral, all entire, glabrous above, hirtellous along the veins beneath but hardly as to the petiolules: panicles small, seldom of much more than one raceme: fruit unknown.

Fort Huachuca, Ariz., spring of 1890, Dr. Edw. Palmer.

T. EXIMIUM. Branches long, slightly tortuous, evidently more or less reclining, only the growing parts seen, these not striate, greenish-gray, velvety-puberulent: leaves 5 or 8 inches long, rather short-petioled; terminal leaflet $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long,

of ovate circumscription above an abruptly tapering base, usually deeply and incisely 3-lobed, the lobes sinuate-lobed, the pair of leaflets little smaller, inequilateral, mostly 2-lobed on the broader side only, rarely 3-lobed, all of a rich deep green above and sparsely strigulose, beneath pale and with an obscure scattered less strigose superficial pubescence, but all the veins distinctly hirtellous: inflorescence a well developed panicle in each axil, much shorter than the leaves and standing out from them almost divaricately: fruit unknown.

Climbing or trailing trees shrubs and volcanic rocks at Nombre de Dios, 40 miles south of Durango, Mexico, as collected by Dr. Edw. Palmer, April, 1896; distr. n. 106.

T. BITERNATUM. Allied to the last, more slender, the branches puberulent and striate; leaves as large, somewhat biternate, the terminal leaflets 3-parted and the divisions all deeply and sinuately 3 to 5-lobed, even the pair nearly as much subdivided, both faces minutely strigulose, the veins beneath minutely hirtellous: panicles very small, few-fruited the fruits small, depressed-globose, only faintly striate.

Eagle's Nest on the Rio Grande, western Texas, V. Havard, in U. S. Herb., sheet 156,164; no date given. Very beautiful almost twice-ternate and compound-looking foliage.

T. VERRUCOSUM. *Rhus verrucosum*, Scheele, Linnæa, xxi. 592. A lobed-leaved species of western Texas, evidently good notwithstanding that the warts on the leaves of some specimens, which suggested the name, are accidental.

T. PUMILUM. Dwarf, erect, simple or rarely with a short branch or two, only 6 or 8 inches high, striate-angled, cinereous and glabrous at maturity: leaflets ovate, coarsely toothed, acute or abruptly acuminate, pubescent on both faces but only on the primary veins and toward the margin: panicles numerous, small and quite simple, not rarely reduced to a mere raceme, in fruit not erect but decidedly nodding: fruits large for the plant, exactly spherical, the epicarp greenish-white, scarcely polished, not obviously either striate or wrinkled.

In higher mountains of northern Arizona not far from Flagstaff, June, 1898, D. T. MacDougal, n. 28 as in U. S. Herb.,

labelled *R. diversiloba*, though the plant, despite its inclining panicles is strictly of the Atlantic type of the genus.

T. PUNCTATUM. Stems stoutish, rigidly erect, of light reddish brown; glabrous, dotted very conspicuously with small elliptic lenticels: leaflets of a vivid green on both faces, of firm texture, all three alike in form and nearly so in size, broadly ovate, abruptly acuminate, sparingly and coarsely serrate-toothed in the middle, glabrous above, beneath hirtellous by tufts in and near the axils of midveins and veins, otherwise scantily short-hairy: panicles short and dense, erect: fruit rather large, strongly depressed-globose, umbilicate at summit, many-sulcate, glabrous and shining.

Type O. B. Metcalfe's n. 1088, from the Black Range of mountains in southern New Mexico, 1904; distributed as *Rhus Rydbergii*, from which it is very clearly distinct.

T. ABORIGINUM. Mode of growth not known: leafy branches slender, striate-angled, minutely lenticellate, glabrous: leaves large, 7 to 9 inches long; terminal leaflet ovate, 3 to 5 inches long, obtusish at base, abruptly apiculate, the laterals similar, smaller, strongly unequilateral, all entire, thin, nearly glabrous above, villous-hirtellous beneath along the primary veins: panicles small, dense, sessile: fruit small, nearly spherical, a trifle longer than broad, neither striate nor sulcate, sparsely muriculate, deeply irregular and sharply wrinkled.

Collected at the Choctaw Agency on Lieut. Whipple's expedition, by Dr. J. M. Bigelow in 1853, type in U. S. Herb. No *Rhus* of this group is catalogued in Whipple's Report.

T. RHOMBOIDEUM. *Rhus rhomboidea*, Small, Fl. 727.

T. GONIOCARPUM. Tall climber, rooting freely: branches slender, sharply angled, obscurely puberulent: leaves large, on slender elongated petioles, the leaflets thin, approximate, the terminal ovate, 3 or 4 inches long, tapering abruptly at base, at apex is abruptly short-pointed, entire or with several shallow crenate lobes in the middle, above puberulent along the veins, sparsely hispidulous between them, beneath only hispidulous and chiefly so along the veins: panicles and fruits both small, the pedicels of the latter divaricate: fruit round-ovoid, very

sparsely hispidulous, not in the least sulcate or stri butate deeply, irregularly and sharply somewhat favose-wrinkled.

Lake City, Florida, 25 June, 1901, Lucia McCulloch in U. S. Herb. Species in foliage not unlike that of the common *T. pubescens*, but by inflorescence and fruits most distinct.

T. *BLODGETTII*. *Rhus Blodgettii*, Kearney, Bull. Torr. Club. xxi. 486.

T. *COMPACTUM*. Shrub apparently low and erect; branches when young villous-tomentulose, as also the stout rigid ascending petioles of the leaves: leaflets very large, the terminal $3\frac{1}{2}$ inches long, $2\frac{1}{2}$ to 3 inches broad, of slightly obovate outline but very strongly 3 to 5 lobed, the lobes shallow but broad and obtuse, the pair smaller but similar, all of firm texture, deep green, sparsely pubescent above with short curved hairs, beneath similarly so, with also a denser hirsute hairiness on the primary veins: panicles short and very dense in fruit, numerous and closely approximate, the whole fruiting branch concealed by the crowded fruit-clusters: fruit large, narrowly and deeply sulcate, quite spherical, densely hirtellous, not polished.

Species of good characters and remarkable aspect, seen in but one sheet in U. S. Herb., from Woodlawn, Va., by William Hunter, Aug., 1899. The leaflets as to form, texture and color recall strongly those of some oaks of the black oak series; though the lobes are all obtuse.

T. *MONTICOLA*. Low, erect, not rooting above ground, rather slender, the mere stem only 8 or 10 inches high, but the large foliage, including the greatly elongated petioles, adding 6 to 8 inches more to the height of the plant, the stem sharply angled, scantily puberulent, not lenticellate: leaflets of ovate or oval rather than obovate outline, all sinuately and deeply 5-lobed, the lobes very obtuse, the terminal leaflet $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, the others smaller, all of firm texture, bright green, minutely reticulate, faintly marked above with scattered short curved hairs, beneath more densely so, even the stronger pubescence of the veins short and curved rather than hirtellous: fruits in small sessile glomerules rather than panicles, each rather large, round but subpyriform, sulcate-striate, dotted with a muriculate tuberculation, but hardly pubescent.

Lookout Mountain, Georgia, July, 1898, Albert Ruth, n. 356 as in U. S. Herb. Perhaps a more pubescent form, with somewhat doubly lobed leaflets, is Percy Wilson's n. 155 from Taylor's Ridge, also in the mountains of northwestern Georgia.

T. QUERCIFOLIUM. *Rhus quercifolia*, Steud. Nom. 1 ed. 689. Habit of the last two, the leaflets quite as strongly lobed, but angularly and acutely so; fruits of the largest, in short glomerules or racemes, depressed-globose, polished and nearly glabrous.

Inhabits the coastal plain, mostly in pine barrens, from Delaware to Florida; excellent specimens in U. S. Herb. from Laurel, Del., Commons; Salisbury; Md.; Chickering; Cape Henry, Va., Kearney; Wilmington, N. C. McCarthy. This doubtless coastal plant is typical for the var. *quercifolia* of Michaux. Its leaflets are patterned always after the black-oak type, i. e. are acutangular, while in both *T. compactum* and *monticola* they have sinuate and rounded lobes, imitating the white-oak type in that respect, though not in color.

T. ORIENTALE. Branches stout, strongly angular, ferruginous-tomentulose the first season, afterwards glabrate, lenticellate: leaflets, large, the terminal one on a short petiolule, broadly ovate, cuspidately acute, entire, commonly 4 or 5 inches long, 3 or 4 in width, deep green on both faces, glabrous above, also beneath except in axils of midvein, these strongly hirsute: panicles short, divaricately branched; flowers large, petals not nervose as in American species: fruit large, globose; epicarp thinner than in any American species, fragile, striate, sparsely muriculate, setose-hispid about the apex when immature.

The Japanese so-called *Rhus Toxicodendron* is in several particulars so different from any and all New World species that it forms a fair subgenus; yet I can not discover that it has ever been indicated as a variety, not to say species; though I can hardly see how this neglect was possible, and fear the above name may prove a synonym. My type is on sheet 19548, U. S. Herb., from Hakodate, 1862, by Maximowicz.

No shrubs that have been referred to *Rhus* are more foreign to that type than those that have been called the Sweet Sumach. They have a watery juice and their twigs and foliage are aromatic and wholly innocuous to the touch. Their flowers appear before the leaves, and from ament-like spiciform clusters imbricate like those of a birch, alder or hazel, and like those they are formed in late summer to remain dormant until spring. Their floral structure is as unlike that of *Rhus* or of *Toxicodendron*.

The first species to be seen in Europe was published by Philip Miller, under whose culture the bush had grown in the Chelsea garden, as a species of *Toxicodendron*. The same was afterwards named as *Betula* by Thunberg. Rafinesque in 1808 made it the type of a new genus to be called *Turpinia*; this at just about the time when several other botanists were dedicating each a genus *Turpinia*. Rafinesque's genus of that name proved to be other than the first; and, before he found this out, and, before he had published the genus with good character and the well formed and euphonic name *Lobadium*, Desvaux had got into print the wretched barbarism, *Schmaltzia*, supposed to be dedicated to Rafinesque, who sometimes wrote his name Rafinesque-Schmaltz. That this name was not only ill sounding and barbaric, but also on the whole untrue to Rafinesque, and published obscurely, without a character, are three circumstances which must have availed with De Candolle, Asa Gray, and others for the recognition of *Lobadium* rather than *Schmaltzia* as the name to be perpetuated.

To the specific characters in *SCHMALTZIA* no attention seems to have been given since Nuttall's time, and our herbaria are replete with specific types not hitherto characterized. A considerable number of such are herein briefly defined, while others remain to await further study.

S. CRENATA. *Toxicodendron crenatum*, Mill. Dict. n. 5. *Rhus suaveoleus*, Ait. Kew. i. 368. All stems and twigs, even the growing ones perfectly glabrous, smooth, reddish brown: foliage large, thin, vivid green and almost shining above, paler beneath and to the unaided eye glabrous throughout, a lens disclosing minute hair-tufts in axils of veins beneath, as also at some of the marginal sinuses, and a few scattered hairs along the

veins and the margin; terminal leaflet cuneate-obovate, acute, $2\frac{1}{2}$ inches long, $1\frac{1}{2}$ wide, acute at apex, subserrate-crenate above the middle; laterals similar, half as large: fruits of middle size, granular, hirsutulous but rather thinly so.

A shrub of middle Georgia, collected by Harper, Ashe and others; the type here described being Mr. Harper's n. 1329 as in U. S. Herb., said to inhabit dry woods. It is the only member of the genus on the Atlantic slope which answers to Miller's *Toxicodendron crenatum* and Aiton's *Rhus suaveolens* by being glabrous and its herbage of a sweet odor. Miller, by the way, compares its fragrance to that of orange peel.

In Catesby's time and later Miller imported plants from the Carolinas and Georgia, and not only from the coastal plain but from the mountains of the interior. His sweet sumach, it is practically certain, must have been this *R. suaveolens*, Ait. so long suppressed.

S. AROMATICA (Ait.), Small, Fl. This type species of the genus was imported into the Kew Garden in 1772, from Carolina, through Bartram's agency. It is said by Aiton to be distinguished from the above by broader leaflets that are not glabrous but somewhat pilose. Quite such a shrub is more or less common all the way from Alabama to Maryland, over which territory it may prove to run into several more or less perfectly defined subspecies; but all I here wish to indicate is, the important fact that both the Aitonian species are southern, even Carolinian.

It may be well to say at this point, that Marshall's *Rhus Canadensis* is not referable to either of the above. It may be one of the next subjoined species; but it is not possible to identify it, no pretense even to a specific character having been given by that author. We are told it is Canadian, and that is all.

S. SERRATA. Branches and twigs, even when young and growing, glabrous as in *S. crenata*: petioles pubescent on the upper side, as well as both faces of the foliage at all stages, the

upper face little so in maturity: terminal leaflet cuneate-obovate, acute, the margin from the middle part upwards cut into about 4 subserrate coarse teeth on each side; laterals smaller, ovate or ovate-oblong 3-toothed on one side, 1-toothed on the other: spikes 3 at each axil of one or two upper leaves, each 3 raised on a distinct pedunculiform twig; bracts glabrous except marginally: fruits small, scarcely compressed, hirsute.

Of northern New York and adjacent Canada, so far as known; my type for foliage, inflorescence and growing twigs being from Jones' Falls, Ontario, 26 May, 1891, by J. Fowler, as in U. S. Herb. A sheet in my own herbarium, collected at Henderson, N. Y., Aug. 1896, by Mr. Tidestrom, is in good fruit.

S. CRATAEGIFOLIA. Evidently low, with rigid short spreading branches always glabrous, even when growing: foliage subcoriaceous, deep green and minutely pubescent above, paler and softly villous beneath; terminal leaflet broadly obovate, obtuse, $1\frac{1}{2}$ inches long, $1\frac{1}{4}$ broad above the middle, below the middle entire but broad and not cuneate, only acute at base, the upper one-half coarsely crenate-dentate; the lateral leaflets half as large, obtuse at base and crenate or dentate all around the margin: fruit small and in small scattered clusters, sparsely hirsute.

North Pownal, Vermont, 25 July, 1898, W. Eggleston, n. 172 as in U. S. Herb. Of firmer foliage than any other northern species, the leaflets strikingly like the leaves of several North American species of *Crataegus*.

S. ARENARIA. Low shrub with erect rather simple branches delicately puberulent the first season, later dark red-brown, glabrous: leaves small, thin, minutely strigulose-pubescent on both faces; terminal leaflet 1 to $\frac{1}{2}$ inches long, narrowly obovate, not notably cuneate, the summit with one terminal, and on each side two lateral rounded lobes, the lateral leaflets similar but smaller: spikes 8 to 10, one at each node of all the upper part of the stem, which thus becomes a kind of elongated compound spike; bracts glabrous on the back, ciliate: fruits small, densely hirsute.

Sand dunes along the southern shores of Lake Michigan, the type in U. S. Herb., from Clarke, Indiana, 1897, by L. M. Umbach.

S. ILLINOENSIS. Evidently a larger shrub freely branching, the twigs pubescent: foliage scantily pubescent above, beneath almost villous-tomentulose, along the veins fairly hirsute: terminal leaflet $2\frac{1}{2}$ inches long, rhombic-ovate, cuneate and entire at base, above this each margin evenly and very obtusely 5 to 7-crenate, the pair 3-crenate on one side, 5-crenate on the other: bracts of the several spikes tomentulose-ciliate, the back glabrous:

This is a shrub of central Illinois represented in U. S. Herb. as collected by Dr. Brendel in 1878.

S. FORMOSA. Branches glabrous except a few scattered pilose hairs, but foliage villous-strigose on both faces, the veins beneath hirsute: terminal leaflet 2 inches long, ovate and acute above a very short and abrupt cuneate base, each margin very evenly and beautifully 8 to 10-crenate, laterals smaller, hardly inequilateral, rounded at the sessile base, subserrate-crenate on both margins: fruits very large, hirsute.

Sandy woods at Cobden, extreme southern Illinois, 8 June, 1885, M. B. Waite. Shrub with beautiful foliage strongly characteristic. The locality is noted as that of a number of local species.

S. SEROTINA. Growing twigs delicately puberulent, the mature glabrous: foliage in maturity vivid green and somewhat shining as if glabrous, under a lens seen to bear scattered short hairs everywhere, the veins quite pubescent on both faces; terminal leaflet 2 inches long or more, $1\frac{1}{2}$ wide, cuneate-obovate, obtuse, each margin above the middle with 2 or 3 broad shallow crenate lobes each crenate-toothed, the pair much smaller, round-oval very obtuse and obtusely crenate: spikes short, thyrsoïdly congested near the ends of the twigs; flowers appearing late, with the foliage almost full-grown: fruit hirsute.

Species of western Missouri, remarkable among Atlantic slope species on account of its late time of flowering. It has been distributed by B. F. Bush, from Independence (in flower) and from Eagle Rock (in fruit).

S. NORTONII. Branches glabrate and sparsely lenticellate after the first season, earlier puberulent: foliage subcoriaceous, thinly soft-pubescent above, densely so beneath; terminal leaflet 2 inches long, usually broadly rhombic, tapering cuneately from the middle, above this 4 or 6 crenate-lobed on each margin, the leaflet occasionally more cuneiform as a whole, being entire to far above the middle and with fewer lobes: spikes large, glomerate towards the ends of the branches, usually 3 or 4 on each of several short pedunculiform twigs, bracts tomentulose on the back as well as marginally: fruit large, very hirsute.

Dry hills, Riley Co., Kansas, J. B. Norton, 1895, flowers 25 April, fruit 12 Oct. Both as in U. S. Herb.

S. GLABRATA. Branches elongated, straight, puberulent the first and second seasons: foliage canescent when very young, in maturity glabrate, with some traces of pubescence on the veins above, some minute hairs all over the lower face, the veins there hirtellous; terminal leaflet $1\frac{1}{4}$ to $2\frac{1}{4}$ inches long, with rather short cuneate base and much longer somewhat deltoid-ovate main blade, this deeply 3-lobed, the terminal lobe broadly and crenately 3 to 5-lobed; lateral leaflets 1 inch long, with about 4 shallow rounded lobes: spikes short, 3 or 4 in each of several subsessile glomerules: bracts densely tomentose.

Black Hills, near Fort Meade, S. Dakota, Dr. Forwood, 1 Sept. 1887, n. 59 as in U. S. Herb.

S. TRILOBATA (Nutt.). Common in the whole northerly extension of the Rocky Mountains from northern Colorado to beyond the British boundary. Twigs puberulent, very delicately so, the first season, afterwards glabrous, light ash gray. Leaves small, subcoriaceous, glabrous, etc., all as described by Nuttall. Bracts of the many short spikes wholly tomentulose. Pedicels of the flowers hirtellous.

Perfect specimens of this are before me in flower, from Pole Creek, Wyoming, by A. Nelson, 2 June, 1894, and in mature leaf and young fruit from Cheyenne, 25 June, 1896, collected by myself, both sheets in my own herbarium.

S. BAKERI. Size and habit of the last, or often larger; foliage rather larger, thinner, always more or less pubescent on

both faces ; terminal leaflet with more gradually and less narrowly cuneate base, often 3-lobed, but lobes entire, or those on vigorous shoots with some secondary lobes, lateral leaflets round-oval, equal sided, with lateral rounded entire lobes : bracts tomentose : pedicels glabrous.

From near Fort Collins, Colo., C. F. Baker, 1896, southward to northern New Mexico, where collected by Heller, 1897 ; unless I confuse two species, of which Mr. Baker's fine specimens in my herbarium are to stand for *S. Bakeri*.

S. SUBPINNATA. Shrub robust and tall, with straight sub-erect branches red-brown and tomentulose the first season : leaves dark green above but thinly soft-strigulose, paler and more densely pubescent beneath, with the veins hirsutulous ; the leaf as a whole appearing as if 5-foliolate, the terminal leaflet, 2 inches long, being completely divided in the middle into 3 segments or divisions, the leaflet as a whole deltoid, the terminal segment rhomboid, acute, with 2 or 3 coarse teeth on either margin, the lateral segments entire on the inner margin 1 or 2-toothed on the outer ; lateral leaflets broadly ovate, 1 inch long, equal-sided, both margins lightly sinuate-lobed : spikes with bracts wholly tomentose : flower and fruit not seen.

Known only as collected by the writer, in the cañon of the Arkansas at Cañon City, Colo., 7 Sept. 1896 ; the collecting done hastily, the remarkable quinate character of the foliage not noted at that time.

S. LEIOCARPA. Branches not slender, long and straight, obsolete pubescent ; twigs of the season tomentulose : foliage small, pale and villous-strigose above, beneath canescently villous-tomentulose ; terminal leaflet $1\frac{1}{4}$ inches long, abruptly cuneate much below the middle, incisely and deeply 3 to 5-lobed, the lobes obtuse, often crenate-toothed : spikes many, small, subsessile, forming collectively a long thyriform cluster : fruits small, little compressed, nearly or quite glabrous.

Valley of the Rio Grande at Mesilla, New Mexico, E. O. Wootton, 1897, n. 48 as in U. S. Herb.

S. EMORYI. Shrub low, very stout, the branches for two seasons very densely clothed with a velvety yellowish tomentum ;

foliage less densely velvety on both faces; terminal leaflet 3-lobed, the broad obtuse lobes coarsely crenate or dentate: bracts of the short spikes not more tomentose than in other species, even partly glabrous: fruits large, not strongly hirsute.

Hills and low mountains of eastern and southern New Mexico, thence across to northeastern Arizona; first collected on Emory's expedition. Mr. Wooton has distributed specimens as "*Rhus Emoryi* n. sp.," but I do not find any printed character, though such may possibly exist.

S. OXYACANTHOIDES. Low, intricately compact with many slender recurved branches, the older pale ash-gray and glabrous, the growing ones minutely puberulent: leaves small, sub-coriaceous, glabrous except a few hairs along the veins on both faces; terminal leaflet 1 inch long, broadly cuneate-obovate in outline, often subtruncate at summit and there deeply 3-lobed, the lobes entire and subequal, or else the middle one exceeding the other two and 3 to 5-crenate, lateral leaflets not much smaller, usually 3-lobed, sometimes entire, the whole margin in all narrowly revolute: spikes 1 or 2, small, both in the axil of the uppermost leaf.

Known only in one specimen, in my own herbarium, collected by myself on some desert hillside back of Grand Junction, Colorado, 27 Aug. 1896. The leaflets imitate the leaves of a common form of *Crataegus Oxyacantha*.

S. PULCHELLA. Branches rigid, straight, hoary for several seasons with dense minute downiness; foliage small, soft-pubescent on both faces, dark green above, light beneath; terminal leaflet seldom an inch long, abruptly cuneate from below the middle, otherwise deeply 5-lobed, the lobes rarely entire, usually with 2 to 5 secondary rounded lobes; laterals half as large, mostly with 5 obtuse lobes: spikes small, sessile near ends of branches: bracts more or less tomentulose on the back: fruit small, setulose.

Toward the Rio Limpio, western Texas, C. Wright, 1852, n. 1342 as in U. S. Herb.; also later from the same general region by Reverchon, Heller, Earle & Tracy.

S. SABULOSA. Upright, slender, the mature branches glabrate, while growing obscurely puberulent: foliage small, subcoriaceous, glabrous; terminal leaflet $\frac{3}{4}$ inch long, obovate-cuneiform, tapering and entire from far above the middle, at summit broadly and obtusely 3-lobed, the middle lobe slightly exceeding the others; lateral leaflets smaller, less cuneate, the 3 lobes more shallow: fruits not small, punctulate and somewhat bristly.

Pebbly banks or beds of the Rio San Pedro, western Texas, Charles Wright, 1851, n. 917 as in U. S. Herb.

S. HEDERACEA. Evidently dwarf, with many short rigid divergent branches, these at first obscurely puberulent, later glabrous: leaves small, of a deep almost ivy-green above and with light-colored veins, glabrous on both faces, or with some short hairs along the veins beneath; terminal leaflet $\frac{3}{4}$ to 1 inch long, below the middle quite as broad, broadly rhomboid, with about 3 shallow crenate lobes on each margin, all very obtuse but mucronulate; laterals not half as large, obovate: spikes small, subsessile, bracts transverse-rugulose, sparsely pubescent: immature fruits hirtellous and viscid-granular.

Mica Spring, Nevada, M. E. Jones, in U. S. Herb.

S. AFFINIS. Habit of the last, with similarly deep green whitish-veiny foliage, but all the leaves simple, often cleft deeply into 3 lobes, each lobe simply or doubtly crenate, as often not lobed at all, then broadly ovate above a broad truncate base, the largest 1 inch long: fruits large, viscid-granular, otherwise nearly glabrous.

Shrub of southern Utah deserts, collected at Kanab, Springdale and Silver Reef in 1894 by M. E. Jones, and distributed as "*Rhus Canadensis simplicifolia*, Greene," but erroneously, the shrub, despite its simple foliage, being more nearly akin to *S. hederacea*.

S. SIMPLICIFOLIA. *Rhus Canadensis simplicifolia*, Greene, Bull. Torr. Club, xvi 13. The leaves in this are not of the dark ivy-green of the last; they are of round-ovate outline, a little tapering to the petiole, broadest not at base but toward the middle, and simply as well as evenly crenate all around except across the base.

In between the habitat of this and that of *S. affinis* are barriers of high mountain and low desert in untold number; and other well differentiated species of this genus will be found in that significant and varied interval.

S. CISSODES. Dwarf, with tortuous or even reclining branches glabrous and of a light ash-gray, the growing twigs almost filiform, puberulent: foliage small, ivy-green, veiny and glabrous above, paler beneath and appressed-pubescent along the veins only, the leaves all simple, often deeply trisected in imitation of the trifoliolate, even occasionally divided to the midvein; terminal segment broader than long, incisely 3-lobed, the margin angular-toothed; lateral lobes about half as large, not lobed but coarsely dentate.

Grand Cañon of the Colorado, Ariz., near Indian Garden, Bright Angel Trail, C. H. Merriam, 10 May, 1903. Elegant vine-like species, and a nice link between the usual trifoliolate type, and that with rounded and simple leaf.

S. ANISOPHYLLA. Dwarf, stout rigid short-branched desert shrub; twigs for two seasons puberulent, afterwards gray, glabrate: foliage at least half-grown at flowering time, small, distinctly trifoliolate but lateral leaflets small and degenerate, never equal to each other in size, the largest not half the size of the terminal, this obovate-cuneiform, lightly 3-lobed and obtusely so: small round capitiform spikes many; bracts transverse-rugose in the middle, only minutely and obscurely ciliolate.

Surprise Cañon, Panamint Mountains, southeastern Calif. A. K. Fisher in Death Valley Exp. n. 618 as in U. S. Herb. A still earlier link in the connection between trifoliolate and simple-leaved species.

S. ELEGANTULA. Slender and tortuous or reclining like *S. cissodes*, only the growing twigs puberulent, also the foliage half-grown at flowering time: leaflets 3 and subequal, all incisely lobed, the terminal one doubly so: spikes 1 or 2 at the end of each slender branch, capitiform, broader than long; bracts tomentulose.

Flagstaff, Arizona, May, 1893, N. C. Wilson, as in my herbarium.

S. PUNCTICULATA. Low, stout, rigid, the short branches leafy and puberulent, glabrate after the second season, leaves small, very short-petioled, subcoriaceous, deep green and glabrous above, paler beneath and appressed pubescent on the veins, both faces muriculate-punctate; terminal leaflet $\frac{3}{4}$ inch long, broadly obovate above an acute rather than cuneate base, doubly and obtusely crenate: fruit very large, scattered, one only from each spike, wholly glabrous, or with a few small bristly hairs.

Union Pass, northern Arizona, 31 May, 1903, N. C. Wilson, as in my herbarium. That this species should be in mature leaf and fruit in May, and *S. elegantula* barely in half grown leaf and full flower in the same month of the same year, and the two occupying stations perhaps 60 or may be 40 miles apart, should intimate to the untravelled the wonderful differences of climatic and other environment plants find there within a small extent of territory.

S. TRINERVATA. Branches stout, rigid, straight, puberulent lenticellate-tuberculate: foliage coriaceous, dark green above, lighter beneath, both faces obscurely puberulent, the margins and veins beneath sparsely pubescent: terminal leaflet 1 inch long, cuneate and entire from about the middle, broadly and shortly 3-lobed, the lobes very obtuse, the terminal now and then 3-crenate, the 3 veins leading to the 3 lobes chiefly conspicuous; lateral leaflets smaller, equal-sided, broadly 5-crenate: scales of the small spikes wholly villous-tomentose.

San Francisco Mountain, Ariz., 2 Sept., 1889, F. H. Knowlton.

S. HIRTELLA. Branches slender, hirtellous-tomentose when young, not quite glabrate the second season: leaves small and leaflets elongated, soft-pubescent on both faces; terminal leaflet quite cuneiform below a short 3-lobed apex, the middle lobe longer than the others and often 3-lobed, all obtuse; laterals small and variable, some cuneate-obovate and 3-lobed, others oval and quite entire: fruits small, glabrous or with a few small bristly hairs.

Grand Cañon of the Colorado, Ariz., 10 July, 1892, E. O. Wooton.

S. BOTRYOIDES. Stoutish and with rigid ascending branches after the first season glabrate and gray, when growing finely puberulent: leaves subcoriaceous, of a deep but glaucescent green above, quite glaucous beneath, hardly pubescent except marginally and on the veins beneath; terminal leaflet 1 inch long, cuneate-obovate, 3-lobed, with or without secondary lobes, all lobes and teeth ending somewhat acutely: fruits copious in a compact terminal thyrus like a bunch of grapes, the drupe globose and as if with little pulpiness, the epicarp thin and finely hirsute.

Fort Apache, Ariz., June, 1900, Dr. Edw. Palmer, n. 590 as in U. S. Herb.

S. GLAUCA. Branches dark red-brown, puberulent; foliage glabrous, glaucous on both faces, most so beneath; all leaflets very obtuse and obtusely lobed, the terminal 1 to 2 inches long; of round-ovate outline with short abrupt entire base not very cuneate, each margin with about 3 broad sinuate lobes, the larger emarginate: spikes 3 to 5; bracts round-obovate, longer than broad, puberulent on the back; scarcely more so on the margin: no fruit seen.

In the vicinity of Durango, Mexico, 1896, Dr. Edw. Palmer, n. 785 as in U. S. Herb.

S. SCABERULA. Twigs of the season dark brown, puberulent, later glabrous, dull blackish: foliage small, subcoriaceous, not pubescent, the dark green upper surface granular-scaberulous, the pale lower face more obscurely so: terminal leaflet 1 to 1½ inches long, broadly rhomboid, tapering abruptly from towards the middle, indistinctly 3-lobed, each lobe with 3 secondary lobes or rounded teeth; lateral leaflets round-obovate, evenly and obtusely lobed or crenate all around save at the subtruncate base: fruits orange-colored, granulate-roughened, glabrous or with a few short bristly hairs.

Cochuto, Sonora, Mexico, C. V. Hartman, Oct. 1890, n. 80 as in U. S. Herb.

S. MALACOPHYLLA. Branches rather stout, soft-pubescent for two seasons: leaves of a rather light green, villous-pubes-

cent on both faces; terminal leaflet 1 inch long, fully as broad in the middle above the more or less sharply cuneate base, 3-lobed, the terminal lobe with 3, each lateral with 2 broad obtuse teeth or lobes; lateral leaflets half as large, round-oval or obovate, crenate-lobed around the summit: spikes panicled at ends of branches; bracts tomentose across the base, at apex glabrous, even as to the margin: fruits smallish, globose, sparsely hirsute.

Griffith Park, Los Angeles Co., Calif., Apr. and Nov. 1902, Ernest Braunton, in U. S. Herb.

S. STREAMINEA. Growing twigs puberulent; also the foliage, but this not strongly so, glaucescent above, more so beneath: terminal leaflet 3-lobed and the lobes crenate; laterals crenate: flowers not yellow, only pale straw-color; bracts pubescent at base only, above glabrous and with margin not only naked but scarious: fruit not seen.

Along Lyttle Creek, San Gabriel Reserve, Calif., 27 Apr. 1898, J. B. Leiberger in U. S. Herb. Specimen in full grown leaf, while not yet out of flower.

S. CRUCIATA. Rigidly and divergently branching, growing twigs pubescent: leaves dark green but glaucescent above, lighter beneath yet not there glaucescent, pubescent along the veins, the upper face merely scaberulous: terminal leaflet 1 inch long and the same breadth in the middle, somewhat cruciform above the abruptly cuneate base, showing 3 broad lobes, the laterals divaricate, all more or less crenate-toothed or-lobed; lateral leaflets round-obovate, crenate: bracts of spike pubescent only at base, the naked margin subscarious: fruit waxy-granular, glabrous.

Hot Springs in the northern part of San Diego Co., Calif., 1875, Dr. Edw. Palmer.

S. QUINATA. *Rhus triobata*, var. *quinata*, Jeps. Eryth. i. 141. Large species, common in middle Californian coastal mountains and valleys.

S. ANOMALA. Growing twigs soft-pubescent with short mostly deflexed hairs: foliage large, as nearly quinately as that of *S. quinata*, more or less densely soft-pubescent on both faces;

terminal leaflet of deltoid-ovate cut, $1\frac{1}{2}$ inches long and as wide, incisely cleft into 3 segments all doubly crenate and obtuse; lateral leaflets doubly crenate: inflorescence seemingly a panicle of alternate divaricate short spikes; bracts villous-tomentulose from base to summit but not ciliate: immature fruits densely wavy-granular and sparsely soft-bristly.

This perplexing shrub—seeming to exhibit spikes arranged in a truly paniced general inflorescence as in *Rhus* or *Styphonia*—is known only from along Little Chico Creek, Butte Co., Calif., as collected by Mrs. Austin in 1883, and with it—at least from the same station—fragments of a very dissimilar species also new, but not to be characterized from the fragments at hand. I have seen *S. anomala* only in my own herbarium, where there are two full sheets.

S. OREGANA. Twigs and branches rather densely soft-pubescent for two seasons: foliage sparsely so on both faces, but the veins beneath beset with long appressed pilose or setose hairs besides the short and downy indument; terminal leaflet $1\frac{1}{2}$ inches long, usually obovate-cuneiform, rarely broader above, lightly and doubly crenate: bracts of the spike altogether tomentose on the back, scarcely ciliolate; fruits granular, sparingly setose.

Grant's Pass, Oregon, 27 May, 1884, Thomas Howell, U. S. Herb.; with a second specimen from the same place, in leaf only, of a distinct species.

S. GLOMERATA. Branches stout, straight, rigid, ash-gray, glabrous, the young growing twigs puberulent: foliage subcoriaceous, deep green above, glaucescent beneath, obscurely and sparsely puberulent on both faces: terminal leaflet $1\frac{1}{2}$ inches long, rhomboidal in outline, deeply and rather sinuately 5-lobed, the lobes obtuse; laterals usually 3-lobed: bracts pubescent at base, naked and rugulose on the back, the margin delicately ciliolate: fruit smallish, in compacted short glomerules forming a long thyrus at ends of branches; epicarp granulate, very sparsely short-setose.

Pocatello, Idaho, May and July, 1893, Dr. Palmer, nn. 44 and 396 as in U. S. Herb.

S. LASIÓCARPA. Branches pubescent the first season, not wholly glabrous until the third: foliage bright green above, paler beneath, prominently veiny and sparsely pubescent on both faces: terminal leaflet $1\frac{1}{4}$ to $1\frac{3}{4}$ inches long, cuneate-obovate, obtuse, coarsely crenate from below the middle, slightly 3-lobed near the summit; laterals more than half as large, less cuneate and mostly only 3-crenate at the summit: fruits large, glomerate in a large thyrus, densely soft-hirsute.

Rocky hills of Osborne Co., Kansas, 9 June, 1894, C. L. Shear, n. 104 as in U. S. Herb.; no other known species has a fruit so very hairy.

S. QUERCIFOLIA. Evidently dwarf, the short dark brown branches tortuous and knotted, twigs of the season puberulent: foliage small, of the texture, color and indentation of leaflets of white oak; terminal leaflet $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, obovate-cuneiform, 3-lobed above the middle, the rounded lobes entire, or oftener crenate, all lobes and teeth very obtuse; laterals more than half as large, simply 3 to 5-crenate, upper face of all scabrous-punctulate, beneath obscurely pubescent, the veins elevated: fruit hirsute.

Cañons in Seward Co., southwestern Kansas, 29 Aug., 1897, A. S. Hitchcock, n. 1106 as in U. S. Herb.; also at Syracuse, Kansas, C. H. Thompson, 1893.

S. TRIDOPHYLLOIDES. Habit of the last but the dark-colored branches puberulent for two or three seasons, the growing twigs densely, and foliage sparsely, pubescent: terminal leaflet $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, cuneate-obovate, acutely 5 to 7-lobed or toothed above the middle; laterals only one-third smaller and quite similar, all subcoriaceous, bright green and minutely reticulate above, lighter and venulose beneath: fruit very hirsute.

Stillwater, Oklahoma, F. A. Waugh, in U. S. Herb.; no date given.

S. COGNATA. Allied to *S. quercifolia*, but larger thinner foliage of different figure and that less uniform, some with all three leaflets cuneate-obovate and quite entire, the more usual terminal leaflet 1 to $1\frac{1}{2}$ inches long, obovate-cuneiform, or more commonly cuneate-obovate, angularly and rather coarsely about

1-toothed on each side, the terminal tooth often larger and now and then tridentate; laterals half as large, cuneate-obovate, 3-toothed: fruit small, globose, scantily and shortly hirsute.

Baker, Earle & Tracy's 525 from Durango, Colo, 1898; Baker's 456 from Arboles, 1899, all as in U. S. Herb.; said to be common in that part of southwestern Colorado; and there is a fragment from Colorado Springs, by Knowlton 1896, that does not differ essentially.

S. RACEMULOSA. Dark brown branches obscurely puberulent even to the third season, growing twigs minutely but densely pubescent: foliage of a rich dark green above, whitish-veiny and minutely granular, beneath glaucescent, the veins and margins pubescent; terminal leaflet obovate-rhomboid, 1 to 1½ inches long, obtusely 3-lobed near the summit, or coarsely 2 or 3-crenate on either side and less obtuse: flowers clustered in short racemes on slender twigs and appearing in late summer after the maturity of the foliage, all on elongated and even pendulous pedicels that are hispidulous toward the base, glabrous under the flower, bracts transverse-rugulose on the back and minutely setulose.

Near Fort Huachuca, Ariz., Aug. 1394, Gen. T. E. Wilcox, n. 378 as in U. S. Herb. Apparently the same is a shrub of Chihuahua, by E. W. Nelson, from below Cacheco, 24 Aug., 1899, with immature fruit distinctly pedicellate and drooping. It is Nelson's 6234 as in U. S. Herb.

When Dr. Engelmann published *Rhus micropylla* he thought "it a true *Lobadium* with pinnated leaves;" and that is what any other would be likely to say who might so intently regard its amentaceous inflorescence and precocious flowering as to overlook those several marked characters by which, over and above the pinnate foliage, this differs from *Lobadium*, i. e. *Schmaltzia*. Habitally it is a rigid, divaricately short-branched naked looking shrub, a desert growth, of aspect in perfect keeping with that of each of a considerable list of small-leaved half-spinescent shrubs of several families and genera; but *Schmaltzia* proper, while also well represented in the deserts, is never so.

While its species there are all much reduced in size, they present a goodly array of comparatively ample foliage, on twigs and branches always lithe and flexible; and the local deviations there from its trifoliolate norm are not at all in the direction of the pinnate, but just the opposite; for in the very centers of aridity the *Schmaltzias* in several species have simple leaves; and they are also leaves of fair size, making not the least approach to the leaflets of the pinnated *Rhus microphylla*. So, then, a "true Lobadium with pinnated leaves" would be expected to display, as all others of that genus do, leaflets ample, strongly indented on the margin, and conspicuously veiny; and we have, moreover, a plain and certain foreshadowing of what such leaves would be in *S. subpinnata* of Colorado, and *S. quinata* of California, in neither of which is there a hint, even remote, of the peculiar foliage of *Rhus microphylla*, which itself is most like that of xerophyte leguminous shrubs of the deserts of all continents.

And the inflorescences in the present type are only rather superficially like those of *Schmaltzia*. They are solitary always, and sessile; one in each axil. Each flower in the spike is embraced at base by a cup formed of three bracts, while in *Schmaltzia* each is axillary to a single bract. The flowers in this type are never yellow, always white, and the petals are ciliate. The fruits, always orange or scarlet in *Schmaltzia*, are dark purple or black in the present type, which I regard as an excellent genus and name it **RHOEIDIUM**.

R. MICROPHYLLUM (Engelm). Leaflets 4 to 7, oval, the lowest pair distinctly smaller but still oval, only slightly inequilateral, both faces of all scantily villous-strigulose.

Widely dispersed in western Texas, doubtless also across the Rio Grande in Mexico; the type Charles Wright's n. 1341. In middle Texas, on the border region between the arid and the humid sections, there is another species.

R. GLABELLUM. Leaflets 9, larger, elliptic-oblong, the odd one not larger than the pair next it, the lowest pair slightly obovate, obtuse, slightly yet distinctly unequal at the not rounded base, all appearing glabrous above and very smooth, a lens showing scattered stiff appressed hairs.

Of more easterly range in Texas, evidently; the only specimens seen being those distributed from Fort Concho by Reverchon, and some fragments from Gillespie Co., by Jermy.

R. VESTITUM (Engler). Distinguished from *R. microphyllum* chiefly by more densely pubescent foliage; but there may be other differences, for it inhabits a district in New Mexico more elevated and more arid than the habitat of the type; but it also occurs in eastern Texas.

R. RUGULOSUM. Leaflets only 5, or rarely 7, as often but 3, oblong, obtuse, mucronate, revolute, villous strigulose beneath, scarcely more than scaberulous above, but minutely transverse-rugulose.

Species with the best of marks, but known only by a single good sheet in U. S. Herb., from Texas by Dr. Palmer, in 1880; no other data given.

R. RETUSUM. Leaflets quite uniformly 9, broader than in the foregoing, oval to slightly obovate, usually retuse at the broad summit, always mucronulate, the lowest pair short, round-oval, very inequilateral, upper face of all deep green and as if glabrous, but with short scattered hairs from distinct muriulations, lower face with scattered longer hairs and showing pinnate veins.

Near Lake Santa Maria, Chihuahua, Mex., Sept., 1899, E. W. Nelson, n. 6422 as in U. S. Herb. Also from Santa Eulalia Plains, Wilkinson, 1885.

R. POTOSINUM. Branches short, rigid, approaching the spinescent: leaves very small: leaflets 5 to 7, oval, except the lowest, these orbicular but extremely inequilateral, all deep green and almost shining above, but with some obscure pubescence on both faces.

San Luis Potosi, Parry & Palmer, n. 126 as in U. S. Herb.

R. CINEREUM. Very small foliage dull cinereous or glaucescent; leaflets 5 to 7, hardly pubescent on either face, beneath obviously almost divaricately feather-veined, the lowest pair oval, moderately inequilateral, all the others oval or oval-oblong and larger, all inclined to be revolute.

Near Durango, Mex., 1896, Dr. Palmer, n. 91 as in U. S. Herb.

New Plants from Southwestern Mountains.

ACHILLAEA SUBALPINA. Stoutish and low, angled and striate stems 3 to 6 inches high, thinly villous-lanate: leaves few, oblong-linear, the basal short-petiolate, the cauline sessile, auricled, all bipinnate, the segments softly spinescent-tipped, the whole leaf villous-silky: corymb of few large heads; involucre campanulate, bracts triangular-ovate to oblong-ovate, none with much pubescence, all strongly carinate-nerved, the inner with thin fuscous margins: rays large, white.

Subalpine slopes of Mount Ouray, southern Colorado, 20 Aug., 190, C. F. Baker, n. 842.

ANTENNARIA FORMOSA Near *A. parvifolia*, every way much larger; stem 18 to 22 inches high, ending in a lax corymbose panicle of large heads: stolons depressed, 1½ to 3 inches long, their full grown leaves an inch long or more, broadly rounded and acutish at summit, thence tapering cuneately to the base, hoary above, beneath white with a dense appressed indument; stem leaves longer, exceeding the internodes, linear-spatulate, acute, erect, more loosely pubescent: heads many and large; involucre greenish white, scarcely tomentose or flocculent even at base, all the bracts with oblong-obovate acute scarious tips as long as the body or longer: male plant not known.

Low meadows at Gunnison, Colo., C. F. Baker n. 580.

ANTENNARIA LATISQUAMEA. Low and with much the habit of *A. aprica* but more slender, the few large heads of the pistillate plant commonly on long pedicels, forming a loose corymb: leaves smaller, thin, spatulate-ovate, ½ inch long or more, not densely silky-tomentose even beneath, sparsely so above: heads 3 or 4, ½ inch high, broad and many-flowered; bracts not very many, all with broad and obtuse white tips, the inner only narrower, not acute: male plant not seen.

At 10,000 feet in the Black Range, New Mexico, on a shaded slope, 30 Sept., 1904, O. B. Metcalfe, n. 1433.

ERIGERON PLATYPHYLLUS. Related to *E. macranthus* and

as large, but herbage green, only sparingly hispidulous-roughened: leaves from oblanceolate in the lowest to elliptic-oblong and oval in the upper, 3 inches long, the largest $1\frac{1}{2}$ inches broad, all thin, glabrous except as to the more or less obvious hispid ciliation of the whole margin: stem rather freely branched at summit, all the branches clothed up to the heads with large sessile oval hispid-ciliolate bracts 1 to $1\frac{1}{2}$ inches long: heads large, though smaller, than in *E. macranthus*; bracts of involucre equal, not at all hairy, viscid-puberulent: rays light-violet or bluish.

Santa Rita Mountain, New Mexico, 9 Oct. 1904, O. B. Metcalfe n. 1469.

ASTER ORTHOPHYLLUS. Plants in broad patches from a connected system of slender horizontal rootstocks; stems 1 foot high, erect or decumbent, corymbose-panicked, notably leafy and the foliage remarkably straight and erect; lowest leaves narrowly oblanceolate, the cauline lance-linear and linear, all entire and all but the very lowest acutish, green and glabrous on both faces, the margins beset with short inflexed hairs: heads above middle size; involucre broadly campanulate to hemispherical; bracts imbricated, appressed, spatulate-linear and linear, the outer obtuse, inner acute, their green tips elliptical, nearly glabrous, somewhat ciliolate: rays bluish.

Low grassy lands along the river at Gunnison, Colo., 23 July, 1900, C. F. Baker, n. 570; and nn. 545, 688 and 820 may all be forms of the same species akin to *A. adscendens*.

ASTER WOOTONII. *A. hesperius* var. *Wootonii*, Greene, Bull. Torr. Club. xv. 119. Mr. Baker's n. 817 from near Gunnison represents well that of Mr. Wooton's distribution from New Mexico, and I judge the form worthy of specific rank.

ASTER LONCHOPHYLLUS. Stout stems erect, 2 feet high, red-purple, thinly white-puberulent, sparsely leafy up to the contracted subcorymbose panicle: basal leaves not seen, those of the stem 3 or 4 inches long, narrowly lanceolate, acute, entire, sessile, the lower by a spatulate base, all of firm texture, green and glabrous on both faces, 1-nerved, the margin barely scaberulous: heads of middle size; involucre campanulate, bracts

in 2 or 3 series, not very unequal, lance-linear, acute, loosely erect, the herbaceous tips purple-edged: rays many, light rose-purple.

In large tufts on stony slopes, Crested Butte, southern Colorado, 13 August, 1901, C. F. Baker, n. 805. A peculiar species the near affinities of which it is not easy to name.

ASTER GRISEUS. Stems decumbent or ascending, $\frac{1}{2}$ to $1\frac{1}{2}$ feet high, branching, sparingly villous-hairy; foliage and bracts pale as if glaucous, but finely strigose-pubescent; lowest leaves oblanceolate, 2 inches long, the cauline oblong-linear to linear, all obtuse, entire, 1-nerved, ciliate or ciliolate: heads of middle size; involucre broadly campanulate or nearly hemispherical, the bracts imbricated in 3 series, erect, appressed even to the tips, the outer obovate, obtuse, the inner more elongated, acutish, all pubescent and more or less ciliate: rays many, showy, pale violet.

The type is a plant collected by myself thirty years since in the Colorado Rocky Mountains west of Denver, on Bear Creek, at Sisty's, the elevation perhaps 9,000 feet. Mr. C. F. Baker's 632 from Doyle's southern Colorado, I think the same, though the plants are larger and with herbage even more decidedly gray-green.

BRACHYACTIS HYBRIDA. A foot high or more, branched from the base and bushy, the root not always annual, the plant apt to propagate by stolons from the crown; stem and branches pubescent in lines; leaves spatulate-lanceolate, sessile, entire, scabrous-ciliolate, otherwise glabrous; involucre campanulate, bracts in about 2 series and equal, all elliptic-lanceolate, the inner narrower, the outer somewhat serrulate-ciliolate; rays lavender, elongated.

Common in alkaline soil about Gunnison, Colo., 27 Aug., 1901, C. F. Baker, n. 937. The plant is remarkable as a *Brachyactis* for its many long rays, as well as by its apparently perennial duration; otherwise it is at perfect agreement with other members of this well marked genus. The name *hybrida* is next to meaningless here, and I regret having assigned it, as I did, in the distribution of Mr. Baker's collection.

MACHAERANTHERA CICHORIACEA. Annual, stoutish, 2 feet high, the stems flexuous above and somewhat fastigiately racemose-panicled and, with the branches, glandular-scabrous or hispidulous; leaves pale green, glabrous, glaucous, the larger lanceolate, sessile, 2 inches long, sparsely runcinate-dentate, those of the flowering branches, small, entire, often recurved: involucre of less than middle size, turbinate, closely imbricate, the dark green viscid bracts erect: rays few, rather short: ovaries loosely silky-villous.

Bottom of cañon at Deer Run, southern Colorado, 25 Aug., 1901, C. F. Baker, n. 918.

MACHAERANTHERA SPECTABILIS. Low, bushy, the many subcorymbose stems some 10 inches high from a biennial or perennial root: lowest leaves narrowly oblanceolate, acute, tapering to a short strongly ciliate petiole, the upper sessile and with a few spinulose teeth, all obscurely pubescent: involucre $\frac{1}{2}$ inch high or more, campanulate, their many and much imbricated bracts purple, the attenuate tips viscid, spreading or recurved: rays very many, deep violet, showy: achenes nearly or quite glabrous.

Clayey banks at Marshall Pass, southern Colorado, 20 Aug., 1901, C. F. Baker, n. 873.

PECTIS TAXIFOLIA. Suffrutescent, 5 or 6 inches high, the leafy flowering branches and their foliage of a vivid green and delicately scaberulous: leaves rather fleshy, about $\frac{3}{4}$ inch long, entire, pungently acute, dotted with two rows of very large glands: peduncles slender, naked; heads turbinate-campanulate, nearly $\frac{1}{2}$ inch high, many-flowered; bracts very firm, lance-linear, acute, their margins scaberulous; rays 6 or 8, large and showy: achenes hispid; pappus fuscous, of many unequal scabrous bristles.

Black Range, New Mexico, 1904, O. B. Metcalfe, n. 1440.

HELIANTHELLA MAJUSCULA. Stout, erect, 2 feet high, monocephalous, sparsely rough-hirsute with short hairs: leaves in about 4 pairs, the lower and middle broadly lanceolate, 5 or 6 inches long, subsessile, acute at each end, lightly and remotely

serrate or crenate, hispid-ciliolate: head 3 inches broad including the large rays and equally long spreading outer bracts of the involucre: pappus soft and delicate, of 2 long awns and several intervening squamellae, all aristate-pointed and villous.

Black Range, New Mexico, O. B. Metcalfe. n. 1435.

BIDENS COGNATA. Allied to *B. heterosperma* but stout and low, the heads twice or thrice as large; stem and branches sparsely hirtellous. the involucre bracts more obviously and densely so: achenes all 2-awned, the short outer ones glabrous and sparsely muriculate, the long and slender inner ones with a few minute appressed-spinulose hairs.

Black Range, New Mexico, at 9,500 feet, 30 Sept. 1904, O. B. Metcalfe, n. 1436.

LACINIARIA FORMOSA. Stout, erect, 2 feet high, leafy up to the short dense subpyramidal raceme of large campanulate heads: leaves thin, hispid-ciliolate, otherwise glabrous, all except the uppermost lanceolate, acute, the upper linear-lanceolate: upper part of stem pubescent in lines, the rachis and peduncles hispidulous: outer bracts of involucre obovate, or spatulate-obovate, inner spatulate-oblong, all obtuse, green-herbaceous and punctate except as to the narrow margin, this dark purple, erose to lacerate-dentate: achenes hirtellous along the ribs; pappus subplumose.

A few plants in a meadow at Jack's Cabin, Colo., 26 July, 1901, C. F. Baker, n. 610. Differs from its analogue in northern Colorado and Wyoming by its thin glabrous foliage and more enlarged as well as more compact inflorescence.

COLEOSANTHUS AXILLARIS. Suffrutescent, bushy, 2 or 3 feet high, branches of the season whitish, scabro-puberulent, very leafy throughout: leaves thinnish, deltoid and crenate, 1½ to 2 inches long, rather broader at base, vivid green above, scaberulous on the veins, underneath scaberulous and pellucid-glandular superficially, the veins muricate-scabrous, petioles ½ to ¾ inch long: axils with short and slender leafy-bracted twigs each with 3 to 6 nodding heads, the whole cluster from half the length of the leaves in the lowest to little exceeding

them in the uppermost, involucre about 4 lines long, 7 to 9-flowered, bracts thin, whitish, 3-nerved, obtuse or abruptly acutish: slender achenes minutely strigulose, pappus delicate, merely scaberulous.

Southward slopes of hills of the Black Range, New Mexico, at about 6,000 feet, O. B. Metcalfe, n. 1446.

COLEOSANTHUS MELISSAEFOLIUS. Size and woodiness of *C. axillaris* but more branching; leaves firmer but green, ovate-deltoid, all obtuse, lightly coarsely and unevenly crenate, the upper face with few and scattered scabrous points and but an obscure venation, underneath hispidulous-roughened on the prominent but irregularly disposed and loosely anastomosing veins and veinlets, the surface obscurely scaberulous and obviously and rather strongly punctate: heads numerous on all branches and branchlets, bracts of involucre 3-nerved, obtuse, some mucronulate: achenes light-colored, appressed-pubescent; pappus delicate, scaberulous.

Organ Mountains, N. Mex., at 4,900 feet, E. O. Wooton, 1 Sept., 1897.

HYMENOPAPPUS PARVULUS. Branches of caudex short, stout, each bearing a tuft of small long-petioled leaves 3 inches high, the petioles 2 inches, blade 1 inch, bipinnately cut into narrowly linear segments, these firm, obtuse, hoary-tomentulose: scapiform peduncles 6 or 8 inches high, ending in a contracted cymose panicle of small heads; involucre subturbinate, $\frac{1}{4}$ inch high, bracts cuneate-obovate, with obtuse scarious tips: achenes slenderly turbinate, villous; pappus of hyaline cuneate-obovate nearly truncate short scales.

Dry hills about Gunnison, Colorado, 17 July, 1901, C. F. Baker, n. 449.

CHRYSOPSIS ASPRELLA. Slender rigid stems 1 foot high closely tufted on a hard ligneous crown, sparsely villous-hirsute: leaves thin, oblanceolate, 1 inch long exclusive of the short petiole, both faces rough with a short strigose pubescence and copious sessile pellucid glands: heads smallish, corymbose;

bracts short, rigid, the outer subulate, villous-strigulose: rays small, deep yellow: achenes short, cuneate-obovate, silky-villous: outer pappus of slender squamellae conspicuous.

Abundant in the Black Cañon of the Gunnison River, southern Colorado, 8 July, 1901, C. F. Baker, n. 379.

CHRYSOPSIS COMPACTA. Allied to the last, not as tall, the leaves much narrower, acute, more pubescent but not as rough: terminal corymb of many heads quite fastigiata: bracts of the small involucre thinner, merely villous: rays deep yellow: outer pappus conspicuous but shorter, definitely linear-squamellate.

In dense tufts on dry open ground near Jack's Cabin, Colo., 26 July, C. F. Baker, n. 608.

PEDICULARIS ANGUSTISSIMA. Akin to *P. racemosa* and with similar undivided glabrous foliage, but somewhat paniculately branched and flowers crowded: leaves narrowly linear, 2 inches long, callous-crenulate: beak of galea short and nearly straight; lower lip of corolla greatly reduced, not as large as the galea and much shorter, the lobes erose.

Mogollon Mountains, New Mexico, 17 Aug., 1903, O. B. Metcalfe, n. 534.

PEDICULARIS MOGOLLONICA. Related to *P. Parryi*, much taller and stouter, 1½ feet high, less leafy at base, more so up and down the stem, but leaves small in proportion: spike 6 inches long, bracts 3 to 5-lobed, the long terminal lobe serrate: calyx 5-toothed, tips of the teeth apt to be dilated and with a few serratures: galea falcate, with abrupt blunt beak.

Mogollon Mountains, New Mexico, 14 Aug., 1903, O. B. Metcalfe, n. 496.

EVOLVULUS OREOPHILUS. Depressed and compact, the stems many from the subligneous branched crown of a thick tap-root, all floriferous from the base, densely leafy: leaves elliptic-oblong, sessile, acute, ½ inch long, canescent with a dense appressed silky pubescence: corollas purple, nearly ½ inch broad at full expansion, the pedicels very short, in fruit recurved.

Dry hills west of Hillsboro, at 5,500 feet at base of Black Range, New Mexico, Aug. 1904, O. B. Metcalfe, n. 1228.

PHACELIA RUPESTRIS. Perennial with habit of *P. ramosissima*, but stems low, slender, very fragile, and with the leaves, velvety with a dense short pubescence, that of stem and branches spreading, of the leaves appressed: racemes 3 to 5, short and crowded: corollas small, whitish: sepals of the small fruiting calyx nearly linear, exceeding by one-third the small round-ovoid acute 4-seeded capsule.

Crevices of rocks, foothills of the Black Range, New Mexico, 25 June, 1904, O. B. Metcalfe, n. 1012.

LAPPULA LEUCANTHA. Perennial, 2 feet high, loosely racemose from near the middle: lowest leaves not seen, those of the stem oblong and linear-oblong, obtuse, narrowed to a subpetiolar base, thin, green, very rough with short mostly appressed bristly hairs from a pustulate base: racemes long, slender, widely spreading: corolla rather large, 4 lines wide, white: back of nutlet ovate, muriculate, surrounded by a short border of alternately large and small flat glochidiate prickles, all of triangular outline and at base united, forming a kind of deeply and sharply serrated border.

Shady cañon of Iron Creek, Black Range, New Mexico, 11 Oct., 1904, O. B. Metcalfe, n. 1475.

PHLOX MESOLEUCA. Perennial, slender, 5 to 10 inches high, the mostly simple stems from horizontal rootstocks not deeply seated: herbage pale, not viscid, merely glandular-puberulent or finely pubescent: leaves 2 or 3 inches long, narrowly linear, widely spreading or recurved, the internodes $\frac{1}{2}$ to 2 inches long: flowers 2 or 3 only; calyx $\frac{3}{4}$ inch long, its teeth as long as the tube, subulate-linear ending in a long slender spinescent tip, the whole calyx glandular-hirtellous: corolla-tube barely equalling the calyx, the limb $1\frac{1}{2}$ inches wide, lilac with large white center; lobes entire, obtuse, round-obovate to nearly orbicular, broadly overlapping each other in expansion.

Dry foothills of the Black Range, New Mexico, at 6,600 feet, 29 June, 1904, O. B. Metcalfe, n. 1272.

The above name was suggested by the color of specimens newly dried; but now, after a year and more, they are faded to white.

POLEMONIUM GRANDE. Stout, very erect, tall, with copious large flowers in a rather strict subcorymbose panicle; plant wholly glabrous below, the stem above the middle with pubescent intervals of some width between certain angles, the branches wholly villous pubescent, the peduncles and pedicels strongly viscid-villous, calyx less so; mature calyx $\frac{1}{2}$ inch high, with subulate-lanceolate erect teeth twice as long as the campanulate tube and strongly venulose, the veins nearly parallel at first, but somewhat anastomosing: corolla open-campanulate more than an inch wide, the rounded segments cuspidately acute: stamens and style strongly declined, notably shorter than the corolla.

At 9,000 feet near Pagosa Peak, southern Colo., 5 Aug., 1899, C. F. Baker, n. 544. Large plant, glabrous as to foliage, the pinnae few.

POLEMONIUM MOLLE. Stout, 2 feet high, with smaller flowers in a much more open panicle; plant viscidly villous as to all parts of the stem, and partly so as to foliage, this of many pinnae: calyx $\frac{1}{2}$ inch high, the triangular-subulate teeth little longer than the tube, not notably veiny, sparsely short-hairy and ciliolate; corolla $\frac{1}{2}$ inch wide; stamens short.

Piedra, southern Colo., 12 July, 1899, C. F. Baker, n. 545.

SILENE CONCOLOR. Rather robust and tall perennial, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, the thin foliage nearly glabrous, closely muriculate-punctate; upper part of stem and the inflorescence viscid-puberulent: basal leaves lanceolate, petiolate, 3 to 5 inches long, the cauline lance-linear, sessile, 4 to 6 inches long, all entire, acutish: flowers 2 to 4 from each upper node of stem, horizontally seated on slender erect pedicels; calyx $\frac{1}{2}$ inch long, turbinate-campanulate, scarious between the broad ribs, the teeth deltoid-ovate, ciliate: petals large, light green.

Black Range, New Mexico, in spruce woods at 8,000 feet, 11 Oct. 1904, O. B. Metcalfe, n. 1482.

DRYMARIA DEPRESSA. Near *D. tenella*, but dwarf, low and diffuse, with shortened pedicels and compacted inflorescence; spread of branches 2 inches, height of plant less than that: stem leaves broad, oblanceolate, obtuse: sepals obtuse, not strongly ribbed.

Open glades of the Black Range, New Mexico, at 9,500 feet, O. B. Metcalfe, n. 1430.

TRIFOLIUM NEUROPHYLLUM. Perennial, the scattered stems from horizontal rootstocks, 5 to 10 inches high, erect or decumbent, canescently villous, usually with a solitary peduncled inflorescence: leaflets of lowest leaves obovate to oblong, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, these passing to such as are $1\frac{1}{2}$ inches and linear and spinescently acute, all very prominently transverse-venulose and doubly spinulose-denticulate, both faces more or less loosely villous especially along the midvein: head at first flowering broader than high, at length 1 inch long and the flowers deflexed: calyx with 5 equal slenderly subulate teeth of twice the length of the turbinate tube, the whole villous with long appressed hairs: corolla twice the length of the calyx, deep red-purple.

Mogollon Mountains, New Mexico, 17 Aug., 1903, at 8,500 feet, n. 532. Of the group of *T. longipes*.

MALVASTRUM DIGITATUM. Evidently rather tall, the flowering branches a foot long, these and all green parts of the plant somewhat canescent with stellate hairs: leaves small, digitately or somewhat pedately divided into about 5 linear-oblong segments, these mostly entire, abruptly acutish: ends of branches loosely racemose, the flowers on very short pedicels: corolla scarlet, $\frac{1}{2}$ inch wide or more: teeth of broad depressed fruiting calyx subulate-triangular; carpels deusely stellate-tomentose.

Kingston, New Mexico, June, 1904, O. B. Metcalfe, n. 941.

Atasites and Thyrsanthema

In examining and naming a collection of choice plants from New Mexico that came to my work table more than a year since, I found a new member of the genus *Chaptalia*, as I would have called it, and as after mature consideration I did afterwards call it.

I knew that, as if upon the authority of the Kew Index and of Otto Kuntze, one or more American botanists had formally deposited *Chaptalia* and had put the name *Thyrsanthema* in its place. Real authority upon any such matter does not exist; but

how men like to assume the exercise of it is well exemplified in the action of the makers of the Kew Index. Mr. Bentham had years before suggested that probably *Thyrsanthema* was the same as *Chaptalia*; but he doubted. In the Index the Benthamian query is omitted, and the Neckerian genus is put down as positively the same as *Chaptalia*; this, too, as I shall venture to guess, without so much as a glance at the pages of Necker. Otto Kuntze had also tried to show that Bentham's doubts were groundless, and that *Chaptalia* must positively be reckoned a mere synonym of *Thyrsanthema*. But American botanists ought to have learned by experience before now, Mr. Kuntze's liability to err—and that by sheer superficiality of examination—in his interpretation of Necker. Shall I point out some instances of our having changed long lines of names according to his dictates, and afterwards found ourselves obliged to change them all back again?

For my part, I am sure I shall in no quarter be accused of any bias against strict priority. If *Thyrsanthema* of 1790 is the same as *Chaptalia* of 1800, with me the former stands, even though with no one else.

Let us open Necker's volume at pages 6 and 7, both occupied by his four segregates of the Linnaean *Tussilago*. Two of the segregates, *Petasites* and *Tussilago* are old genera well established long before Linnaeus. Necker simply restores them, with the names that belong to them by right of priority. His new genera are *Thyrsanthema* and *Atasites*. The later furnishes a luminous illustration of superficial slipshod and bungling methods of "authority" in disposing of Neckerian genera. I think everybody who has ventured a say about it has said that *Atasites* and *Gerbera* are identical; and yet *Gerbera* with Linnaeus was an *Arnica* species. Necker says twice over on the same page that *Atasites* is based on some Linnaean *Tussilago*, while in one place only on the page, he intimates that *Arnica Gerbera* may be included in *Atasites*. That is very different from making it the type species of the genus. Now what *Atasites* may be, I need not know. I only see that, according to Necker's

own reiterated statement, some Linnaean *Tussilago* is its type ; to which type *Arnica Gerbera*, Linn., is appended, as it were to get it out of the way.

Returning now to *Thyrsanthema*, I note first of all that a highly significant name is assigned this new genus ; even a diagnostic one. It gives distinct intimation of the nature of the inflorescence. *Thyrsanthema*—thyrsoidly arranged flowers—will apply to none of those species of the Linnaean *Tussilago* the scapes of which are monocephalous ; and so it is definitely indicated by the very name, that *Thyrsanthema* is not *Tussilago nutans*, Linn. It would apply well enough to all those species of the old genus *Petasites* which Linnaeus reduced to *Tussilago*. I therefore judge by the name alone, without even a glance at the Neckerian diagnosis, that we have in *Thyrsanthema* some segregate of *Petasites*, the genus one of the characters of which is a thyrsiform inflorescence. Indeed, I feel quite sure of it ; and a glance at what Necker has to say of the inflorescences of each of these four proposed segregate genera makes me doubly sure. I know beforehand that this author was accustomed to reckon as of generic value such distinctions as those between acaulescent and caulescent allies ; and when it came to the acaulescent species, a group with monocephalous or monanthous scapes he would treat as forming a genus distinct from one with polycephalous or polyanthous scapes. I learned this part of Necker's method long ago. And, assuming that he was ruled by it in the present case, the two genera on his page 6 form one group, and those on page 7 another. Or more taxonomically, to *Atasites* and *Tussilago* on page 7 are ascribed monocephalous scapes. Of the two on page 6, the last we know to be polycephalous, hence, even if *Thyrsanthema* had been given a meaningless name, we should feel confident that it had a polycephalous scape, because of our knowledge that this author did never such a thing as to intercalate a genus with thyrsiflorous scapes, between two others, each of which have monanthous scapes. This is a very essential item in the Neckerian taxonomy.

Let us now compare diligently the descriptions Necker gives of these two allied genera *Thyrsanthema* and *Petasites*. The

distinguishing mark between them is one only. In the former the bracts of the involucre are in several series and imbricated. In the latter they form but a single series, are equal and not imbricated. It is such a distinction as the most accomplished synantherologists of a hundred years past and more, have recognized as of generic value.

Now, whoever shall find among the thyrsiflorous species of Linnaean *Tussilago*, one that has imbricated involucre bracts, will have the type of *Thyrsanthema*, Neck.

I regret the necessity of here indicating how reckless the author of the *Revisio Generum* has been in his reading of Necker upon *Thyrsanthema*. The name, first of all, has been meaningless to him. He cannot have given it a thought. He assumes that to be scapose, a plant must have monocephalous scapes. Had he read the corresponding part of the diagnosis of *Petasites* he would have discovered this error; for Necker says of that also, proles scaposae, indicating no difference. Necker is made to say of the ray flowers that they are small (*parvi*), which would apply well enough to those of *Chaptalia*, but Necker says those of *Thyrsanthema* are minute. That is not *parvi*; and the term *minuti* while not applicable to the outer circle of corollas in *Chaptalia* is true to the letter in those of certain Linnaean thyrsoid *Tussilago* species. Necker says of the pappus of his genus, *simplex pilosusve*, which in the *Revisio* is put down as *simplex pilosus*. One means simple *or* pilose, the other simple *and* pilose. I do not comprehend the force of this part of Necker's diagnosis; but I do know that *simplex pilosusve* is not the same in meaning as *simplex pilosus*.

As regards *Chaptalia*, based as it is on *Tussilago nutans*, it may possibly be the type of Necker's *Atasites*, I think; for, as I have shown already, it cannot be *Gerbera*, which is only an appended species, not the type. It seems as if the type of Cassini's *Homogyne*, that is *Tussilago alpina*, Linn., of which the involucre is more or less imbricated, may have stood with Necker for the type of *Atasites*. It is an European type which Necker must have known well enough, while with the then new and rare *T. nutans* of the West Indies he may have been altogether unac-

quainted. But there is too much uncertainty about all this to warrant the taking up of *Atasites* for either *Chaptalia* or *Homo-gyne*, both of which are later; so that, for the present, *Chaptalia* is the only tenable name for the genus long recognized by that appellation.

As for *Thyrsanthema*, whoever wishes to see that which Necker so evidently had in mind for its type, may look at its fine representation in the Hortus Elthamensi's of Dillenius, plate 230. It is entitled to the name:

THYRSANTHEMA HYBRIDUM. *Tussilago hybrida*, Linn.

New Species of Chaptalia.

C. ALSOPHILA. Leaves $3\frac{1}{2}$ to 5 inches long, extremely thin and flaccid, almost glabrous, a scanty arachnosed tomentum along midvein and margin, even this often obsolete; outline obovate-oblong, acutish, the terminal half only lightly sepand-crenate, the lower narrower and distinctly crenate-lobed, even somewhat sinuate-lobed, the lobes retrorse, as are also the several prominent teeth of each: scape usually one only, 8 to 12 inches high, slender, much dilated under the involucre, the dilatation an inch long or more and white tomentulose; involucre an inch long; bracts few, subulate to subulate-linear, the margins flocculent; achenes slender; pappus slenderly stipitate.

Black Range, New Mexico, at 7000 feet, on shady northward slopes, 4 Oct., 1904. O. B. Metcalfe, n. 1454.

C. CONFINIS. Leaves 2 or 3 inches long, very firm, almost subcoriaceous, glabrous above, beneath pale with a thin but persistent tomentum not at all flocculent; outline obovate-elliptic, with 2 or 3 pairs of lobes at base, but body of leaf angulate-dentate, each tooth with a single mucro and this not retrorse: scopes 2 or 3 more, rigidly erect, 6 to 10 inches high, linear-bracted, not dilated under the involucre, this $\frac{3}{4}$ inch high, its bracts rigid: achenes tapering to a short villous beak rather than stipe.

Huachuca Mountains, Arizona, at 9,000 feet, Sept. 1882, J. G. Lemmon, n. 2789 as in U. S. Herb.

A Proposed New Genus, *Callisteris*.

An early attempt to resolve into natural genera the confused and impossible "*Gilia*" of Bentham and of Asa Gray, has been for years interrupted; but I here offer one of the ideas long entertained, namely the segregation of a natural group, all biennials or perennials, and of peculiar habit, of which Pursch's *Cantua aggregata* is typical. From the *Ipomopsis* of Michaux, itself an excellent genus and monotypic, they differ not only habitally and in foliage, but widely in character of calyx and seeds. They are in technical character, far nearer true *Gilia*, differing therefrom mainly by peculiar habit, biennial or perennial root, more fleshy and pectinate-pinnate foliage, a corolla of characteristic configuration and almost always in a manner bilabiate, the segments not radiating regularly, but one-sidedly to a greater or less degree. Moreover, no *Gilia* makes any approach to these plants in the peculiarity of their thyrsoïd paniced, or really thyrsoïd inflorescence. I recognize following geographic species of the genus CALLISTERIS:

C. AGGREGATA. *Cantua aggregata*, Pursch, Fl. i, 147. Calyx-teeth greatly exceeding the short tube, triangular-subulate, slenderly attenuate, herbaceous except laterally near base, hardly spinescent: corolla with rather short lobes very acute.

Plains and foothills of the Rocky Mountain region eastward and northward.

C. COLLINA. Calyx-teeth not half as long as the almost cylindrical tubes, very obtuse, abruptly aristate-pointed, the point straight, rigidly erect: corolla only pinkish, its oblong-lanceolate very acute lobes reflexed, and irregularly so.

Bluffs of Clear Creek on the plains not far from Denver, collected by myself, July, 1870. Type in my own herbarium.

C. LEUCANTHA. Two feet high, stout, the copious thyrsoïd of large white flowers a foot long; calyx subcylindric, purple, its lobes obtuse but each ending in short herbaceous recurved tip: lobes of the very long corolla rather wide, oblong, hardly acute.

At elevations of 8,000 and 9,000 feet in the Colorado moun-

tains; there often abundant, very beautiful. Type in my herbarium, collected by myself on upper Bear Creek west of Denver, 26 July, 1889.

C. ATTENUATA. White-flowered, but corolla-lobes lanceolate, slenderly acuminate; calyx-teeth also long and slender.

Parks of the interior of Colorado. See Gray, Syn. Fl. p. 145.

C. FORMOSISSIMA. Stem parted near the ground into upright racemose rather than thyriform branches, the flowers very large; tube of corolla truly though narrowly funnelform, the lanceolate segments slenderly acuminate, $\frac{3}{4}$ inch long, falcate-curved, crimson, dotted copiously with yellow: calyx almost wholly herbaceous, the subulate-linear teeth about equalling the tube and reflexed.

Black Range, southern New Mexico, 1904, O. B. Metcalfe, n. 1318.

C. FLAVIDA. Calyx rather open campanulate, largely scarious, the subulate-triangular herbaceous teeth equalling the tube and diverging at the same angle with it: corolla yellowish-red if not quite yellow, the funnelform tube nearly equalled by the lanceolate slenderly acuminate segments.

Southern Colorado, Baker's 532 from Arboles, as in U. S. Herb., being the type.

C. TEXANA. Stout, low, much branched, flowering almost from the base, the flowers smallish, scarlet: calyx-tube wholly herbaceous, turbinate, the rigidly erect triangular-subulate teeth rather shorter than the tube.

Gnadalupe Mountains, western Texas, V. Havard, Sept., 1881. Type in U. S. Herb.

C. ARIZONICA. Calyx short, wholly herbaceous, the deltoid very acute teeth shorter than the also rather short campanulate tube and erect: corolla with short tube not longer than the segments, these ovate-lanceolate or lanceolate, merely acute.

Northern Arizona, near Flagstaff, McDougal and others.

C. BRIDGESII. *Gilia aggregata Bridgesii*, Gray. Peculiar to subalpine districts of the Californian Sierra, perhaps northward in Oregon approaching the next, though not too closely.

C. PULCHELLA. *Gilia pulchella*, Dougl. in Hook. Fl. ii. 74. Common in Oregon, Washington and Idaho.

New Species of Pentstemon.

P. CINERASCENS. Suffrutescent, decumbent and low, the woody base producing sterile leafy branches, and others floriferous, the leaves and growing parts canescently and retrorsely short-pubescent; leaves an inch long or less, oblanceolate tapering to a narrow petiole, all entire, acute: inflorescence loose; pedicels and sepals hirtellous, the latter obovate-oblong to oblong-lanceolate, strongly striate, loosely ciliate: corolla purple, $\frac{3}{4}$ inch long, narrow, strongly bilabiate: sterile filament glabrous.

Douglas Co., Nevada, June, 1902, C. F. Baker, n. 1144 as in U. S. Herb.

P. CHIONOPHILUS. Allied to *P. confertus* and with equally congested inflorescence of small dark-purple corollas, but plant low and suffrutescent, with many decumbent woody branches, the whole plant barely 6 or 8 inches high, all the parts glabrous: leaves $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, mostly obovate-spatulate, the very lowest oblanceolate and petiolate, all entire, obtuse, mucronulate: sepals very short, obovate, subtruncate and cuspidate, the margins slightly scarious: corolla less than $\frac{1}{2}$ inch long, with long tube subcylindric and limb very short.

Snow Valley, Ormsby Co., Nevada, C. F. Baker, 8 July, 1902, n. 1278 as in U. S. Herb.

P. LACERELLUS. Allied to *P. confertus*, stouter, more leafy, glabrous, not glaucous; lowest leaves elliptic-lanceolate, the upper lanceolate, all entire, acute, $1\frac{1}{2}$ to 3 inches long: thyrsus short, crowded and flowers small; both the leafy bracts of the inflorescence and the sepals with broad scarious margins that are deeply lacerate: corollas purple, less than $\frac{1}{2}$ inch long, the tube narrow-funnelform and segments not small.

At Sargents', southern Colorado, 5 July, 1901, C. F. Baker, n. 352 as in U. S. Herb.

P. LATIUSCULUS. Near the last but very stout and large, 14

to 18 inches high, glabrous, glaucescent: lowest leaves elliptic-lanceolate, 3 or 4 inches long, short-petioled, the cauline ovate-lanceolate to subcordate-ovate, the largest 2 inches long and $1\frac{1}{4}$ inches in breadth toward the base: thyrsus large, at base leafy and the clusters on stout peduncles of an inch or more; both bracts of the inflorescence and the long sepals scarious-edged and laciniate: corolla purple, small for the plant, not more than 4 lines long, but broad for this group, the tube ventricose and segments short.

Stony ground along stream banks at Gunnison, Colo., 24 July, 1901, C. F. Baker, n. 588 as in U. S. Herb.

P. GLASTIFOLIUS. Allied to *P. confertus*, stouter, the few stems rigidly upright, with broad and short capitiform cluster of flowers at summit: leaves light-green, glabrous, thinnish, blades of the basal ones elliptical, 1 to 2 inches long, on slender petioles as long, the 3 pairs of the cauline spatulate-oblong, sessile, erect, obtuse, all entire: sepals oblong, obtuse, ciliate, puberulent on the back, not scarious-margined: corollas $\frac{1}{2}$ inch long, nearly tubular, with short limb.

Mineral King, Sierra Nevada, Calif., 3 Aug., 1891, Coville & Funston, n. 1449, as in U. S. Herb.

P. ALSINOIDES. Low suffrutescent slender ally of *P. confertus*, the loosely tufted stems only 5 or 6 inches high, decumbent or upright, all parts glabrous except the short capitiform inflorescence: leaves nearly all obovate or obovate-lanceolate, more or less distinctly short-petioled, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, obtusish, thinnish: sepals all linear-lanceolate and acuminate, with no trace of scarious margin, sparsely pubescent on the back: corollas very small, with nearly cylindric tube and comparatively ample limb.

Near Big Cottonwood Meadows, Sierra Nevada, Calif., 20 Aug., 1891, F. W. Koch, Death Valley Exp. n. 2138, as in U. S. Herb.

P. DEPRESSUS. Akin to *P. confertus* but low, caespitose, with very stout woody branches 1 to 3 inches long clothed with small entire coriaceous leaves $\frac{1}{2}$ inch long, elliptical, on short stout

petioles, the 2 or 3 cauline pairs subsessile: inflorescence depressed-capitiform, the rather few corollas large for the plant, tubular, with short not very irregular limb; sepals subquadrate-oblong, glandular-pubescent

At 13,000 feet in the White Mountains, Mono Co., Calif., Aug., 1888, W. H. Shockley.

P. INTERRUPTUS. Stems tufted, stout, rigid, upright above a decumbent base, a foot high, all parts of the plant glabrous: leaves thinnish, all narrowly lanceolate, entire, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long: flowers small for the plant, in 5 or 6 verticillasters 1 to 2 inches apart: sepals oblong lanceolate, the scarious edges toward the summit violet and variously laciniate: corolla 4 lines long, its tube a little dilated upwards and limb short.

Soda Springs on Mt. Conness, Calif., July, 1890, W. G. Harford. Type in my herbarium.

P. WASHOENSIS. Of the *P. confertus* group, stout and tall, 12 to 16 inches high, glabrous throughout and glaucous: lowest leaves smaller, elliptical, petiolate, cauline larger, lanceolate, sessile by a broad base, about 2 inches long, mostly shorter than the internodes: inflorescence large, as much interrupted as in the last, the lower of the 4 or 5 false whorls 2 inches apart: sepals oblong-linear, with triangular more or less toothed apex, indefinitely scarious-edged: corolla purple, more than $\frac{1}{2}$ inch long, with slightly ventricose subcylindric tube, the limb ample in proportion for this group, lower lip strongly bearded, sterile filament less so.

About Washoe Lake, Nevada, alt. 5000 ft., 13 June, 1902, C. F. Baker, n. 1079, as in U. S. Herb.

P. OREOCHARIS. More than a foot high, the stout stems rigidly erect above a merely short decumbent base; plant wholly glabrous, of a light green, not glaucous: basal leaves 3 or 4 inches long, oblanceolate, acutish, the cauline in about 4 pairs, lanceolate, sessile, 2 or 3 inches long, shorter than the internodes: inflorescence long and interrupted, the axillary clusters about 5 or 6 pairs and all but the uppermost on pedicels of $1\frac{1}{2}$ to 1 inch long: sepals mostly quadrate-oblong, some

obovate-dilated, all subulate-pointed and with narrow often erose scarious margins: corolla purple, small for the plant, 4 lines long, ascending, not deflexed as in the allied *P. confertus*; tube broad, nearly cylindric.

Pine Ridge, Fresno Co., Calif., July, 1900, Hall Chandler, n. 301 as in U. S. Herb.

P. LASSENIANUS. Akin to *P. confertus*, almost wholly herbaceous, stout, erect, a foot high, light green and glabrous: lowest leaves oblanceolate, cauline in 4 pairs, ovate to oblong-lanceolate, 2 inches long, sessile and half-clasping by a broad base: congested clusters of flowers sessile or definitely pedunculate: sepals with long liguliform nearly linear body and an abrupt long and slender caudate acumination, the slightly scarious margins erose or lacerate: corolla whitish or yellowish, short, but the tube somewhat ventricose, not cylindric, the segments not small.

At 6,000 feet on Lassen's Peak, California, 8 July, 1897, M. E. Jones. Type in U. S. Herb. It is also in my herbarium from the same region by Mrs. Anstin, and again in a purple-flowered form as collected by myself above Donner Lake, 26 July, 1895.

P. LINEOLATUS. Tufted, slender, a foot high, glaucescent, obscurely puberulent, leafy up to the open thyrsus of middle-sized flowers: leaves all entire, the lowest with oblanceolate or elliptic blade and slender petiole, the whole but an inch long, the cauline longer, oblanceolate to oblong-linear, sessile, ascending: peduncles 3-flowered and, with the calyx, sparsely villous with gland-tipped hairs: sepals elliptic-lanceolate, acuminate, finely and closely lineolate, not scarious-edged: corolla purple, $\frac{3}{4}$ inch long, narrow but ventricose, bilabiate: sterile filament densely hirtellous at tip, sparsely so to the middle.

Known only as collected by myself in the West Humboldt Mountains, Nevada, July, 1894.

P. PHLOGIFOLIUS. Tufted stems stout, rigid, upright, 1 to 1½ feet high, very leafy with large leaves exceeding the internodes, the whole plant glabrous, glaucous: basal leaves not seen,

cauline obovate to elliptical and small toward the base, the others ovate lanceolate, entire, sessile, ascending, 2 or 3 inches long, acute: thyrsus not compact: sepals ovate, cuspidate, lineolate, very narrowly scarious-edged: corolla purple, $\frac{3}{4}$ inch long, the tube ventricose and limb definitely bilabiate: sterile filament strongly bearded.

Castle Gate, Utah, M. E. Jones, 1894, sheet 237,290 U. S. Herb.; also by the same from Mt. Ellen, 1894, sheet 237,292. both labelled *P. confertus*, though the plant is in no way specially related to that species.

P. PRATENSIS. Stems solitary from short rootstocks, very slender, $1\frac{1}{2}$ feet high: plant glabrous throughout, sparingly leafy; basal leaves few, 1 to 2 inches long, of elliptic blade and slender petiole, cauline remote in 4 or 5 pairs, mostly sessile, lanceolate, 1 to 3 inches long: thyrsus short, of 3 to 5 clusters: sepals subquadrate-oblong, narrowly scarious-margined, the subtruncate summit abruptly subulate-pointed: corolla pinkish, $\frac{1}{2}$ inch long, narrow-funnelform, the segments not small; lower lip densely bearded.

Moist meadows of the Humboldt River about Deeth, Nevada, 14 July, 1896, collected only by the writer. Allied to *P. confertus*, as is also the following.

P. MODESTUS. Subalpine, with subliguous branching base and slender but rigid ascending stems 8 or 10 inches high sparsely leafy, the foliage firm and subcoriaceous: basal leaves 1 inch long or more of obovate to elliptic blade and slender petiole, cauline smaller, spatulate-oblong to oblong, acute, glabrous, as are all parts of the plant: inflorescence of 2 to 5 interrupted false whorls of small blue flowers: calyx small, of obovate sepals truncate and more or less dentate across the summit, indefinitely somewhat scarious-edged: corolla hardly 4 lines long, the very slender narrow funnelform tube deflected, the limb ample in proportion, lower lip bearded, as also the sterile filament at tip.

Ruby Mountains back of Deeth, Nevada, 20 July, 1896, collected only by myself; the type in my herbarium.

P. MILITARIS. Tufted stems stoutish, upright, a foot high, leafy with large elliptic-lanceolate sessile leaves, glabrous, except as to the short capitiform thyrus, not glaucous: leaves 3 inches long, equalling the internodes, entire, acute: sepals lanceolate, acuminate, narrowly scarious-edged, sparsely pubescent with curled hairs: corolla 8 lines long, with ventricose tube and bilabiate limb, the whole sparsely hairy without, the lip but lightly bearded: sterile filament bearded strongly at the very tip only.

Soldier Mountains, Idaho, L. F. Henderson, n. 3395, as in U. S. Herb., labelled *P. confertus*, and a true ally of that species.

P. PROPINQUUS. Of the group of *P. confertus* and allied to *P. militaris* but of widely dissimilar habit, showing copious basal and scanty cauline foliage, the stems only 8 inches high and from a subligneous branching crown or rootstock: basal leaves 2 inches long, of obovate-elliptic blade and short petiole, the few cauline reduced, oblanceolate, all acute, glabrous, thin: thyrus either capitiform or with a smaller cluster of flowers an inch below it: calyx elongated, the sepals subquadrate-oblong or even spatulate-oblong, abruptly acuminate, their scarious margins as wide as the herbaceous middle portion, the whole calyx sparsely pubescent: corolla $\frac{1}{2}$ inch long, dark-purple, slightly ventricose, the lower lip strongly bearded, also the sterile filament at tip.

Blue Mountains, Oregon, at 8,250 feet, F. V. Coville, 13 July, 1896, n. 549, as in U. S. Herb.

P. PRODUCTUS. Tufted stems a foot high or more, herbage deep green, glabrous flowers of *P. confertus* group: basal leaves elliptic-lanceolate, slender-petioled; cauline narrowly to broadly lanceolate, sessile: inflorescence mostly crowded and subcapitate but flowers not small: body of sepals lanceolate or linear, scarious edged, but ending in an equally long wholly herbaceous slenderly attenuate point, its very apex recurved: corolla purple, with uncommonly long and slender tube slightly widening upwards, hardly at all ventricose, $\frac{1}{2}$ inch long; segments a little elongated: sterile filament bearded for half its length or more.

Stein's Mountain, Oregon, 1896, J. B. Leiberg, n. 2,384, as in U. S. Herb.

P. ELLIPTICUS. Herbaceous to the base, a foot high or more, rather stout, glabrous throughout, glaucescent: basal leaves ample, slender petioled, the elliptic-blades $2\frac{1}{2}$ or 3 inches long, thin, faintly 3-nerved, the cauline all reduced, lanceolate, sessile by a broad base, much shorter than the internodes, those next the inflorescence denticulate: thyrsus large for the *P. confertus* group, the false whorls 5 or 6, but mostly approximate: sepals long, lanceolate, acuminate, broadly scarious and often toothed or serrated: corollas purple, $\frac{1}{2}$ inch long, rather broad as to both tube and limb, scarcely ventricose, lower lip bearded, as also the sterile filament at tip and below it.

Type in U. S. Herb. from some unrecorded station in the State of Washington, in 1889, by G. R. Vasey, n. 446.

P. VERONICÆFOLIUS. Herbaceous throughout, or old plants with short suffrutescent base, stout, a foot high, glabrous except as to inflorescence, glaucescent: basal leaves small, elliptic-lanceolate, petiolate, entire, cauline larger, in about 5 pairs, oblong to lanceolate, sessile, 2 or 3 inches long, entire, or more or less distinctly denticulate: thyrsus much interrupted, all parts glandular-pubescent: sepals lanceolate, acuminate, scarious-edged: corolla $\frac{3}{4}$ inch long, with narrow-funnelform tube and bilabiate, only sparsely hairy limb.

Known to me only as collected by Sandberg, in Idaho, in 1892, the type from Lake Waha, n. 245, and larger plant with leaves all entire, from Viola, Latah Co., n. 479. The leaves in all respects, save as to the bloom on them, recall those of some large *Veronica*.

P. ALBERTINUS. Near *P. humilis*, about as large, more slender, the foliage thinner: basal leaves 2 inches long, of ovate-elliptic acute blade and slender petiole of equal length, cauline in about 3 pairs, oblong to ovate-lanceolate, 1 to $1\frac{1}{2}$ inches long, shorter than the internodes, often like the basal quite entire, some denticulate, all parts glabrous: thyrsus rather lax: sepals lanceolate, acute: corolla blue, $\frac{3}{4}$ inch long, tube ventricose, limb ample, loosely bearded, as also the sterile filament at tip.

Sheep Mountain, Alberta, July, 1895, Mr. John Macoun, Geol. Surv. n. 11865, as in my herbarium.

Madronella.

During two years past the above name, now for the first printed, has existed in my herbarium on genus cover and species sheets that were formerly labelled *Monardella*. This last name has something of a history. Though in form it is generic, the author of Michaux's Flora who constructed it and first caused it to be printed, used it as specific under the genus *Pycnanthemum* to designate a dubious member of the genus; one which he seems to have thought of as perhaps meriting the rank of a genus. This is the natural and reasonable explanation of his having given the species a name that is as to form, generic. Only about thirty years later Mr. Bentham in monographing the whole family of the Labiates carried into effect what one must believe to have been purposely at least hinted at by Michaux, for he published, as a genus, the suggested *Monardella*, making Michaux's *P. Monardella* the type, renaming it *Monardella Caroliniana*, while the greater part of the species making up the genus as Bentham had it, were from Pacific North America, and not truly congeneric with the Carolinian type. And while later authors have remanded the type of *Monardella* to an older genus, and an older species even, the name has been retained for what is now a large genus of western plants.

The viciousness of this method in nomenclature I long ago endeavored to point out; and I here, after long delay, propose a new name for the western genus; a name made out of the old *Monardella*, that is MADRONELLA. I shall not attempt to transfer more than a portion of the species; but here is a considerable number of them, placing first in order what should be the type of the genus.

M. ODORATISIMA.	Benth. Lab.	under	<i>Monardella</i> .
M. UNDULATA.	Benth. l. c.	“	“
M. DOUGLASII.	Benth. l. c.	“	“
M. CANDICANS.	Benth. Pl. Hartw.	“	“
M. VILLOSA.	Benth. Bot. Sulph.	“	“
M. BREWERI.	Gray, Am. Acad. vii	“	“

M. HYPOLEUCA. Gray, Syn. Fl.	under	<i>Monardella</i> .
M. LANCEOLATA. Gray, Am. Acad xi.	“	“
M. LEUCOCEPHALA. Gray, l. c. vii	“	“
M. LINOIDES. Gray, l. c. xi	“	“
M. MACRANTHA. Gray, l. c.	“	“
M. NANA. Gray, l. c.	“	“
M. PALMERI. Gray, l. c. xii	“	“
M. PRINGLEI. Gray, l. c. xix	“	“
M. SHELTONII. Torr. Pl. Dur.	“	“
M. THYMIFOLIA. Greene, Bull. Cal. Acad. i.	“	“
M. DISCOLOR. Greene, Pitt. ii.	“	“
M. MODOCENSIS. Greene, Pitt. iv.	“	“
M. GLAUCA. Greene, l. c.	“	“
M. NERVOSA. Greene, l. c.	“	“
M. LEDIFOLIA. Greene, Pitt. v.	“	“
M. SUBSERRATA. Greene, l. c.	“	“
M. GLOBOSA. Greene, l. c.	“	“
M. NEGLECTA. Greene, l. c.	“	“
M. OVATA. Greene, l. c.	“	“
M. INGRATA. Greene, l. c.	“	“
M. OBLONGA. Greene, l. c.	“	“
M. RUBELLA. Greene, l. c.	“	“
M. MURICULATA. Greene, l. c.	“	“
M. EPILOBIOIDES. Greene, l. c.	“	“
M. VIMINEA. Greene, l. c.	“	“
M. ANEMONOIDES, Greene, l. c.	“	“
M. EXILIS. Greene, l. c.	“	“
M. SANGUINEA. Greene, l. c.	“	“
M. PENINSULARIS. Greene, l. c.	“	“

New Species of Isocoma.

I. TENUISECTA. Shrub more than a foot high, with slender scaberulous somewhat fastigate branches: leaves from narrowly linear and perfectly entire to remotely and narrowly-

linear-pinnatisect, but most commonly consisting of a linear rachis with 2 or 3 mere teeth or short lobes on either side, all hirtellous-roughened: bracts of the involucre pale straw-color with greenish tips, these often bearing a gland: achenes short, densely silky; pappus copious.

Mesas about Tucson, Arizona, collected by Smart, 1867, by Pringle, 1884, and by Toumey, Neally and others at more recent dates.

I. **RUSBYI**. Branches a foot high, slender, glabrous, corymbose at summit: leaves $1\frac{1}{2}$ to 2 inches long, ascending, narrowly linear, entire, obtusish, glabrous, 1-nerved: involucre broad, subcampanulate, the bracts in few series, oblong-lanceolate, acutish, glabrous, not glutinous, but acutish, tips green and pulverulent: achenes not seen.

Holbrook, northern Arizona, 20 Aug., 1883, H. H. Rusby.

I. **PEDICELLATA**. Shrub 8 to 12 inches high with many very slender upright branches glabrous, viscidulous, at summit fastigiate-corymbose: leaves very small, linear-oblong-lanceolate, glabrous, viscid, nerveless, bullate-rugulose: involucre one or several at the end of each filiform and elongated branch of the inflorescence, small, turbinate, their bracts in many series, oblong, obtuse, green and glandiferous at tip: achenes not seen.

Southwestern Texas, Edw. Palmer, 1879 or 1880, special locality not noted on label, the species most distinct from all others.

I. **BRACTEOSA**. Stout, apparently only suffrutescent, but 2 feet high, with many loosely fastigiate long branches all very sparsely hispidulous: leaves small for the plant, oblong-oblong-lanceolate, entire or with a few spinulose-serrate teeth, those of the flowering branches numerous but reduced to small sessile oblong entire acute bracts: cymes mostly of few and pedicellate heads; involucre turbinate, bracts much imbricated, subquadrate oblong, ending in an abrupt green tip thickened by a large gland, and with a terminal spinescent cusp or mucro.

Species strongly marked, but known only as collected in early flower somewhere in Tulare Co., California, by C. S. Sheldon, 1899.

I. *LEUCANTHEMIFOLIA*. Branches stout, tortuous, leafy with large foliage up to the ample compound cyme of large heads, scaberulous and viscid: leaves 2 inches long, broadly oblanceolate, obtuse, coarsely and closely serrate-toothed, scaberulous above, somewhat villous-arachnoid and viscid beneath: heads glomerate in twos and threes at the ends of the branches and branchlets of the cyme, large, with broadly subturbinate involucre many-bracted, the bracts with broad obtuse green and glandiferous tips: achenes not seen.

At Warren, in the Mountains of San Diego Co., Calif., 21 Oct., 1889, C. R. Orcutt.

I. *EREMOPHILA*. Branches $1\frac{1}{2}$ feet high, stout, glabrous, parted in the middle to form a loosely fastigiata panicle of cymose corymbs: lower leaves spatulate-oblanceolate, 2 inches long, obtuse, remotely subserrate-toothed, glabrous, punctate, those of the panicle all reduced, linear, entire: involucre small, turbinate, their bracts glabrous, not viscid, subquadrate-oblong, obtuse, only inconspicuously and shortly green-tipped, the tips of the inner with a large low gland on the back.

Southwestern part of the Colorado Desert, Calif., 1 Nov., 1890, C. R. Orcutt, n. 2,223 as in U. S. Herb.

I. *OXYPHYLLA*. Plant evidently large, the long branches striate, loosely villous-hairy, leafy up to the ample compound cyme of rather large heads: leaves 1 to $1\frac{1}{2}$ inches long, linear-lanceolate, entire, very acute, of thin texture, glabrous, light green: involucre broadly turbinate, glabrous, not viscid, the green herbaceous tips of the bracts large, elliptical: limb of corolla remarkably short.

Jamul Valley, back of San Diego, Calif., Edw. Palmer, 1875, the species very strongly marked, and not otherwise known.

I. *MICRODONTA*. Branches stout, scabrous, densely leafy up to the ample cymose panicle of rather large heads: leaves small; about $\frac{3}{4}$ inch long, spatulate-oblong, entire below the middle, subserrate-denticulate near the apex, the whole margin more or less scabrous-ciliate, both faces glabrous; branches of the panicle long and leafy, the leaves little reduced: involucre turbi-

nate, their many bracts with long scaberulous green tips and abruptly as well as almost pungently acute.

Santa Maria, southern Calif., Nov., 1893. Mrs. Blochman; the plant barely in early flower at that date.

I. LATIFOLIA. Very stout stems densely leafy and villous-arachnoid, the cobwebby wool extending to the bases of the broad sessile leaves, these spatulate-obovate, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, $\frac{1}{2}$ inch wide below the summit, coarsely and closely serrate-toothed all around except at base: heads many, rather large, forming a dense cymose panicle or thyrus; involucre short-turbinate, of not very many bracts, these short, mostly obtuse.

Island of Santa Cruz, coast of California, by the writer, Aug., 1886, also a form of the same with foliage longer and not as broad, from Santa Rosa Island, Brandegee, 1888.

I. SEDOIDES. *Bigelovia veneta* var. *sedoides*, Greene, Bull. Calif. Acad. ii. 400.

I. VILLOSA. Stems extremely robust but decumbent, parted above the middle into a broad panicle of many and compact cymose corymbs, the stem and all branches very leafy and softly villous with long spreading somewhat viscid and arachnoid pubescence: leaves of main stem 1 inch long or more, spatulate-oblong, obtuse, coarsely serrate, sparsely villous, viscidulous, those of the branches not half as large, often subentire: heads not of the largest, very many and crowded; involucre turbinate, bracts much imbricated, pungently acute, the green tips conspicuous but bearing no gland.

Type specimens in my own herbarium, gathered from the University Botanic Garden at Berkeley, Calif., in 1893, by Mr. Davy. The plant was sent from southern California, but I cannot recall by whom. Its next of kin is *I. latifolia*.

I. DECUMBENS. Branches a foot long, very slender, decumbent, sparsely leafy and leaves very small, narrowly oblanceolate, sharply serrate-toothed: heads much scattered, about 3 at the end of each slender branchlet and all pedicellate; involucre small, turbinate, bracts imbricated, oval or oblong, acute, their green tips villous-pubescent: achenes narrow-turbinate, very silky; pappus of coarse rigid unequal bristles.

C. F. Baker's n. 3405, collected by Mr. Brandegee San Diego, went out into distribution under the above name. I now think the plant must be a hybrid between an *Isocoma* and a *Corethrogyne*. In habit it is like the latter, also as to the pappus in all but its color, while the corollas are those of *Isocoma*.

New Asteraceous Genera.

In the journal entitled ERYTHEA, established by me at the University of California thirteen years ago, I began but did not finish the work of breaking up into natural genera the *Aplopappus* of Bentham as maintained by Gray for North American species. There were then under consideration two specific types which I could relegate to none of the genera that had been so well founded by pre-Benthamian synantherologists. These I wish here to offer as representing good genera not hitherto recognized ; and first,

TUMIONELLA MONACTIS. *Aplopappus monactis*, Gray, the nearest affinity of which I conceive to be *Acamptopappus*, of which it has in a way the involucre, corollas, achenes and the pappus, at least as to its permanent whiteness, while in habit and inflorescence it may be considered nearer several other groups of asteraceous shrubs inhabiting western deserts. The plant is very common upon a somewhat limited area of the Southwest, and good specimens abound in the herbaria ; something that cannot be said of the following.

HESPERODORIA SCOPULORUM. *Bigelovia Menziesii*, var. *scopulorum*, Jones, Proc. Calif. Acad. 2 Ser. v. 692, where it is described by Mr. Jones, who however failed to apprehend its real affinities. It is next of kin to my genus *Petradoria*, i. e. Nuttall's *Solidago pumila*, of which it has the foliage and something of the habit, but with very different inflorescence, involucre, corolla and achenes.

Along with this I place tentatively a type which remained in *Aplopappus* as I left it, that is

HESPERODORIA HALLII. *Aplopappus Hallii*, Gray. That this has rays while the type is rayless does not with me count for much ; but the involucre are not quite the same, neither is the pappus, nor even the style-tips.

Segregates from *Sieversia*

Never well content with North American *Sieversia* as set forth by myself seven years ago (Pitt. iv 78), I here present another and to my mind a more satisfasctory view of that heterogeneous assemblage. *Sieversia* was founded on a Siberian under-shrub low and slender, with almost rotate calyx and corolla, the former nearly chorisepalous, and its mature styles are long, filiform, plumose to the very apex. We have nothing in North America that I can regard as congeneric with it ; and our most familiar kindred types are far enough from that in habit and respective generic characters, and as far from each other.

Our subarctic and subalpine, or even alpine herbs with yellow flowers, of peculiar habit and turbinate calyx-tube are distinct by two important characters of the style, which is neither plumose, nor even accrescent after flowering. They are hardly longer than the stamens ; and the whole group is so much like *Potentilla* that two of the four members of the genus already described were at first published as of that genus. There are few if any better genera of Potentilleæ than this ; and I name it ACOMASTYLIS.

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| A. ROSSII. Seringe in D.C. Prodr. ii. | under | <i>Geum</i> . |
| A. TURBINATA. Rydb. in Torr. Bull. xxiv. | “ | “ |
| A. SERICEA. Greene, Pitt. iii. | “ | “ |
| A. GRACILIPES. Piper., Torr. Bull. xxvii | “ | <i>Potentilla</i> . |
- A. DEPRESSA. Caudex very long and stout: leaves very short, rosulate-depressed, softly appressed-silky but not canescently so: scapiform peduncles only 2 or 3 inches high, 1-flowered: calyx tube very short, scarcely turbinate, the segments twice or thrice as long, the whole very villous.

Mount Stuart, Washington, Aug. 1898, A. D. E. Elmer, n. 1182, as in U. S. Herb.

The type that has been called *Geum triflorum* and *Sieversia triflora*, differs from the last named as far as possible in aspect. The accrescent and plumose character of the styles it has in common with *Sieversia*, but its flowers are so different that there is no comparison between them. They are analogous to those of *Horkelia* as contrasted with *Potentilla*, that is, the calyx is never expanded, and the petals are elongated and erect, never in the least spreading. The genus has a remarkable range, occurring from Labrador all the way across to the Pacific shores, and southward as far as Mexico. The species are to be distinguished, just as in most *Potentilla* groups, by almost no characters of flower or fruit, but by good characters of foliage. The red color of the calyx is nearly universal, and the mature styles are as red underneath the plume; and so I call the genus ERYTHROCOMA.

E. TRIFLORA. *Geum triflorum*, Pursh. Leaf-segments ascending, cuneiform, 1 to 1½ inches long, almost parallel-nerved, entire except near the apex, there deeply 3-toothed, or bifid and each lobe 3-toothed: calyx-segments triangular-subulate, very acute, much surpassed by the narrowly linear bractlets: petals spatulate-oblong, obtuse, nearly equalling the bractlets: plume of the achenes 2 or 2½ inches long.

Elevated prairies and drift hills of Illinois, Wisconsin, Minnesota, and the Dakotas.

E. CINERASCENS. Allied to the last, but low, the foliage barely half as large, subcinereously appressed-villous; leaf-segments not half as large, more broadly cuneate, more deeply 3 to 5-toothed, less ascending on their rachis: flowers quite as large as in the last, the red color of the calyx concealed by a denser pubescence: plume of achenes hardly 2 inches long.

Black Hills about Fort Meade, western S. Dakota, W. H. Forwood, 1887; good specimens in U. S. Herb.

E. AFFINIS. Also allied to *E. triflora* by broad segmentation of foliage with segments entire except at summit, of subquadrate-cuneate outline, ¾ to 1 inch long, deeply 3 to 5-toothed, not notably ascending but spreading on their rachis, nearly glabrous

save as to the notably pilose-ciliate margin, of the same deep green as both the foregoing: calyx of the largest, deep red and only moderately pubescent, the lance-linear bractlets large, surpassing the erect petals: plume of achenes $1\frac{1}{4}$ inches long.

In meadows near Banff, Alberta, Canada, June and July, 1899, W. C. McCalla, n. 2,073, as in U. S. Herb.

E. AUSTRALIS. Large, $1\frac{1}{2}$ feet high when mature; leaves not large in proportion, deep green as in the foregoing, foliage more dissected, far less pubescent, minutely and viscidly so underneath a very sparse clothing of long pilose hairs; segments usually cleft to the middle, with one lobe entire and small, the other longer and 2 or 3-toothed, all teeth and lobes obtuse, callous-tipped: flowers mostly 3 only, long-peduncled: bractlets lance-linear, exceeding the calyx-segments, not rarely bifid at summit: plume $2\frac{1}{4}$ inches long.

At 8,500 feet in the mountains of southern Colorado above Cimarron, C. F. Baker, n. 214 as in my herbarium.

E. BREVI-FOLIA. Seldom a foot high, the two interdodes of the short stems each bounded by a whorl of unusually large pinnatisect leaves: proper foliage short and compact, the leaflets crowned, nearly divaricate, very broadly cuneate or cuneate-obovate, much dissected, the ultimate lobes acutish or obtuse, both faces of mature foliage almost glabrous under the sparse clothing of slender and not long pilose hairs, these not notably appearing as a marginal ciliation: segments of calyx oblong-lanceolate, bractlets uncommonly small and not exceeding them, the whole calyx fully equalled by the quite broad obtuse petals: plume fine and short, $1\frac{1}{4}$ inches long.

Subalpine in the mountains of middle Utah; collected by M. E. Jones (3 sheets in U. S. Herb.), and Lester F. Ward; S. Watsons' n. 318 probably the same, but taller and with less abbreviate foliage.

E. FLAVULA. Size of the last, more slender, the foliage rather small, more dissected but open, not of crowded leaflets, their pubescence scanty and none of it long-pilose: flowers 3, on pedicels both short and slender; calyx with very short low-hemispheric tube, short deltoid or deltoid-ovate segments barely purpled-veined like the petals and yellowish; bractlets small, shorter than the segments, and the whole calyx quite surpassed by the broad obtuse obovate petals: plume short, 1½ inches long, not red.

Wind River Mountains, Wyoming, Nelson's 829 as in my herbarium the type for flowers; W. H. Forwood's, of July, 1882, as in U. S. Herb., for fruit.

E. DISSECTA. Large and with large foliage, distinguished from all the foregoing by light green herbage and more finely dissected foliage, the leaflets from broad-cuneiform to narrow rhombic in outline, all deeply, the larger somewhat pinnately cleft into oblong lobes, both faces almost glabrous except at or very near the margin, there sparsely long-pilose: flowers mostly 3, neither the linear bractlets nor triangular-lanceolate calyx-segments any more than equalling the yellow petals: mature fruit not seen.

Mountains of Central Colorado, about the sources of the Platte and the Arkansas rivers, therefore on the Atlantic slope of the continent. Superficially most resembling *E. ciliata* of the far northwestern Pacific slope, yet with fair characters. The best specimens are by Crandall and Cowen from near Como, and from Michigan Creek, n. 624 by an unknown collector, 5 Aug., 1899, both these as in U. S. Herb.

E. CILIATA. *Geum ciliatum*, Pursh. This is an aggregate which I fail to resolve into its specific elements by any certain characters. The plants all have a foliage much dissected and more or less strongly though loosely pilose, the margin more or less apparently ciliate. Nothing is more easy than to distinguish these plants as a group, from the eastern *E. triflora*; but this has a range of its own and comparatively restricted. This one

has a geographic form abundant in northern Colorado, many parts of Wyoming and Montana; another in Idaho (whence came the original) and part of Montana, and throughout at least eastern Washington and Oregon; perhaps several rather than one. These all have long calyx-segments and long narrow bractlets; but the foliage is different in different localities, though not very definitely so.

Var. *ORNATA* is marked essentially by its calyx-bractlets, these being cleft into 2, 3, or 5 filiform segments. Specimens are before me from Idaho (Heller), Washington (E. P. Sheldon), and from the Yellowstone Park (Burglehaus).

E. CAMPANULATA. Low, the stems 6 to 9 inches high, usually 2-flowered: leaves short, the leaflets crowded, obovate-cuneiform 3 to 5-cleft, the lobes oblong, obtuse, upper face appressed-pilose, margin not ciliate: flowers broad and short, quite campanulate, with short deltoid-ovate segments and still shorter small bractlets hardly longer than the hemispherical tube, the whole greatly surpassed by the obovate very obtuse crimson-tinted petals: achenes not seen.

Olympic Mountains, Washington, July, 1900, A. D. E. Elmer, n. 2529 as in U. S. Herb.

E. CANESCENS. Stouter than the last, sometimes taller; leaves as short, broader, canescently soft-villous and sparsely pilose; leaflets obovate-cuneate, with 3 to 5 segments or teeth mostly broad, oval, obtuse but with small abrupt cusp-like termination: stems mostly 3-flowered: calyx-tube very short, bractlets small, commonly of but half the length of the ovate-lanceolate segments; petals obovate-spatulate: plume hardly more than an inch long.

Northern Sierra Nevada, Calif., Brewer, 1863, on a volcanic cone above Ebbett's Pass, 8,500 feet; also from like elevation above Donner Lake, Heller, 1903. Perhaps Cronkhite's n. 38 from Klamath Valley, and also Leiberg's n. 2555 from Steins' Mountain, both these in Oregon, may be referred here.

E. GRISEA. Caudex very large in proportion to the whole plant; stems at flowering only 5 to 8 inches high: foliage small, firm, hoary with a quite uniform short villous-tomentose pubes.

cence, longer and more pilose hairs altogether few and obscure : leaflets less than $\frac{1}{2}$ inch long, cuneiform, mostly not cleft and equally tridentate at summit, others bifid and with 3 teeth on one lobe, 2 on the other : calyx-segments triangular-lanceolate, very acute, surpassed by the linear bractlets.

Subalpine slopes of the San Francisco Mountains, northern Arizona, J. B. Leiberger, 25 June, 1901. Type in U. S. Herb.

E. ARIZONICA. Much larger than the last, the foliage ample, of thin texture and pale, but as if glaucescent, not hoary with pubescence, the hairiness rather sparse, long and pilose though appressed : leaflets an inch long, obovate-cuneiform, commonly cleft into 3 to 5 unequal segments, each rather unequally 2 or 3-toothed : calyx-segments triangular-lanceolate, attenuate-acuminate, much surpassed by the linear long-attenuate bractlets : plume $1\frac{1}{2}$ inches long, nearly colorless.

Hillsides and summits of the region about the San Francisco Mountains, Ariz., MacDougal's n. 65 from about Mormon Lake, and Rusby's from Bill Williams Mountain being typical.

E. TRIDENTATA. Tall as the last, the foliage of similarly glaucescent hue but also distinctly though not densely villous-pilose, the leaf-segments or leaflets cuneate and cleft only at the apex or not at all, many being simply tridentate at apex : flowers large, long-peduncled : calyx-segments lanceolate, attenuate-acuminate, hardly surpassed by the narrow-linear bractlets ; petals spatulate-oblong, subtruncate, mucronate : plume $1\frac{1}{2}$ inches long.

Willow Spring, White Mountains, Ariz., Edw. Palmer, June, 1890, n. 506.

E. ALIENA. Low, with small leaves and remarkably stout stem 6 or 8 inches high : leaflets of the small leaves when grown almost glabrous above, strongly pilose-ciliate, the lower face sparsely pilose, all short, broadly cuneate, not cleft but only 3 to 5-toothed near the summit : flowers small, the low-hemispherical calyx-tube singularly turgid, even obscurely 5-saccate ; segments short, ovate-lanceolate, merely acute, the bractlets small, about equalling the segments : fruit not seen.

Sierra Madre, Chihuahua, at 7,500 feet, 6 June, 1899, Townsend & Barber, n. 15 as in U. S. Herb.

Various New Species.

PETASITES VITIFOLIA. Leaves large, broadly cordate ovate, 6 inches broad across the deeply cordate base, 8 inches long, sub-incisely and deeply 5-lobed, the one terminal and two basal lobes with coarse triangular teeth or secondary lobes, the others subentire, lower face of leaf thinly and only hoarily flocculent: fruiting raceme 4 inches long, rather dense, the large heads on slender pedicels: flowers and young foliage not seen.

Emerson, Manitoba, 10 June, 1880, Mr. John Macoun; type specimens in U. S. Herb., the label without specific name; the cut of the large leaf intermediate between that of *P. palmata* and *P. sagittata* in configuration like that of the grape leaf in general.

PETASITES TRIGONOPHYLLA. Leaves not large, about 4 inches long, nearly or quite as wide in the middle, of a peculiar triangular outline and consisting of a terminal part not larger, even smaller now and then, than either of the two subhastate or subsagittate-basal lobes, all three primary subdivisions deeply and incisely cut into triangular secondary lobes and these entire or toothed, upper face of leaf deep green and whitish-veiny, the lower thinly white-tomentose: scapes stout, covered with imbricated lanceolate bracts usually ending in a small trifid blade: heads many, small, subcorymbose.

Wet meadows, Carlton Co., Minnesota, May and June, 1891, J. H. Sandberg, as in U. S. Herb.

EUTHAMIA HIRTELLA. Growing in colonies; stems a yard high from rootstocks, striate-angled, hispidly hirtellous: leaves ascending, lance-linear, 3 to 4 inches long, faintly strigulose above, beneath almost hispidulous along the veins, the margins serrulate-scabrous: branches of corymbose summit fastigiate, strongly hispid-hirtellous: heads sessile in glomerules of 3 or more, the whole formed into a nearly flat-topped dense corymb: involucre turbinate, their bracts hardly acute, the short outer ones green-tipped.

At present known only from northern Indiana, as collected by myself at Lakeville, 29 Sept., 1903, and by Mr. C. C. Deam in Wells Co., 27 Aug., 1905. In characters approaching *E. Nutt.*

allii of the middle Atlantic slope, but taller, with longer, narrower and ascending rather than spreading foliage, a longer and more fastigiately branched corymb, etc.

POLYGONATUM VIRGINICUM. Stem stoutish, 3 feet high, notably striate: leaves elliptical, about 4 inches long and 2 in width, neither acuminate nor even acute, the short tip very obtuse, glabrous throughout, glaucous beneath, above of a dark rich green and marked conspicuously by about 17 slender parallel nerves, of which 8 nearly equal the midvein in prominence, the alternating ones less prominent: peduncles 2-flowered, rather short, ascending, the pedicels subequal: perianth tubular, 7 lines long.

Bluffs of Holston River, southeastern Virginia, May, 1892, John K. Small; type in U. S. Herb., labelled *P. commutatum*, like that species in size, but in size only, being a true ally of *P. biflorum*.

POLYGONATUM CUNEATUM. Stem rather slender, 1½ feet high, the naked lower portion finely striate: leaves narrowly cuneate-elliptic, elongated, stout, 5 inches long, 1½ in width, acuminate, tapering somewhat cuneately at base to a short petiole, glaucous beneath and sparsely and minutely pubescent with very slender yet obviously acute hairs, dark green and glabrous above, both faces pervaded by 9 to 11 nerves of which the midvein alone is very conspicuous, 2 laterals less so, the others faint: peduncles filiform in flower and pendulous, the lower 2-flowered, the upper 1-flowered: perianth small, 4 lines long, whitish as to the tube: berries small.

In forests of sugar-maple on the northern peninsula of Michigan, near Turin, Marquette Co., 31 May, 1901, Bronson Barlow; type in U. S. Herb., sheet 416,083; beautifully marked by the distinctly cuneate-based long foliage.

POLYGONATUM BOREALE. More than a foot high, nearly upright, rather slender, the leafy portion of the stem shorter than the striate naked basal part: leaves large for the plant, elongated-elliptic, 4 inches long, 1½ in width, glaucous beneath and loosely pubescent with very fine more or less curled and appressed hairs of equal thickness from end to end, above pale and glaucescent but glabrous, the manifest nerves 5 to 7, but

only 3 prominent: peduncles filiform, pendulous, mostly 1-flowered, when 2-flowered the pedicels very unequal: perianth very small, 4 lines long, of a very deep green, darker than the foliage.

Winona, Minnesota, 9 June, 1885, Johu M. Holzinger; type in U. S. Herb.

Mutations in *Viola*

Among the North American violets that have been first brought into notice through my researches during the last ten years, there are several which, at the time of their publication I indicated as being perhaps mere abrupt metamorphoses, so to speak, of more common and familiar forms; abrupt though perhaps permanent deviations from the names of other species; distinguishable and demanding to be distinguished from mere varieties by the abruptness of their divergence from their parent types, not showing those intergradations with it which subsist between varieties and their respective type species.

Over and above those recognized by me at the outset as probable mutations, there are others which I did not at first suspect of having had such origin, but which I have since learned to think of as probably belonging to that category; and I wish without further delay, to make a list of all which I now view in the light indicated, not excluding from the list a few quite old species—published as such, at least—the very names of which are at this date half-forgotten.

V. *INDIVISA*, Greene, Pitt. v. 124, t. 13. To the detailed account of this given at the place cited I have to record some extension of its known range. It seems to occur in very typical condition in the immediate vicinity of Chicago. U. S. Herb. sheet, n. 313,261, over a label reading "Flora of Chicago. Collected by W. S. Moffatt, M. D.," contains four specimens, of which three are *V. pedatifida* with leaf segments wider than usual, the fourth exactly *V. indivisa*. The indication of special locality is "Claybanks." Sheet 339,398, by L. M. Umbach from Naperville, very near Chicago, 18 May, 1897, is occupied by four specimens of pure *V. indivisa*, and in petaliferous flower. The corollas are larger than in those garden-grown specimens described

and figured, but the petals are so evidently notched that this must be accepted for one mark of the form; this notwithstanding that there are occasional hints of the emarginate in those of *V. pedatifida*.

V. BERNARDI, Greene, Pitt. iii. 260, also partly (and especially as to probable origin) Pitt. v. 123, and partly that of Pollard in Britton, Man. 635. Stout and low, the whole plant at petaliferous flowering only 4 or 5 inches high, the hirtellous petioles no more than twice the length of the leaves, these flabelliform, often broadly and roundedly so, yet only subtruncate at base, never cordate, but the middle basal portion tapering abruptly to the petiole: petaliferous flowers borne barely above the foliage, large, deep purple as to the petals; sepals lance oval, obtuse, somewhat serrulately ciliolate. Autumnal state not taller than the vernal, glabrate, copiously fructiferous from apetalous flowers, the capsules borne quite above the foliage and large, oblong, fully $\frac{1}{2}$ inch, obtuse, of more than twice the length of the small narrow long-auricled sepals. Leaves of all stages cleft to near the middle into 9 to 12 oblong straightish (not falcate) obtuse segments.

This is the first proper diagnosis that has been given of what I had in mind as *V. Bernardi*. Much of what I and others have, in the last seven or eight years, referred to it I now see must be excluded. The actual type specimen of *V. Bernardi* is a petaliferous one in my herbarium collected by me at Albion, Wis., May, 1866. Doubtless the very same, specifically, is one from Plattsville, in the same part of Wisconsin, by S. M. Tracy, 1 Nov., 1887, also in U. S. Herb., this my type for the autumnal state; but there is a better sheet of precisely the same from Riley Co., Kansas, 9 Sept., 1895, by J. B. Norton.

These autumnal specimens present points of contrast with those of *V. pedatifida* which must here be indicated. A perfect type of the last is in my herbarium, collected by myself in a typical prairie locality near Sandoval, Illinois, 1898, is just a foot high, its fruiting peduncles only 5 to 6 inches, therefore borne distinctly and far below the leaves. Another sheet by me, taken at Prairie du Chien, Wis., the same year, is 10 inches high, with peduncles of only 2 to 3 inches, or of less than one-third the

height of the foliage. The capsules of these are about three-fourths of an inch long in the longest. The real *V. Bernardi* is, then, a strongly characterized mutate.

The plant I had from Rock Co., Wis., from Mr. Bernard Saunders in 1897, is intermediate between *V. Bernardi* and the parent species.

V. PERPENZA. Tall and slender, even at petaliferous flowering 8 or 9 inches high and with peduncles and petioles of equal length, all slender, glabrous or nearly so: leaves small in proportion, thinnish, broadly subcordate in outline, deeply cleft, or the small earliest only subserrate-toothed or lobed, the segments of all the later regular and even, a little falcate, the lower margin of each apt to be serrate-toothed; largest summer foliage 3 inches wide near the base, the length a trifle less, all the veins and even now and then the leaf-surface strigulose-hirtellous, most so beneath, sepals oblong-lanceolate, acutish, very lightly and delicately ciliolate: apetalous summer flowers on short very slender prostrate and even sometimes hypogeous peduncles: petaliferous flowers often fertile, their oblong capsules middle-sized.

The type specimens as to early state are on U. S. Herb. sheet 441,069, and were collected on a moist prairie at Dunning, near Chicago, Ill., 18 May, 1902, by Dr. H. S. Pepon. There is another from Ottawa, Ill., by C. F. Johnson, May, 1889, and a third from "Low prairies, Dupage Co.," Ill., by Dr. W. S. Moffatt; all these from the same region roundabout Chicago. But the plant was first known to me as seen and collected by myself at Dixon, Ill., from a low prairie, 18 June, 1898. I incautiously labelled the specimens *V. Bernardi*, not so much overlooking the almost or quite hypogeous nature of their summer flowers as suspecting that this might prove to be a character of that plant, the summer flowers of which were not then known. It was from a view of these specimens of mine, labelled wrongly *V. Bernardi*, that the character of the summer peduncles was taken by Mr. Pollard for his account of *V. Bernardi* in Britton's Manual.

I doubt that *V. perpensa* has any intimate relation to *V. pedatifida*; but I find it convenient to name and define it here, as having been mistaken for that evident mutation, *V. Bernardi*.

V. FALLACISSIMA. *V. Bernardi*, Mackenzie, Man. 135, not of Greene. Low at petaliferous stage, the large foliage on short petioles as in *V. Bernardi*, but herbage of a light green, the stout petioles quite villous-hirtellous, the peduncles slender and glabrous, bearing the flowers just above the foliage: sepals lanceolate, acute, ciliate: corolla not large, apparently blue rather than purple: foliage whether young or mature more like that of *Bernardi* than of *perpensa*, always more or less flabelliform rather than subcordate in outline, cleft to the middle in the earlier, in the later nearly to the base, at this stage on elongated petioles (plant 8 or 10 inches high) the blade more than 3 inches wide and about as long, the segments broad, obtuse, often coarsely subserrate-toothed, rather densely but shortly hirtellous-ciliate and with sharp partly appressed hairs on the veins as well as now and then in the spaces between them: apetalous flowers of summer very short-peduncled and almost or quite hypogeous, never straight or upright.

In dry woods of extreme western Missouri, Jackson Co., collected by Mr. Bush and also by Mr. K. Mackenzie, and sent to me rather copiously by both, their specimens with less divided foliage being reported by me as *V. Bernardi*, the others as *V. pedatifida*, all too hastily done, on my part; for not one of the specimens can rightly be referred to either of those species, They all represent a plant somewhat analogous to *V. perpensa*. yet in character very different. That this has any immediately genetic relation to *V. pedatifida* I altogether doubt. All the material known to me is in my own herbarium.

V. DIGITATA, Pursh. Fl. i. 171; probably also *V. ranunculifolia*, Juss. in Poir. Encycl. viii. 626. Related to *V. pedata*, from which it differs by a cuneate-obovate leaf which is undivided and digitately cleft, or merely lobed, or even only toothed. Such a violet, inhabitant of the Atlantic slope of the United States southward, was known to Michaux; next by Le Conte, who communicated dried specimens to Pursh from Virginia, with also doubtless the manuscript name *V. digitata*; but later Le Conte declined to assign it a name even as a variety,

though he mentions it in his monograph (Ann. Lyc. N. Y. ii. 147) as a frequent state of the species. It seems to have been rarely collected; but there is a good sheet of it in U. S. Herb. from Hamlet, N. C., 15 Apr., 1897, by C. S. Williamson, who found it "In dry sand, in pine barrens." There is also a fine specimen from Bluff Spring, Clay Co., Alabama, by Pollard and Maxon, July, 1900, in which the digitate foliage appears as the aestival development in a plant whose earlier leaves were normally pedate. I take this deviation to be not exactly a mutation, but rather an example of atavism. It seems to tell us that a remote ancestor of *V. pedata* had the foliage of *V. digitata*. This view has a further warrant in the young plants of *V. pedata* that spring up from root shoots (its seedlings have never been described) the foliage of which is invariably of the digitate type, only simpler, exhibiting the cuneate figure, but with only about 3 teeth or lobes at summit.

The analogue of *V. digitata* in the case of the northwestern *V. inornata*, Greene, has been both described and figured in Pittonia.

V. LAETECAERULEA, Greene, Biol. Soc. xiv. 70. Though not quite certain that this well marked violet is a mutata of *V. papilionacea*, I have hardly a doubt that it is such. Two years ago, by Mr. Steele's guidance I came to the original station for it. I found it plentiful on the one low mound-like elevation of the Potomac flats whence the specimens had come. About the borders of the elevation there was some almost typical *V. papilionacea*, which species, however, is abundant at no great distance, on lower ground, and perfectly normal. There are acres of it on the flats, and I could find no specimens elsewhere than on the elevation referred to, which indicated any approach to *V. laetecaerulea*. This not surprising; for the true thing has all the strong characters which I assigned it when I published it.

V. CONJUGENS, Greene, Pitt. iv. 3. In the original account of this I have said that the corollas are large and blue, recalling those of *V. cucullata*; also that young plants, before acquiring the multicipitous caudex and copious leafage and flowering, might pass for *V. emarginata*—excepting, of course, the pale

color of the corolla. This blueness of the corolla was one of the facts which, taken along with the massed rootstocks, leaves and flowers, convinced me that the plants could not be referred to *V. emarginata*, although the locality was one in which that species might be looked for.

A year after having published it I transferred a clump of it to my garden, and the one self sown seeding from it had corollas almost purple, so that I have since then suspected the whole thing of being a mutata, of which *V. emarginata* is the parent, notwithstanding that the characters of it are good enough for a proper species.

V. ABERRANS, Greene, Proc. Philad. Acad. for 1903, p. 683. This offspring of *V. fimbriatula* is the first violet observed by me which at the very outset impressed me as indubitably a mutata. In the midst of a colony of the true *V. fimbriatula* near Washington there grew one plant differing from all the others not only by its cordate long-petioled leaves with no hint of the dentation, but also by the fact that its caudex was multicipitous. I transferred the plant to my garden. It flourished there for three years. Seedlings from self-sown seed sprang up around it the second year, others the third year, seven or eight of them in all. Out of those one was a revert to *V. fimbriatula*, a perfect revert, without shadow of approach to its true parent, while the other six or seven were as precisely true to the parent. I noted at the time some characters of calyx and corolla, and wrote them down, but the manuscript is lost.

After all this, the violet came in to me, in the dry, from Mr. Witmer Stone, for my opinion as to what it should be, and I gave him my manuscript name for it, and my view of its origin. He afterwards expressed his own—a zoologist's—opinion of it. It is not now rare in the U. S. Herbarium, and has come in from various localities; and here, notwithstanding my own exclusive right to the name, I find several sheets have been labelled by Mr. House "*V. aberrans* (Stone) House"!

V. SECEDENS, Greene, Pitt. v. 121. At the place of publication this has been sufficiently indicated as, in my opinion, a mutata; bearing just that relation to *V. subagittata* of the West, which *V. aberrans* bears to *V. fimbriatula* of the East.

The Genus *Tridophyllum*.

The species of the very old genus *Potentilla*, were distributed by Tournefort among his three genera *Quinquefolium*, *Tormentilla* and *Pentaphylloides*. Linnaeus' retained *Tormentilla* and relegated the other twenty-five or thirty species to one genus *Potentilla*. Since then many a taxonomist has studied the Linnaean *Potentilla* with a view of resolving its incoherent elements into a number of natural and acceptable genera. Among all the segregate genera that have been proposed, not one is better entitled to the rank of a genus than Necker's *Tridophyllum*. As its name indicates, it is founded upon species of Linnaean *Potentilla* having trifoliolate leaves. But this mark of the foliage is not the one which he considered essential. He makes the generic rank of the group to rest on the very small ovaries, greatly reduced styles, and minutenaked achenes. The so-called *Potentillas* that evince these characters have other marks more obvious. Their roots are annual, or now and then of biennial duration. All other plants that ever were referred to *Potentilla* are perennial, and very many suffrutescent. The whole aspect of this group is such as to enable an experienced botanist to recognize a member of it at first glance. This is not true of even such genera as *Drymocallis* and *Horkelia*, for these are not habitually distinguishable the one from the other, or either one from certain plants that are still retained in *Potentilla*.

The North American species of TRIDOPHYLLUM are perhaps more numerous than the European; but they are every one western, and in Necker's day were yet undiscovered. His type of the genus is *P. monspeliensis*, and he does not seem to have realized the fact that *P. supina* has all the essential marks of TRIDOPHYLLUM.

The genus in a small one, but is far more widely dispersed than almost any other segregate of *Potentilla*. The prompt maturing of the individual as annuals, and the small smooth seeds

easily dispersed and in myriad numbers, must have favored so wide a dissemination.

T. MONSPELIENSE.	Linn., Sp.	under	<i>Potentilla.</i>
T. NORVEGICUM.	“ “	“	“
T. SUPINUM.	“ “	“	“
T. NICOLLETTII.	E. P. Sheldon,	“	“
T. PARADOXUM.	Nutt. in T. & G.	“	“
T. RIVALE.	“ “	“	“
T. PENTANDRUM.	Engelm. “	“	“
T. BIENNE.	Greene, Fl. Fr.	“	“
T. CRYPTOTENIAE.	Maximowicz.	“	“

New Species of Mimulus.

M. EQUINUS. Erect, simple, 2 feet high, not stoloniferous, perhaps not perennial, remotely but equably leafy from base to summit, glabrous except as to the minutely puberulent calyx: leaves thin and delicate, $2\frac{1}{2}$ inches long including the slender petiole, the blades ovate or oval, acutish, saliently dentate: raceme of few or rather many flowers: calyx large, with short subequal teeth and villous-ciliate sinuses: corolla very large, nearly 2 inches long, wholly yellow.

“Horse Pasture,” near the summit of Mt. Sanhedrin, middle California, A. A. Heller, n. 5924 as in U. S. Herb.

M. IMPLICATUS. Slender perennial a foot high, much branched from near the base, abundantly leafy, few-flowered; plant deep green, nowhere puberulent, everywhere minutely and sparsely hairy: leaves equably distributed, often slender-petioled, 1 inch long or more, ovate or oval, remotely and very saliently dentate, the floral slightly broader and sessile but not reduced to bracts. pedicels of the 3 to 5 flowers greatly elongated, twice the length of the leaves: mature calyx strongly bilabiate, coarsely purple-dotted: corolla $1\frac{1}{4}$ inches long, yellow.

Mill Creek Falls, at 5,500 feet in the mountains back of San Bernardino, Calif., S. B. Parish, n. 5630 as in U. S. Herb.

Probably descended from the subalpine *M. implexus* of northern California, but with no such underground growth, and good characters of its own.

M. PANICULATUS. Stems stout and somewhat fistulous, 1 to 2 feet high, glabrous, remotely leafy, small plants simply racemose at summit, the larger in a manner paniculate, each axil bearing a raceme instead of the usual peduncles; root not seen: lowest leaves 3 or 4 inches long, peduncles and blade about equal as to length, the latter oval, obtuse, doubly dentate: pedicels and calyx as well as bracts minutely villous: corolla yellow, $1\frac{1}{2}$ inches long, with short tube and broad limb.

Witch Creek, San Diego Co., Calif., May, 1894, R. D. Alderson.

M. PRIONOPHYLLUS. Stems simple, 8 or 10 inches high from a short horizontal base or rootstock, not stoloniferous, probably only annual or biennial, densely leafy at base with somewhat rhombic-ovate or deltoid-ovate obtuse leaves an inch long or more, on very short winged petioles, the cauline smaller and remote, of obovate outline and sessile, all definitely and not very finely pubescent and rather closely subserrate-dentate; floral bracts ovate, cuspidate, not more pubescent than the proper foliage, calyx rather less so: corolla $\frac{3}{4}$ inch long, wholly yellow; the few flowers all long-pedicelled.

Willow Spring, Arizona, June, 1890, Edw. Palmer, n. 527.

A Further Study of *Chaptalia*.

The reference is to pages 154 to 158 preceding, an enquiry into the tenability of *CHAPTALIA* as the name for a certain genus of American *MUTISIACEÆ*¹. What led to that study were the *C. alsophila* and *confinis* of p. 158. The investigation of these two was not made without examination and comparison of a large collection of herbarium material in the National Museum

¹ I use this name purposely as that of a Natural Family; one clearly distinct from all other so-called *Compositæ*. There is, in my view no true relation, and nothing but the merest analogy between these plants and either asters or sunflowers.

and in my own, gathered in from almost the whole extent of southern North America, and northern and middle South America.

Out of these collections I find the following to have been hitherto undescribed ; and there are more such, doubtless.

I do not find ground for distinguishing, generically, between *Chaptalia* and *Leria*.

C. TEXANA. Plant with rather large foliage very thin, and with the usually solitary scape, from a short and not thick root-stock : leaves commonly 4 to 6 inches long, lyrate by a few pairs of small shallow lobes, the large terminal one oblong-oval, acutish, obsoletely sinuate and not remotely retrose-dentate, the upper face green but with a few conspicuous rolls of wool lying along the midvein, beneath permanently white-tomentose but thinly so : scape 8 to 16 inches high, bractless, floccose, not thicker under the involucre, this an inch high, of floccose-tomentose linear acuminate bracts : small achenes scabrous, the slender stipe of the pappus twice as long.

Rocky sparsely wooded ground in western Texas, the type Neally's 297 as in U. S. Herb., Lindheimer's n. 446 and the n. 674 of the Mexican Boundary Survey appear to be the same ; perhaps also Reverchon's n. 1546, but that is doubtful. It seems different.

C. CARDUACEA. Smaller than the last, the foliage firmer, hardly lyrate, the whole leaf sinuate-lobed, and somewhat retrorsely so, but the upper lobes broader and more shallow, the denticulation very sparse, upper face glabrous, lower white-tomentose : scapes only 6 inches high, bractless, rigid, wiry, the rather large heads nodding even in maturity ; bracts subulate and subulate-linear, hard and rigid, pungently acute, tomentose : achenes papillose-scabrous, shorter than the stipe of the pappus.

San Diego, Texas, Miss Croft, n. 35 as in U. S. Herb.

C. SONCHIFOLIA. Plant large, about 3 scapes a foot high, the numerous leaves about 4 inches long, all from the nearly obsolete crown of a cluster of long and soft whitish roots, leaves thin, only thinly arachnoid beneath, above glabrate except as to rolls of loose wool lying along the midvein, lyrate-pinnatifid, the shallow rounded lobes each with 2 or 3 small

salient mucro-like teeth : scapes with a few filiform bracts, and gradually thickened under the head, this 1 inch high, its bracts long, narrow, thinnish, tomentose : achenes not seen.

Rincon Mountains, Arizona, at 7500 feet, G. C. Neally, 1891, n. 223, as in U. S. Herb.

C. POTOSINA. Thin foliage, fleshy-fibrous roots and obsolete rootstock all as in the foregoing, as to texture, but plant smaller : leaves perfectly glabrous above, very lightly flocculent beneath, scarcely lyrate, but with broad blades lightly and rather evenly sinuate-lobed, the lobes with or without a tooth : scapes dilated above under the immature heads, and bracted.

San Luis Potosi, Mexico, Parry & Palmer, n. 544, as in U. S. Herb.

C. HOLOLEUCA. Small leaves and scapes from a subligneous upright rootstock fibrous-chaffy with the remains of the leaves of former seasons : leaves $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, scarcely lyrate, usually with one pair of small lobes at base of the body of the blade, this oblong-oval, acute, runcinate-toothed, the whole leaf of firm texture and thickish, densely white-tomentose beneath, less densely and more loosely so above, as well as perhaps less permanently : scapes rigid, naked, 2 or 3 inches high : involucre $\frac{1}{2}$ inch high ; bracts oblong-linear, white-tomentose except at the rigid purple tip.

Near Saltillo, Mexico, May, 1898, Edw. Palmer, n. 192 as in U. S. Herb.

C. PRINGLEI. Larger than the last, the subligneous rootstocks horizontal and only thin-chaffy : leaves numerous, firm, very densely and compactly white-tomentose beneath, the thin coat on the upper face flocculent and more or less promptly deciduous, the leaf-outline obovate-oblong, very shallowly sinuate-lobed, not lyrate, the rather many small retrorse teeth seldom manifest : scapes solitary, 8 or 10 inches high, rigid, nearly bractless, not dilated under the involucre, this of many very narrow floccose bracts : achenes with beak or stipe as long as the body.

Cañon above Domingillo, Oaxaca, Mexico, C. G. Pringle, Nov. 1894, n. 5796 as in U. S. Herb.

C. LEUCOCEPHALA. Rootstock none, the crown of the root deep-seated, the petioles of the many leaves therefore partly hypogeous and blanched: leaves 3 or 4 inches long, somewhat lyrate sinuate and narrowed below the ovate acute terminal lobe, the whole margin remotely denticulate, texture thin, upper face glabrous, lower merely pale with some traces of a thin arachnoid tomentum: scapes 3 or 4, stout, 7 to 10 inches high, flocculent, filiform-bracted; bracts of involucre lance-linear, white with a loose tomentum: achenes finely appressed-pubescent, the beak short.

Foothills of the Sierra Madre, Chihuahua, Sept. 1887, C. G. Pringle, n. 1312 as in U. S. Herb. named *C. Seemannii*, but the foliage makes no approach to that attributed to Seemann's plant.

C. LEONINA. Rootstock short, ascending, not chaffy at top: leaves not distinctly lyrate, in outline obovate-oblong, obtuse, coarsely retrorse-crenate-lobed, obscurely denticulate, 2 or 3 inches long, thin, thinly arachnoid above, beneath densely white-tomentose: heads large, on short naked scapes of only 3 inches: bracts of the involucre broad and much imbricated, tomentose except as to the purple margins and tips, the latter pungently acute: achenes crystalline-granular, tapering to a beak of their own length.

Strongly marked species from either Coahuila or Nuevo Leon, Mexico, by Edw. Palmer, in 1880, n 764 as in U. S. Herb., in aspect more like the Texan *C. carduacea* than any other.

C. PETROPHILA. Rootstock an inch long, ascending, the roots slightly fusiform, leaves upright, 5 or 6 inches long, oblong-lanceolate, cuspidately acute, obscurely denticulate, in no degree lyrate but the base of some leaves lightly sinuate, all very thin, glabrate above, beneath thinly hoary-tomentose: scape solitary, naked, a foot high or more: bracts of involucre subulate to linear-lanceolate, floccose-tomentose except at the pungent tip.

Rocky hills near Guadalaxara, Mexico, 22 July, 1902, C. G. Pringle, n. 11315, as in U. S. Herb.

C. MONTICOLA. Rather slender and tall species of subalpine woods, with no proper rootstock and fleshy-fibrous roots: leaves

small, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long including the narrow petiole, not in the least lyrate or otherwise lobed, broadly cuneate-oblong, acutish, saliently dentate, often coarsely so, thin, glabrous above, beneath more or less canescently thin-tomentose: scapes very slender, $\frac{1}{2}$ to 1 foot high, with few erect bracts and a long narrow head, the bracts of the involucre few, lance-linear: achenes canescently somewhat villous, short-beaked.

Mountains of middle Mexico, at 9,500 and 10,000 ft., C. G. Pringle, numbers 6411 (type) and 9882 as in U. S. Herb., both labelled *C. Seemannii*, to the description of which species these specimens in no wise respond even remotely.

C. CRISPULA. Rootstock short, upright: leaves $1\frac{1}{2}$ to 3 inches long, cuneate-oblong, or some tapering more spatulately, obsolete denticulate and more or less crisped, never in any way lobed, thinnish, glabrate above, densely tomentose beneath: scape mostly solitary, naked, flocculent, as also the subulate-linear and linear bracts of the involucre: achenes small, glabrous, pappus-stipe filiform, twice the length of the achene.

At 3000 feet in the mountains of Santa Rosa, Guatemala, 1892, Heyde & Lux, n. 3433 as in U. S. Herb.

C. DIVERSIFOLIA. Rootstock short, ascending, bearing unusually copious fleshy-fibrous roots: leaves rather few, thinnish, light green and glabrous above, thinly tomentose beneath, not concealing the many feather veins, the outline various, the terminal lobe in some subcordate-deltoid and with only a nearly straight wing-like border running down below it, in others more oval and with a pair of more or less lyrate lobes above the wing-like basal margin, the margins of all terminal lobes lightly retrorse-crenate and retrorse-denticulate: scapes 1 to 3, commonly $1\frac{1}{2}$ feet high, flocculent, naked: involucre more than an inch high, its bracts all very narrow, and, by involution of the margin, appearing almost filiform: achenes small and slender, delicately scaberulous, surmounted by a filiform stipe of 4 times their length.

Near Mazatenango, Guatemala, 20 Febr., 1905, William R. Maxon & Robert Hay, n. 3504 as in U. S. Herb.

C. SUBCORDATA. Large plants, without rootstock but with $\frac{1}{2}$ to 1 inch of leafy stem above ground: leaves ample, 5 to 8 inches long, very thin, glabrous above, thinly hoary-tomentose and permanently so beneath, of an unusual type of the lyrate in form, a large subcordate-oval terminal part often 4 inches long and 2 in breadth occupying the upper half, below this a broadly winged petiole, all the margins lightly and remotely crenate and with a rather close denticulation everywhere: scape usually solitary, not dilated under the involucre, this not large, many-bracted and imbricate: immature achenes short-beaked.

Islands of Porto Rico and St. Croix, the type Ricksecker's n. 447 from St. Croix, as in U. S. Herb., Percy Wilson's n. 40 from Porto Rico evidently the same.

C. FALLAX. Rootstock obsolete; leaves many, 2 to 4 inches long, oblanceolate, somewhat spatulately so, acutish, entire or faintly undulate, or obscurely crenate, no denticulation obvious deep green and glabrous above, densely and permanently white-tomentose beneath: scapes several, slender, naked, 8 or 10 inches high, abruptly dilated under the narrow involucre; bracts of this narrowly subulate and subulate-linear, many and much imbricated: achenes with a distinct slender beak.

Vicinity of Baracoa, Cuba, Jan., 1902, Pollard & Palmer, n. 86 as in U. S. Herb. The collectors referred this to the Floridian *C. tomentosa*, evidently looking to the leaves only. By its involucre and achenes it is unmistakably of the other group, namely that of *Leria*, and not a proper *Chaptalia*.

C. PRIMULACEA. Rootstock not thick, upright, somewhat tapering and root-like: leaves many, narrowly oblanceolate, mostly 3 to 6 inches long, thin, glabrous above, beneath densely white-tomentose, but the numerous feather veins somewhat glabrate and conspicuous, the outline in no degree lyrate, the whole margin lightly repand-crenate one retrorse tooth at base of each crenature, the apex cuspidate-mucronate: scape usually 1 only, 5 to 8 inches high, very slender, naked, abruptly enlarged under the small involucre; bracts of this subulate as to the outer, the inner narrowly linear, all flocculent: achenes scabrous, the slender beak nearly as long as the body.

Island of Santo Domingo, Wright, Parry & Brummel, 1871' n. 261 as in U. S. Herb. The long narrow foliage of thin texture, singularly white beneath, and the very slender scapes together give the plant a marked likeness to *Primula farinosa*.

C. EROSA. Rather slender rootstock an inch long, ascending or horizontal, the fibrous roots neither large nor fleshy: leaves 3 or 4 inches long, very thin, dark green and glabrous above, beneath pale with a thin but close persistent tomentum, lyrate lobes small, in two pairs, body of blade oval, acutish, lightly and coarsely crenate-lobed and the whole margin sharply erose-dentate: scapes several, a foot high, slender, naked; involucre an inch high. of subulate-linear thin bracts: achenes small, slender, the slender stipe of the pappus of twice their length; pappus firm and soft.

Costa Rica, June, 1892, Conduz, n. 447 as in U. S. Herb.

C. MICRODONTA. Large, with well developed ascending, rootstock: leaves 3 to 9 inches long, with broadly oblanceolate blade tapering to a winged petiole nearly as long, margin of all minutely and not at all retrorsely denticulate, upper face darker green or even purplish, glabrous in maturity but arachnoid-tomentose when young, lower face densely silvery-tomentose: scape not slender, 16 to 20 inches high, naked, flocculent: involucre large its outer bracts subulate-filiform, inner narrowly-linear: achenes minutely hispidulous on the ribs and as minutely scaberulous between them; pappus-stipe slender-filiform, 4 or 5 times the length of the achenes.

Yungas, Bolivia, 1894, Miguel Bang, n. 2095 as in U. S., Herb., named *integrifolia* on the label; but Cassini's *Leria integrifolia* is of southwestern South America, and extremely different from this.

C. MAJUSCULA. Rootstock stout, an inch long or more: leaves commonly 8 or 10 inches, lyrate by several pairs of deep and angular small basal lobes below the very large terminal one, this oval to ovate-lanceolate, subcordate, lightly but distinctly crenate-lobed, each lobe with 2 or 3 sharp retrorse teeth, texture of the whole very thin, glabrous above, hoary beneath with a

light and thin tomentum: scapes stout, a foot high, naked, flocculent: involucre large, many-flowered, almost hemispherical at flowering, bracts very narrow, numerous: achenes minutely and sparsely pubescent along the ribs, and more minutely granular-scaberulous between them; stipe of pappus filiform, very long.

Bolivian species; Rusby's n. 1677 from Mapiri and Bang's 237 from Yungas, both as in U. S. Herb.

Icianthus and Sprengeria.

Under these names I am about to propose two other genera of Cruciferae.

ICIANTHUS has for its type species what Hooker named *Streptanthus hyacinthoides*, a Texan annual which, in the Torrey and Gray Flora, was mistakenly appended to that section of *Streptanthus* to which Nuttall has assigned the generic or subgeneric name *Euclisia*; a group marked by many characters of the calyx and corolla, and to which the type now in hand can by no means rationally be referred, its calyx not being thin, or inflated, or in the least degree bilabiate. In ICIANTHUS the calyx is (1) not in the least inflated, (2) its sepals are thick and fleshy, (3) straight to their tips, (4) forming a regular calyx (5) none of the sepals connivent at apex. The petals have (6) not the broad and deeply channelled claw, nor (7) the short and somewhat rounded limb of *Euclisia*.

The species of ICIANTHUS are perhaps several, and more than are here indicated.

I. HYACINTHOIDES. *Streptanthus hyacinthoides*, Hook. Bot. Mag. t. 3516. *Euclisia hyacinthoides*, Small, Fl. 485 in part Species exclusively Texan, bearing long loose racemes of rather small nodding flowers of a dull greenish purple.

I. GLABRIFOLIUS. *Streptanthus glabrifolius*, Buckley, Proc. Philad. Acad. 1861, p. 448 must needs be distinct by its short, crowded racemes of quite large flowers said to be rose-purple.

I. **ATRATUS.** Stems erect, simple, 1 to 2 feet high, bearing a simple and short raceme of large dark-purple flowers at summit; herbage glabrous, glaucescent; leaves oblong to linear, sessile: sepals tipped with a somewhat abrupt long acumination: petals nearly $\frac{3}{4}$ inch long, the oblong limb much wider than the narrow claw, of very dark purple, almost blackish: pods not known.

Along the Canadian River, Indian Territory, M. A. Carleton, June, 1891; type in U. S. Herb.

There is a type inhabiting the deserts of the Great Basin and of southeastern California which has been masquerading for half a century as a *Lepidium* with yellow flowers; a circumstance which Doctor Torrey himself in publishing the species considered very extraordinary for a *Lepidium* and he therefore named it *L. flavum*, regarding this as the most salient feature of a species, which nevertheless, has other and more significant peculiarities. Not only the flowers but also the whole herbage is yellow—at least decidedly yellow-green. Its stout depressed branches are more or less definitely dichotomous, bearing in the forks and at the ends, not the racemes of any *Lepidium*, but short subumbellate clusters of flowers and pods commonly broader than high. The lower pedicels of this cluster are leafy-bracted. The pods themselves are surmounted by a stout persistent style of half their own length, while in most lepidia there is no trace of any style at all.

Here are then, five points of divergence from each and every section of *Lepidium* that can be brought into comparison with it; and the aggregate of all these marks of this annual of western deserts, gives to the type an aspect more like that of certain desert genera of capparids, such as *Oxystylis* and *Wislizenia*, than like any genus of cruciferae that can be mentioned.

Three subspecies of SPRENGERIA are well isolated geographically, and may take names as follows:

S. **FLAVA.** The original of *L. flavum*, Torr., restricted to the

Mohave Desert, of southern California, a region having an elevation (as to habitat of this species) of 2,000 feet more or less. Excellent specimens have been distributed by A. D. E. Elmer. In this plant all the foliage, even that of the branches, is narrow and pinnatifid.

S. WATSONIANA. Habit of the former, with short racemes resembling heads or umbels, but branches clothed with only somewhat cuneate leaves that are sometimes few-toothed about the summit, more often quite entire and very acute: pods smaller than in *S. flava*, more rounded, the style longer in proportion, more than half the length of the pod.

Deserts of Humboldt River, northern Nevada, especially about Humboldt Lake, altitudes of 4,000 and 4,500 feet; the type Watson's n. 126 as in U. S. Herb.

S. MINUSCULA. Smaller, more slender, less depressed: racemes distinctly elongated and longer than broad: pods smaller than in either of the foregoing, more rounded, their pedicels filiform and well lengthened.

Isolated small deserts among the mountains of Inyo Co., California, at altitudes of 5,000 and 6,000 feet; type certain specimens of Coville & Funston's n. 734 as in U. S. Herb. Specimens by M. E. Jones from Owen's Valley referred here.

New or Noteworthy Species.

DALEA URCEOLATA. Slender glabrous, annual, freely branching, 5 to 8 inches high: leaflets 11 to 21 oblong to cuneate-oblong, emarginate $1\frac{1}{2}$ to $2\frac{1}{2}$ lines long, sparsely glandular-dotted beneath: spikes oval to oblong, $\frac{1}{2}$ to 1 inch long, dense: calyx rather thin and urceolate, the very short and connivent triangular-subulate teeth villous: corollas small, light-blue.

Type specimens from the Mogollon Mountains, N. Mex., 20 Aug., 1903, by Mr. Metcalfe, distributed under n. 553. The plant has been collected by others, usually mixed with *D. polygonoides*, a species of similar habit, but with different foliage of about 5 to 7 linear leaflets.

BIDENS TENUISSIMA. Very slender, widely branching, 2 to 6 feet high, glabrous throughout: leaves mostly ternate, very thin and flaccid, long-petioled; leaflets broadly lanceolate, acuminate, remotely serrate-toothed, petiolulate, the odd one of more than twice the size of the lateral pair and on a much longer petiolule: heads extremely small for the plant, campanulate, only 2 or 3 lines high and nearly as broad, rayless; outer foliaceous and spreading involucre bracts spatulate-lanceolate, far surpassing the others, inner oblong, acutish, 3-nerved: achenes from oblong-cuneiform to cuneate-linear in each head, the outer series being shorter and broader, these with a pair of short teeth rather than awns, the inner with a pair erect upwardly barbed awns, all the achenes sparsely soft-hairy.

Inhabiting moss-covered and decaying logs in swampy woods near Saratoga, Mississippi; collected by S. M. Tracy, 2 Oct., 1903, and distributed by him under n. 8,525. A gigantic ally of *B. connata*, but with almost minute heads.

ASTER COPELANDI. Stems clustered from a mass of interturred small and wiry rootstocks, slender, ascending or assurgent, 5 to 8 inches high, usually monocephalous, sometimes with 2 or 3 subcorymbose heads; herbage green and seeming glabrous, but the margins of the small lance-linear leaves from ciliate in the lower to sharply and closely scabrous-serrulate in the upper, the peduncular upper part of the stem sparsely and softly hirtellous: heads large for the plant, the involucre hemispherical, 4 or 5 lines broad, the firm bracts in few series, subulate-linear, acute, ciliate: rays short but rather showy, violet.

At 6,000 feet on Mount Eddy, northern California, 7 Sept. 1903, by Mr. Copeland; distributed by C. F. Baker, under n. 3,867.

PENSTEMON VASEYANUS. *P. ellipticus*, Greene, Leaflet. i. 167, not Coult & Fisher, Bot. Gaz. xviii: 302.

ANTENNARIA ANACLETA. *A. latisquamea*, Greene, Leaflet. i. 145, not of Piper, Bull. Torr. Club, xxviii: 41.

I am under obligations to the kindness of Mr. Piper for having indicated these errors of mine in nomenclature, which I now endeavor to correct.

An Unwritten Law of Nomenclature.

In the process of genus-naming, whether in relation to animals or plants, there are possible courses of action not a few that are in various degrees open to objection as leading to the introduction of names more or less offensive and repugnant to good taste. Many names of that character had become established in earlier and later pre-Linnaean botany; so many that, with the steady advance in literary learning and mental refinement, early in the eighteenth century Linnaeus seems to have felt that the time was ripe for a reform of nomenclature in this particular. There existed then, as there has always existed, and most naturally, a deep sense of the right of priority in nomenclature; but such appears to have been the degree of dissatisfaction felt with a host of generic names then in vogue, that Linnaeus' rules published as code in the *Philosophia Botanica* led at once to the suppression of a long list of distasteful names despite their being under the supposed protection of the law of priority. Such expurgation of generic nomenclature as was then made could never have been effected through the mere will of one individual reformer. Botanists in general, as men of culture, must have been already more or less disgusted with the superabundance of cheaply and easily made names that were current in all the books, and upon the tongues of all teachers of our science. Let any one who will, look for himself into the indexes of genera found in the excellent volumes of Ray, Tournefort, Vaillant, Boerhaave and others of the most celebrated among the immediate precursors of the Swedish reformer. There are I think hardly fewer than a hundred names formed by the mere adding of *oides* at the end of the generic name to make a new one for some different genus. *Carex*, for example, was *Cyperoides*, *Oxytropis* was *Astragaloides*, one roseaceous *Pentaphyllum*, and next after it *Pentaphylloides*, this indistinctive undignified onomatology—ready-made, so to speak; for the most illiterate pretender to anything approaching botany could by this cheap trick make a hundred or two of

generic names—this name-making method, I say, had already disfigured nomenclature beyond further endurance on the part of the educated.

Then there was a second easy mode of constructing generic names *ad libitum*; that of taking two distinct names of old genera and writing them together as one, to form the title of a new genus different from both. Such were *Cytisogenista*, *Lilionarcissus*, *Narcissoleucomum*, and a dozen more of that ilk, all of which held their places in all the books, until Linnaeus called for their banishment despite their indisputable priority, and they were banished. I long since came to regard this expurgation of the list of generic names—one made, I repeat, despite priority—as his greatest benefaction to botany.

But there was one possible way of abusing the name-maker's privilege which Linnaeus did not legislate against, and that for the reason that there was then upon record no instance of it; nor could he have dreamed that such an abuse would ever have an example, so utterly irrational and absurd every thoughtful mind must regard it, at least until some one supposed to be sane and competent has led the way; for there is no kind of absurdity which some one will not approve and practice if but some supposed authority has given the first example of it. I refer to the newly introduced usage of naming two or three different genera of plants in honor—dishonor, it should be said—of one and the same man, and doing it deliberately. Against this usage no legislation or admonition was ever yet directed that I know of. Law against it was never enacted or suggested, and for the simple reason that no one would be expected to violate such a principle. From the time—now twenty-five centuries past—when *Eupatorium* and *Gentiana* were dedicated to royal botanists, down through all the later centuries of genus-naming, from Conrad Gesner, Matthioli and Caesalpinus, of the sixteenth century, to the middle of the nineteenth, I believe that every instance of a botanist's having a second genus named in his honor was accidental; the two names—sometimes three or four, and even five—were each made without knowledge of the existence of another; and when the facts became known, and the later name must needs pass into synonymy, the new and substitute name was not al-

lowed to bear, in its structure, any allusion to the man to whom the genus had been at first dedicated. An unwritten law against such a procedure was recognized; a law, one may say, of common sense, common courtesy, good taste.

The earliest instance of an apparently deliberate transgression of this unwritten law that I meet with so far, I find in Kunth's *Enumeratio*, Volume V, published in 1850. There may be earlier cases, though I think not. At that date there had been already two genera dedicated to De Witt Clinton under the name *Clintonia*, one in 1817, the other in 1829. I need not here repeat the bibliography, for I gave it in the second volume of *Pittonia* more than sixteen years since. The author of the name, as it appeared in 1829, had no knowledge of the existence of the same as applied to another genus in 1817. His—the second *Clintonia*—was therefore but an accident; but in 1850, Kunth finding the 1817 *Clintonia* valid, altered that of 1829 to *Wittia*, thus dedicating a second genus to De Witt Clinton. A few years later Dr. Torrey came to know this and promptly declined to make use of or give recognition to Kunth's *Wittia*; but, though it had priority in its favor, he suppressed it, substituting *Downingia*; and *Downingia* was at once adopted everywhere, both in America and in Europe, *Wittia* therefore hardly obtaining recognition as a synonym. This must have been Dr. Torrey's first intimation that it could ever enter into the mind of a botanist to do such violence to one of the most fundamental principles of nomenclature; and his only passing comment on Kunth's error is "It would be inadmissible to bestow two genera on the same person."¹ It is possible, barely, that Kunth did not know that Rafinesque's original *Clintonia* had been dedicated to the same Clinton; but that is unimportant. No one has ever admitted *Wittia* as a name, because, as Torrey said, that and the *Clintonias* are named for the same man.

I do not know that any case like the above was again furnished until some forty years later; but from about the time of the appearing of Mr. Otto Kuntze's *Revisio* this phase of degeneracy in nomenclature made a new beginning and has not yet met

¹Pacific Railway Report, iv. 116 (1857).

with a line of adverse comment, or indeed of any comment of any kind. Not that I am at all certain of that learned author's having dedicated any two genera to the same person. I recall that, having suppressed the *Greenella* of Gray, he proceeded to make restitution by proposing another genus *Greeneina*. It also may be charitably supposed that the authors of the very recently published name, *Greeneocharis* thought neither of the two others valid genera. If so, they are excusable on the ground of their not holding to the principle of the invalidity of revertible names.¹ But among those many Americans who have subscribed to this, and act accordingly, there is no condoning this violation of a law so plain that it never seemed to need formal and verbal enactment until within the last decade. But here with us it is time it should be considered and openly discussed. I do not know how many *Washingtonias* there have been. Perhaps a half-dozen or so; but I perceive that two dedicated to Washington are current in books of American botany, *Washingtonia* and *Neowashingtonia*, the latter doubly impossible in any but a weak and degenerate system of nomenclature. It is completely ruled out by the most rational code ever yet made, that of Linnaeus. It has seven syllables; the same number as *Lepidocarpodendron*, all the like of which Linnaeus suppressed, as well as many of only six syllables, as intolerably sesquipedalian. This should be treated the same way, not any more for this fault than for the other offense of its dishonoring rather than honoring the name of Washington.

I shall not attempt a list of genus names now current in botany that violate this unwritten law; but here are some of them: PORTERELLA, Torrey, valid, *Porteranthus*, Britton, illegal and to be displaced: BRITTONAMRA, Kuntze, *Brittonastrum*, Briquet.

I may give further attention to this important subject in a future paper. There are aspects of it not yet brought clearly into view; but let me conclude here with the suggestion more distinctly made, that to name one good genus after a man, as the ancients did for the kings Gentius and Eupator, or as later

¹Pittonia, ii. 185 (1891).

authors have done for Caesalpino, Columna, Ray, Tournefort, Linnaeus, and then stop—*that* is to really *honor* a man, while to use his name as a merely convenient foundation for the making of a dozen different names—is not that to openly dishonor him?

I respectfully commend this topic to the serious consideration of the next International Congress of Botanists.

Certain Malvaceous Types.

The very many herbs and shrubs of far-western and south-western North America that have been distributed between *Sphaeralcea* and *Malvastrum* are much in need of recension. Of this I have long been convinced; the conviction having come from a long study of the various types in their native soil; a much more prolonged acquaintance with them in this way than any other botanist ever has enjoyed.

The essential characters, no less than the strong habitual peculiarities of several groups, have long been fixed in my mind; but I can not yet satisfy myself as to whether we have or have not a single species of real *Sphaeralcea* or a genuine *Malvastrum* in all North America. If these are wanting here, then we have at least two more North American genera of Malvaceae that remain undefined over and above those herein proposed.

Those that with us have been called *Sphaeralcea* species are of two ecologic groups, one of the arid districts of the far Southwest, companions of the Cactaceae, and geographically coextensive as a group, with that family, and the desert Salsolaceae. It is in this assemblage only that we find species with the habit of typical South American *Sphaeralcea*. That any of them have the floral or carpological characters of that genus is what I can not yet determine.

As widely different from this group in habit as can be, and also of totally different habitat, are the types of a few northwestern plants, at first called *Malva* species, but after that transferred to *Sphaeralcea*. The habitat of these is the banks or borders of mountain streams or other very moist places at consider-

able altitudes. They have a thin and ample foliage, quite green, usually appearing glabrous to the unaided eye, and the large whitish or purplish corollas which, together with the foliage, gives them the aspect of some Old World *Malva* and *Lavatera* species, from which they differ generically by their large truncate-subconic fruits, made up of 3-seeded dehiscent carpels. But the fruit characters by which these two American types are generically separated may be more easily recognized by means of a brief and less informal statement.

SPHÆRALCEA, so called. Fruits small, from subtruncately broad-ovate to truncate-subconic, always densely stellate-tomentose, without other pubescence; carpels strongly fenestrate-reticulate laterally toward the base. Seeds stellate-roughened.

ILIAMNA, Gen. Nov. Fruits 3 or 4 times as large, subtruncate-ovoid, the stellate pubescence both fine and sparse, overtopped by long hirsute simple hairs; carpels marked by no kind of reticulation or venation on the sides. Seeds roughened by minute simple hair-points, or in one species quite hispidulous with longer and denser but simple hairs.

Of **ILIAMNA**, there are, I think, a considerable number of species yet to be given recognition over and above the old types. I shall merely indicate by name the old ones and define two that are clearly new, in so far as I can ascertain.

I. RIVULARIS. Dougl. in Hook. Fl. under *Malva*.

I. ACERIFOLIA. Nutt. in T. & G., under *Malva*.

I. ANGULATA. Three feet high or more, the stem moderately stellate-pubescent; leaves with 3 to 7 lobes, all very broad and short, broadly triangular, the sides about equal, the margins of the lobes either very saliently or else slightly dentate; segments of calyx long, ovate-lanceolate, even somewhat acuminate; corollas large, apparently white: fruit not seen.

In the Uncompahgre Cañon, southern Colorado, Aug., 1887, Miss Eastwood; type in U. S. Herb.

I. REMOTA. *Sphaeralcea acerifolia*, Gray, Syn. Fl., i, 317 in part, and wholly as to the Illinois plant. Very large, nearly 6 feet high, bushily branched from base and throughout; stems and foliage quite densely stellate-pubescent; leaves of firmer

texture, the larger 7 inches wide and as long, of orbicular outline, but with from 5 to 7 triangular lobes; these broadly, obtusely but mucronulately dentate; calyx cleft into ovate-acuminate lobes; corolla large, light rose-purple; seeds distinctly and not sparsely hispidulous.

Inhabits an island in the Kankakee River, Illinois, some twelve or fifteen miles above the city of Kankakee and just opposite a small village called Altorf; this the only known locality for this species. While by its dense pubescence it is next of kin to the real *I. acerifolia* (excluding *I. rivularis*), it is specifically distinct by characters of calyx and seed; also as distinct from all others by its remarkable habit, being a large and bushy plant, all its congeners being few-stemmed and often without a branch. By the extreme distance intervening between the habitat of this local plant of eastern Illinois and that of its nearest congeners, which are of the Rocky Mountain region, any well travelled American botanist would know that this plant could not represent any Rocky Mountain species. The isolation of it is so complete that one does not see how any "authority" could readily have pronounced it to be referable to a Pacific coast mountain species, even if it had not its two or three good characters.

As far as the herbarium specimens here used are concerned, they are all of my own collecting, at the place where Mr. Hill, who first brought the plant to knowledge, collected his. The date of my visit to the spot was 1 Aug., 1899.

As consisting of a medley of incongruities, *Malvastrum*, as received in North America hitherto, is more confused than *Sphaeralcea*; and that there exists so much as one real *Malvastrum* north of the Mexican border I hold to be most doubtful. I shall here indicate but two new genera of this aggregate. The characters of one became clear to me a dozen years since, when I had several of the species in cultivation at the University of California. All of them are shrubs, and with long branches—in most species densely tomentose—usually flexu-

ous or tortuous and recurved, beset at intervals with densely subcapitate clusters of flowers, one cluster in the axil of each leaf, the leaves often sessile. Corollas large, white or pinkish or purple. Calyx large, commonly concealed altogether by a very thick and dense coat of tomentum. Fruits as depressed and low as those of any *Malva*, the carpels not very tomentose, their sides without reticulation, one-seeded, promptly dehiscent, the two perfectly distinct valves falling away separately together with the ripe seed.

The genus thus defined has a number of described species, and perhaps an equal number undescribed. I denominate it MALACOTHAMNUS, and with the species I shall here do little beyond indicating the most typical, or in other words fixing the type of the genus.

M. ARCUATUS.	Greene, Man.,	under	<i>Malveopsis.</i>
M. FREMONTII.	Torr.,	"	<i>Malvastrum.</i>
M. ORBICULATUS.	Greene, Fl. Fr.,	"	"
M. DAVIDSONII.	Robinson,	"	"
M. PALMERI.	Watson,	"	"
M. ABORIGINUM.	Robinson,	"	"
M. DENSIFLORUS.	Watson,	"	"
M. MARRUBIODES.	Dur. & Hilg.,	"	"
M. FASCICULATUS.	Nutt. in T. & G.,	"	<i>Malva.</i>

The second is a small group of desert annuals, the habitual and floral peculiarities of which are given in Gray's Synoptical Floral under an asterisk and as heading the whole line of Malvastra, the subsectional adjective employed being *Pedunculosa*. I assign this series the generic name EREMALCHE.

E. ROTUNDIFOLIA.	Gray, under	<i>Malvastrum.</i>
E. PARRYI.	Greene,	" "
E. EXILIS.	Gray,	" "

From my way of viewing things, the genus *Sida*, as set forth by Bentham and adopted by Gray, is less mixed by diversity of types than is *Malvastrum*; yet here also, the section defined by Gray and named by him Pseudo-Malvastrum, is to my mind

more distant from *Sida* than from *Malvastrum*. As a genus I designate this group **DISSELLA**.

- | | | | |
|------------------|----------------------|-------|----------------|
| D. HEDERACEA. | Dougl. in Hook. Fl., | under | <i>Malva</i> . |
| D. LEPIDOTA. | Gray, | “ | “ |
| D. SAGITTIFOLIA. | Gray, | “ | <i>Sida</i> . |
| D. CUNEIFOLIA. | Gray, | “ | “ |

The herbaria show a number of undescribed species of this genus.

The Genus *Nuttallia*.

When in the year 1891 I sought to invest a favorite drupaceous genus, then called *Nuttallia*, with a name that should not be revertible, proffering *Osmaronia* as new, and therefore securely tenable, I was careful to point out that there had been already five different applications of *Nuttallia* to as many plant genera, and also bold enough to prophesy that the Loasaceous type to which it was first applied by Rafinesque in 1818 would some day be restored to proper rank as a genus and would claim the name. This piece of bibliographic information, it may be assumed, was never read, or if read forgotten by those who as if unwittingly have fulfilled my prophecy, for the type in mind was removed from *Mentzelia* in 1891 under a new name, *Hesperaster*.¹ Three years later another botanist, reasserting the generic rank of the group, and finding *Hesperaster* to be a synonym, presented the species all in line under a name sixty years older than *Hesperaster*, namely, *Touteria*.

I made each time mental note of the attempt to invest this group with a tenable name, and knew the futility of each attempt; but it was not the time for me to speak, as I thought, particularly as I had already published, ten or a dozen years before, all needful instruction for those who might be out in quest of *the name* for Pursh's homonymous *Bartonia*; and so I now gladly avail myself of the opportunity of making restitution to the memory of Nuttall, whose once currently-accepted genus I fifteen years ago discovered untenable and displaced.

The following is a partial list of the published species of **NUTTALLIA**:

¹Torrey a. i. 142.

N. DECAPETALA.	Pursh,	under <i>Bartonia</i> .
N. NUDA.	“	“ “
N. MULTIFLORA.	Nutt.,	“ “
N. LAEVICAULIS.	Dougl. in Hook,	“ “
N. PARVIFLORA.	“ “	“ “
N. CHRYSANTHA.	Engelm,	“ <i>Mentzelia</i> .
N. PTEROSPERMA.	Eastw,	“ “
N. WRIGHTII.	Gray,	“ “
N. BRANDEGEEI.	Wats,	“ “
N. DENSE.	Greene,	“ “
N. LUTEA.	Greene,	“ “
N. PUMILA.	Nutt.,	“ “
N. SPECIOSA.	Osterh.,	“ “
N. STRICTA.	Osterh.,	“ <i>Hesperaster</i> .

The Genus *Bossekia*.

Necker was among those early in the field of championship for multitudinous good genera which Linnaeus had of late been so bold as to suppress. He must needs have taken up the case of the Linnaean aggregate *Rubus*, and in doing this he left in *Rubus* what for centuries before Linnaeus had constituted the genus, namely the shrubs with compound leaves and clustered flowers. *Dalibarda* he restored in deference to its simple leaves and monanthous peduncles. He also so defined it as that it might include the still older genus *Chamæmorus*, which, by the way, was not regarded as either a blackberry or raspberry, but as a mulberry, the very name telling us this.

Upon the one remaining simple-leaved Linnaean *Rubus* he sought to establish a new genus, calling it *BOSSËKIA* (Neck. Elem., ii, 91.) Mr. Rydberg must be credited with having fortified this genus by some new characters, and I for having relieved it of a name so cheap and ill-made as *Rubacer*, the author of which might have avoided the framing of any new name at all, had he learned, as I have, by long experience, to distrust the Kew Index as to what genera have been published; for there are, perhaps, some scores

of generic names—*Bossekia* among the rest—of which the authors of that nevertheless invaluable treasure of learning had no knowledge. It is but one of not a few names for genera which do not appear among the synonyms even.

Even as to the intended meaning of it *Rubacer* is a failure; for the purpose must have been that of saying in Latin Maple-leaved Raspberry, and what is said is Red Maple; for “acer” is the substantive and “rub” is but the qualifying adjective. The author himself has placed this beyond dispute, unwittingly to be sure, by giving neuter endings to the trivial names, such as are always given in *Acer* but never in *Rubus*.

The following are the early species of BOSSEKIA:

B. ODORATA. Cornut. Canad, under *Rubus*.

B. PARVIFLORA. Nutt. Gen., “ “

New Plants from New Mexico.

RANUNCULUS NUDATUS. Stems mostly solitary, erect from an unusually large fascicle of fleshy-fibrous roots, naked and simple below, parted near the middle into a few strict often subumbellate flowering branches: radical leaf often solitary, on a long and slender petiole, pedately 5-parted, the divisions trifid, their segments oblong to oblong-linear, obtuse, those subtending the peduncles sessile, of 3 linear entire divisions, both stem and leaves sparsely villous-hairy; sepals thin, ovate, villous-hairy, caducous, not reflexed; corolla yellow, $\frac{3}{4}$ -inch broad; petals 5 to 8, obovate-oblong to oblong; achenes not seen.

Burro Mountains, at 7,500 feet, O. B. Metcalfe, 20 June, 1903. Of peculiar habit, but related to *R. acriformis* of Wyoming.

ERIGERON DEUSTUS. Perennial, slender, freely branching, 6 or 8 inches high, minutely hirtellous-strigulose; leaves about an inch long, oblanceolate, acute, entire; heads scattered, terminating slender pedunculiform branches; involucre nearly hemispherical, 4 lines broad, not as high, their bracts equal, acute, sparsely hirtellous; rays 60 or more, very narrow, purplish; achenes not seen.

West Fork of the Rio Gila, 28 Aug., 1903, O. B. Metcalfe. A member of the group of *E. divergens*.

SENECIO CYNTHIOIDES. Perennial, tufted, with habit of *S. Fendleri*, but foliage entire, pale, glabrous above and strongly glaucous, narrowly oblanceolate or almost linear, obtuse or acutish, beneath tomentulose, the cauline reduced and few; cymes and heads as in *S. Fendleri*, rays much longer, pale-yellow; achenes light-colored, glabrous, oblong, obtusely 5-angled, and with more than twice as many obscure intervening striae.

Hillsides along Turkey Creek in the Mogollones, 23 Aug., 1903, O. B. Metcalfe; a plant with pale entire leaves, recalling certain cichoriaceae.

SENECIO MOGOLLONICUS. Perennial, with tall stems decumbent at base, then upright, ending in a single large head: basal leaves spatulate-oblanceolate, the lowest and largest 4 inches long, without clear distinction of blade and petiole, of firm texture, entire, green, though slightly flocculent on both faces, those of the upper and pedunculiform part of the stem reduced, lance-linear; head $\frac{3}{4}$ -inch high, broadly turbinate; rays few, small, and inconspicuous for so large a plant, deep-yellow; achenes not seen.

Dry flats on the West Fork of the Gila, 7 Aug, 1903, O. B. Metcalfe. The species is related, but not closely, to *S. Actinella*.

SENECIO PRIONOPHYLLUS. Size and habit of *S. Balsamitae*, the stem more nearly naked and subscapiform; the plant glabrous, or with but traces of flocculent indument: basal leaves with slender petioles 2 or 3 inches long, blades 1 or 2 inches, oblong and obovate-oblong, closely serrate rather than crenate, none lobed or pinnatifid, wholly glabrous; cauline few, much reduced, sessile, pinnatifid; heads few, larger than in *S. Balsamitae*, rays shorter; achenes glabrous, light-colored, 5-angled, and with 5 alternating slender ribs.

Moist flats on the west Fork of the Gila, in the Mogollones, 7 Aug., 1903, O. B. Metcalfe.

TOWNSENDIA FORMOSA. Perennial, spreading by short stout stolons, the sterile ones ending in a rosette of leaves, the others in a stout upright very leafy monocephalous stem: basal leaves cuneately to spatulately obovate, very obtuse, entire, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, of thin texture, glabrous, except as to the prickly-ciliolate margins, those of the stem crowded and somewhat imbricated, spatulate-oblong: heads large, 2 inches broad from tip to tip of the broad purple rays: bracts of involucre oblong to lanceolate, thin, broadly scarious-margined.

In the Black Range, in the spring or early summer of 1903, O. B. Metcalfe; specimens sent to me under n. 1434.

HEDEOMA PULCHELLA. Dwarf many-stemmed perennial, at very base suffrutescent, the stems though tufted usually simple, leafy, floriferous from the base, 3 to 5 inches high, all the growing and flowering parts villous-hoary, leaves $\frac{1}{2}$ inch long, ovate, very acute and sharply few-toothed above the middle, flowers very large for so small a plant, 2 or 3 in each axil; calyx strongly bilabiate, the slender-subulate teeth and the tube all equally and strongly hirsutulous: corolla lavender-colored, more than $\frac{1}{2}$ inch long, the tube slender, long-exserted.

Limestone hills at about 6600 feet near Kingston, 18 May, 1905, O. B. Metcalfe, n. 1599. The most beautiful and large-flowered of dwarf species.

UROPAPPUS PRUINOSUS. Annual, stout, low, subcaulescent, 6 to 10 inches high: leaves but half the length of the scapiform peduncles, consisting of a linear rachis and remote narrowly linear segments, the whole, and also the lower part of the peduncles more or less hoary with short papilliform and some longer and curled white hairs: fruiting heads barely an inch high: achenes short, subcylindric, tapering but slightly, of only half the length of the pappus, paleae of the latter very deeply bifid, the bristle long in proportion.

Common winter annual of southwestern New Mexico and adjacent Arizona, hitherto referred to *U. linearifolia* of the Pacific seaboard; thoroughly distinct by its short achenes and comparatively long pappus, the achenes not beaked, etc. The

best specimens before me are of my own collecting in 1877, and a sheet by Mr. Metcalfe in 1905.

SENECIO QUÆRENS is a name that may perhaps be found tenable in place of that of my second *S. prionophyllus* namely that of page 212 preceding.

New Species of Viola.

During the three seasons last past, in relation to our acaulescent violets I have done some field study, some collecting, and not a little silent reflection upon the whole subject, and not so much of writing and publication. The defining of new forms, as well as wise or unwise commentation upon many somewhat newly published I have for the most part left to a number of people who, all of them new in this field as compared with myself, are not yet checked by lack of confidence in the sufficiency of their own knowledge.

In the course of some journeyings made in the month of May, 1902, through Western Maryland, northern Ohio and southern Michigan, I took something like alarm at the great number of undescribed violets that I encountered; and to these were added in my thought not a few forms common in the valley of the Potomac near Washington which I had not yet dared to publish, though I had been studying them, but only too interruptedly, since the year 1896.

One or two of the settled conclusions I seem to have reached during these three seasons of more silent study I may here briefly state.

I think that the number of valid species of so-called acaulescent violets in the United States is very great; that it may amount, eventually, to some hundreds.

I have not the least faith in the existence of any hybrids in this group. Certainly not one case has been proven. Quite a number have been guessed at; not one of them with what to me is the least show of reason or probability. That which to any scientific mind should preclude even any guessing at hybrids, or almost any hope of finding such in the field is the simple fact that 99 out of 100 seeds of these plants are from flowers that

having no corollas, never open even their sepals; which flowers are even in a majority of cases developed under the ground, the capsules not rising to the surface of the soil until the day approaches for the scattering of the ripe seeds. It is a remarkable phase of science, a strange method of induction, by which men can convince themselves of the existence of hybrids—even the common occurrence of them—in a group of plants which, as if intelligent entities, seem to use every thinkable natural precaution against cross fertilization.

VIOLA FILICETORUM. At petaliferous flowering low, 3 or 4 inches high, the flowers barely surpassing the foliage: earliest leaves subreniform, $\frac{3}{4}$ inch long, crenate, plane, subsucculent, purple beneath, those next succeeding subcordate, obtuse, $1\frac{1}{2}$ inches long, nearly as broad, glabrous, as are all the vegetative organs at every period, sepals oblong-oval, very obtuse, with distinct and evident scarious margin, this when fresh minutely serrulate as seen under a lens; corolla violet, not of the largest, the petals all very obtuse, the odd one as long as the others and almost truncate. Plant of early summer a foot high and even more, with vivid green thin and delicate leaves subcordate-deltoid, $2\frac{1}{2}$ inches long, $3\frac{1}{2}$ broad across the base, crenate: apetalous flowers on most delicate filiform horizontal and subterranean peduncles 2 to 4 inches long.

Species peculiar to deep woodland shades along the Potomac above Washington, where it is very common in a narrow belt along the summits of such slopes as are occupied by the Christmas Fern, sometimes along the bases of such declivities, and not rarely in among the ferns. It is plentiful about Cabin John Bridge, in Maryland, and also just outside the District line, in the same region. I have observed it and collected it in these and other localities at various dates during five years past. It is in good petaliferous flower about 20 April. In its extremely different dress of the latter part of May and in June no one not acquainted with the species would suspect it of being identical with the little dwarf of April with the petaliferous flowers.

To this I must append some account of what I shall call its

Var. *PARTHENICA*. Earliest foliage larger, thinner, not purplish beneath, transversely elongated, but hardly subreniform, being subtruncate across the base; sepals narrower, as also the petals in the same degree, and these rather bluish than violet, and in most specimens definitely but narrowly whitish-margined, the odd petal very decidedly shorter than the others.

More open wooded slopes and summits on the Virginian side of the Potomac not far from the Chain Bridge; collected by me and notes taken 3 May, 1906.

VIOLA INDUTA. Of the low stature of the preceding at first, and with like small subreniform early leaves, the petioles of these but not the blades hirtellous, the peduncles of petaliferous flowers almost filiform and quite glabrous: sepals lance-oblong, obtuse, closely ciliate with short, stiff spreading hairs: corolla small for this group, usually blue, rarely purplish or violet, the petals subequal, all but the odd one very distinctly and rather deeply emarginate. Plant in summer state not large in proportion, 8 or 10 inches high, copiously leafy and the leaves light-green, of firmer texture, their petioles hirsute, even hoarily so when seen standing and fresh, blades broadly subcordate and emphatically cucullate, when pressed out appearing somewhat roundedly deltoid-subcordate, the length and breadth equal, $2\frac{1}{2}$ inches: peduncles of apetalous flowers, short and very stout when buried, or when above ground still short and stoutish, ascending or horizontal.

In rather open ground bordering woodlands, commonly on open banks, always in soil of red clay mixed with sand; this at various stations among the hills outside the District line in Maryland; near the bridge over Powder Mill Branch quite copious; petaliferous flowers in the latter part of April, my specimens 21 April, 1906; of summer stage May and June of former years and also this season; apparently first obtained by me near Cabin John, in clayey-sandy bottom land ten years ago, that is, in 1896, 31 May, all the specimens being in the summer stage.

V. EMARGINATA, var. *SIMULATA*. Plant of the size, habit and also exactly the leaf outline of *V. sagittata*, but of the deep color, peculiar smoothness and subsucculent texture of *V. emarginata*; in summer stage 7 to 9 inches high, with petioles thrice as long as the blades, these 2 to 3 inches long, $1\frac{1}{2}$ inches broad across the quite roundedly sagittate base: petals narrower than in the type, not emarginate: capsules from apetalous flowers obovoid, $\frac{1}{4}$ inch long.

On steep openly wooded slopes looking westward in Rock Creek Park, D. C., May 7 and 31, 1906, collected by the writer; no typical plants found in the vicinity, nor even as yet by me in any part of Rock Creek Park or its outlying hills.

V. VESPERTILIONIS. Rootstock stout, simple, at petaliferous flowering with about 3 leaves and 2 flowers, rarely more, all long-stalked and very erect, the peduncles slender and glabrous the petioles stout and villous-hirsute, the plant at this stage 3 to 6 inches high, its earliest blades cordate and subreniform-cordate, the one developing with the corolla larger and commonly hastate-lobed, never palmate; sepals subfalcate-oblong, obtuse, strongly hispid-ciliate toward the base; corolla rich violet, $\frac{3}{4}$ inch long and the petals broad. Plant in early summer with the one or two newer leaves extremely large, variously reniform in general outline, in robust plants 4 to more than 6 inches wide and only 2 or $2\frac{1}{2}$ in length, often not lobed but coarsely crenate-toothed, more usually deeply 3-lobed, sinuses nearly or quite closed, the petioles of these leaves not villous, only sparingly hairy, but foliage pubescent, plant at this stage commonly a foot high, or even more; the few apetalous flowers short-peduncled and, with the capsules, subterranean.

Common in certain woods of the Potomac Basin in Maryland, Virginia and D. C., my type specimens from about Brookland, D. C., April, May and June, 1897. I have never until now given this plant any specific name at all in my herbarium. The less cautious, and they who must first of all have a name for a form, have called this *V. palmata*, and *V. palmata* var. *dilatata*. The only violet that can with any degree of propriety

be called *V. palmata*, Linn. is very different from this, and is palmated, which *V. vespertilionis* never is. There are other names, *V. asarifolia*, Pursh, and *V. congener*, Le Conte, that may perhaps embrace among other different forms, this also.

V. ORNITHODES. Mode of growth as in the last, the leaves and flowers as few and strict, all far more slender, even taller, 5 or 6 inches high, the petioles long-villous, but not densely so; foliage at all stages much smaller, the very earliest reniform, the leaf accompanying the flowers, lobed but cucullate, concealing its lobes; corolla more than an inch long, its petals narrower, spatulate-oblong, the sepals also longer and narrower and nearly or quite devoid of ciliation. Summer state of plant not large in proportion, 7 to 10 inches high, the foliage various, but configuration always peculiar, the undivided leaves somewhat triangular or even semiorbicular, the largest hardly 2 inches wide, the divided ones always or nearly always 3-lobed or -parted, with middle lobe largest, oval or oblong, subentire, the pair spreading away from this, leaving almost rectangular sinuses, crenate on the outer margin and curiously bird-wing-like in cut, the leaf as a whole suggesting the outline of a bird with spread wings.

On open hills bordering woods and looking eastward, in Rock Creek Park, D. C., also in like situations on the Virginian side of the Potomac, below Chain Bridge, April to June, 1906.

The relations between these two types last defined I, of course do not know. They may be subspecific descendants of some other type known or unknown. They are not, I think, varieties one of the other. Each of them, now after long study, confirms me in the view I took when studying that kindred plant of the mountain sides above Harper's Ferry, which I called *V. variabilis*, namely, that one must allow in this group, without even varietal distinction, plants with all leaves undivided, and other plants with leaves all, and variously, cut or cleft or lobed.

V. FONTANA. Larger plants 9 to 11 inches high at petaliferous flowering, the flowers surpassing the foliage by an inch or more; herbage light-green, glabrous, subsucculent: leaves cordatè-ovate, obtuse, about $2\frac{1}{2}$ inches long, a little wider than that across

the strongly cordate base, not cucullate, the broad lobes meeting or nearly meeting, but plane, not involute, the whole margin remotely and lightly crenate: peduncles unusually stout and fleshy, their bractlets supramedial, alternate: sepals much elongated, lance-linear, lightly serrulate: corolla deep-blue, its width $\frac{3}{4}$ inch or more, and greater than its length, the odd petal being much shorter than the others, all obtuse. Summer state of plant not enlarged, its apetalous flowers few, short-peduncled, their capsules not seen; the one latest petaliferous on each plant producing a small capsule with few seeds.

This handsome violet of open grassy places about springs and along streamlets flowing from springs, was first brought to my notice about five years since, the specimens having been brought in quantity from a locality at the sources of Rock Creek, just outside the District of Columbia, in Maryland. I then saw that it was new, but declined at that time to give any account of it. This season I have chanced to come upon extensive masses of it, growing amid grasses, sedges and some hydrophilous moss, on a tributary of Rock Creek within the District, and having studied it *in situ* to my satisfaction, have decided to give it a name and diagnosis. It was in perfect petaliferous flower 7 May, 1906.

Parthenocissus a Synonymn.

Among the numerous medley genera of Linnaeus not many are more impossible than his *Hedera*, composed as it is of two species, one the Old World ivy, the other an American grape. Tournefort more than a half-century earlier had determined Cornut's five-leaved ivy to be a grape and not an ivy, and had named it *Vitis quinquefolia*, and this Tournefortian disposal of the species met with almost universal approval for nearly a century, notwithstanding Linnaeus' retrograde proposition; for after 1753 Adanson, Moench, Gaertner and others retained the Virginia Creeper in *Vitis*, while only Crantz and Miller stood by Linnaeus in calling it a *Hedera*.

Necker, in 1790, appears to have been the first to indicate this shrub as the type of a proper genus.

I have been unable to ascertain that any authority upon genera or generic nomenclature, whether of the nineteenth century or the twentieth, has hitherto discovered this. Every one of them seems to have been misled by the name PSEDERA, Neck. This is really *Pseudohedera* with certain syllables eliminated, partly for the sake of brevity, but more for the purpose of keeping it from falling under the ban of that excellent article of Linnaeus' Code which prohibits the use of generic names formed by prefixing *Pseudo* to another name. The name itself, therefore, must have beguiled the superficial into guessing that PSEDERA is some segregate of *Hedera*: and this guess has found expression in certain well known bibliographies. But the authors can hardly be supposed to have looked beyond the mere name itself. The character ascribed to PSEDERA by Necker is in accord with that of Planchon's *Parthenocissus* in all essentials. But what places my identification of PSEDERA with *Parthenocissus* beyond all cavil is the circumstance of Necker's having stated one of Linnaeus' *Hedera* species to be its type; for of that genus the species, with Linnaeus, are but two.

Only the American species of PSEDERA at present concern me.

P. QUINQUEFOLIA. *Hedera quinquefolia*, Cornut (1635), Linn. (1753), Mill. (1768). *Vitis quinquefolia*, Tourn. (1700), Lam. (1793), Moench (1794).

P. HIRSUTA. *Ampelopsis hirsuta*, Roem. and Schultes (1819).

P. VITACEA. *Parthenocissus vitacea*, Hitchc. (1894).

P. TEXANA. *Parthenocissus Texana*, Rehder (1905).

P. LACINIATA. *Ampelopsis quinquefolia* var. *laciniata*, Gray in Planchon (1887).

New Western Plants.

SENECIO ORTHOPHYLLUS. Suffrutescent, the woody basal branches stout, rigid, obscurely angular, white-tomentulose; flowering branches a foot long, very erect, loosely leafy, subcorymbose at summit, all the leaves linear, entire, obtuse, revolute, the principal ones 2-3 inches long, erect, even almost appressed to the branch, the axils of the lower bearing crowded fascicles of a foliage short but otherwise similar, the whole white-tomentose, even to the involucre, these less than $\frac{1}{2}$ inch high, subcampanulate: rays nearly $\frac{1}{2}$ inch long, yellow, not numerous.

Willow Springs, Arizona, 1890, Dr. Edw. Palmer, n. 479 as in U. S. Herb.

SENECIO MONOENSIS. Woody at base, with many striate-angled stems decumbent, $1\frac{1}{2}$ feet high, rather sparsely leafy, of a rather light green, the plants glabrous in all its parts; leaves made up of a filiform-linear rachis and few as narrowly linear remote acute segments: heads large, in a loose subcorymbose panicle; involucre broadly subcylindric, $\frac{1}{2}$ inch high, notably calyculate-bracted at base, the main bracts narrow, linear, acuminate: rays rather many and conspicuous, clear yellow.

White Mountains of Mono Co., Calif., on slate hills near Southern Belle Mine, 25 May, 1906, A. A. Heller, n. 8330.

SENECIO LEIBERGII. Stems solitary, very erect from the crown of a fascicle of fibrous roots, $1\frac{1}{2}$ feet high, rather slender, simple, ending above in an ample fastigiata corymb of larger than middle-sized heads: leaves mainly basal, thin, plane, oval-elliptic or elliptic, nearly entire, almost glabrous, $2\frac{1}{2}$ - $3\frac{1}{2}$ inches long, on slender petioles of more than equal length, the scattered cauline leaves lance-linear, sessile, sharply denticulate somewhat arachnoid-hairy as also the stem and inflorescence: involucre short-cylindric, bracts oblong-linear, acuminate: rays many, white: achenes acutely few-angled, light-colored, glabrous.

Granite bluffs of the Pend d'Oreille River, Kootenai Co., Idaho, May, 1906, collected by Mr. and Mrs. John B. Leiberger. More tall and slender than other members of this group, and noteworthy on account of its "chalky-white" rays.

ERIGERON TEPHRODES. Perennial, the tufted stems from a not large tap-root, all rigidly ascending, 6 or 8 inches high, sparingly branching, freely and loosely floriferous, the whole herbage densely cinereous-hirtellous: basal leaves twice as long as the rameal, all narrowly oblanceolate, entire, acutish: heads with hemispherical involucre less than $\frac{1}{2}$ inch broad in expansion, of very numerous dull-white narrow rays $\frac{1}{4}$ inch or more: pappus to unaided eye simple and of few delicate long bristles, a good magnifier disclosing an equal number of very short accessories even more slender.

Foothills west of Bishop, Inyo Co., Calif., 23 May, 1906, A. A. Heller, n. 8315 as by him distributed. In aspect somewhat intermediate between *E. concinnus* and *divergens*.

A New Genus of Rutaceae.

TARAVALIA. Differing from *Ptelea* by subumbellate or corymbose few-flowered inflorescence, pentamerous flowers and a thick nut-like wingless fruit; the pericarp neither rugose nor reticulate, but roughened by closely compacted low tubercles, also tardily dehiscent, separating into two concavo-convex valves.

Genus as far as known endemic on the Mexican Territory of Lower California, and dedicated to the memory of Sigismund Taraval, who in the year 1730 explored much of Lower California and was the first to visit the large outlying island now called Cedros, and to make some report upon its topography and natural history.

The known species of the genus are three only.

T. APTERA. *Ptelea aptera*, Parry in part. *P. aptera*, Greene, Contr. U. S. Herb., x. 76. Pericarp small, round-ovate, its margin acute.

Maritime hills at Punta Banda, northern L. Calif.

T. OBSCURA. *Ptelea obscura*, Greene, l. c. Pericarp large, subquadrate-oval, its margin obtuse.

Interior of northern L. Calif., near Santo Tomas.

T. NUCIFERA. *Ptelea nucifera*, Greene, l. c. Fruit large, oval, sharply carinate all around the margin.

Near a desert water hole, middle of L. Calif., inland.

The Genus *Leiostemon*.

When nearly thirty years since in New Mexico I for the first time saw the type of this genus, not knowing its name, I regarded it as possibly a *Gerardia*, never thinking of *Pentstemon* at all in connection with it, so far removed as it is in habit and in the structure of its flower from the last named. I was therefore not well satisfied when I learned that its only name in botany was *Pentstemon ambiguus*; the trivial name also telling the tale of Torrey's own doubt about the reasonableness of the placing of it as a species of *Pentstemon*.

Within the last year, having been led to examine and compare a series of specimens from different places, I reached the decision that the type ought to be excluded from *Pentstemon* and given the rank of a genus. I could not readily invent a pleasing generic name for it, and the subject passed out of my mind. This may have been fortunate; for, in reading lately some botanical articles by Rafinesque in the Atlantic Journal, I came upon his establishment of this type in the rank it demands, and with a name that may easily pass without any objection that I can see.

The species of *LEIOSTEMON* seem to me to be two at the least, with possibly as many more.

L. AMBIGUUS. *Pentstemon ambiguus*, Torr. *L. purpureus*, Raf.

L. THURBERI. *Pentstemon Thurberi*. Torr.

The Genus *Batanthes*.

This, as set forth by Rafinesque in the *Atlantic Journal*, p. 145, is not a genus, but an aggregate of three. My own usage in such cases, however, has been that of those who hold that the name of a genus stands or falls with that of the first species enumerated under it, unless the character given excludes such first species and points to one of the others as having been the author's type species. In the present instance the character is equally that of all three of the included species. One must, then, either suppress the name *BATANTHES*, or else support it for that genus of which *Cantua aggregata* of Pursh is the oldest type. This will reduce to synonymy *Callisteris*, of page 159 preceding, the known species of which may take names as follows under *BATANTHES*.

· *B. AGGREGATA*, Raf., *Atl. Journ.*, 145, *Cantua aggregata*, Pursh; probably not *Callisteris aggregata*, Greene, *Leafl.*, I, 159, for Mr. C. V. Piper, who has given careful attention to the localities of many of Pursh's types, tells me it is certain that *Cantua aggregata* came from the Pacific slope of the continent.

B. SCOPULORUM. *Callisteris aggregata*, Greene, l. c. excl. syn.

B. COLLINA. Greene, l. c. under *Callisteris*.

B. LEUCANTHA. " " "

B. ATTENUATA. " " "

B. FORMOSISSIMA. " " "

B. FLAVIDA. " " "

B. TEXANA. " " "

B. ARIZONICA. " " "

B. BRIDGESII. " " "

B. PULCHELLA. " " "

Four Streptanthoid Genera.

This is a continuation of studies published in part on pages 81 to 90 preceding. In those paragraphs only the Californian streptanthoid types are dealt with. All the genera now proposed

belong to the arid interior; the species of one of them ranging between Arizona and Texas, not far to the northward of the Mexican boundary; those of another, far more numerous, occur at many different stations all the way between the Rocky Mountains of Colorado and Wyoming on the one hand, to the Cascades and Sierra Nevada on the other. A third is typically Californian.

The genus of altogether southerly range I name

DISACCANTHUS. Calyx of thin texture, but not as in *Euclisia*, inflated in the middle and closed at the summit, two larger sepals distended at base and saccate. Pods broad and flat; seeds broad thin, wing-margined. Plants of a thinnish foliage, the basal leaves (early disappearing) runcinate-pinnatifid, and forming a rosulate tuft, the cauline cordate-amplexicaul.

The few species may take names as follows:

D. CARINATUS. *Streptanthus carinatus*, C. Wright. Calyx purple, all four sepals saccate, and more notably so than in other species. Pods $2\frac{1}{4}$ inches long, 2 lines wide.—The original from a cañon 60 miles below El Paso, Texas.

D. VALIDUS. Plant stout, rigid, with few rigidly ascending branches: pods oblong-linear, very large, $1\frac{1}{4}$ –2 inches long, fully 4 lines wide, obtuse. —Type from somewhere in western Texas, 1884, by M. E. Jones, who mistook it for *Streptanthus platycarpus*, Gray.

D. MOGOLLONICUS. Calyx very thin, creamy white, sepals less notably saccate: pods 3 inches long, barely a line wide.—Type collected by myself among foothills of the Mogollones in New Mexico, 30 March, 1881. All white-flowered material from New Mexico from Las Cruces to the upper Gila belongs here.

D. LUTEUS. Flowers wholly of a clear yellow.—A more northerly species, of the Black Range, New Mexico, known only in flowering specimens collected in 1905 by O. B. Metcalfe.

D. ARIZONICUS. *Streptanthus Arizonicus*, Wats. Plant more delicate than in other species; no rosula if basal leaves; stem slender, simple; flowers nearly white.—Mountains of southern Arizona.

In a paragraph beginning on page 87, preceding, I have already outlined a group which I shall proceed to discuss under the new generic name *CARTIERA*. These are very far removed from *Disaccanthus* in habit, being perennials, and having a thick foliage which in texture is intermediate between coriaceous and succulent, and is either entire or merely toothed. On the stem under the inflorescence the scattered foliage takes the form of large cordate bracts, in this recalling *Pleiocardia*, as I said. The calyx is closed, its sepals thick and subsucculent, very often showing the peculiarity of a few spinulose or bristly hairs at tip, just below a narrow scarious margin. The pods are large, flat, filled with seeds not so thin, but usually wing-margined.

The following is a partial list of the species of *CARTIERA*:

C. CORDATA. Nutt. in T. & G. Fl. under *Streptanthus*.

C. CRASSIFOLIA. Greene, Pitt., iv, 227, " "

C. ARGUTA. Greene, " " " " " "

C. HOWELLII. Wats. Am. Acad. xx, 353, " "

C. BARBATA. Wats. Am. Acad. xxv, 125, " "

C. MULTICEPS. Leafy caudex much branched, surmounting a long taproot: basal leaves round-obovate, less than 1 inch long, sharply serrate-toothed: flowering stems simple, 4-6 inches high, their many leaves oval, entire, sessile, clasping, all the herbage glabrous, very glaucous: pods linear, more than 3 inches long, 1 line wide, slightly curved upwards: seeds oval, narrowly winged.

Guano Ranch, Harney Co., Oregon, 24 July, 1896, Coville & Leiberg, n. 2, as in U. S. Herb.

C. LEPTOPETALA. Size of the last, not multicapitous, herbage thinner, less glaucous: lowest leaves spatulate-obovate, toothed across the summit, the cauline subquadrate-oblong, $1\frac{1}{2}$ inches long, acute, often toothed at apex, flower more than $\frac{1}{2}$ inch long, limb of petals very long and narrow; tips of sepals prickly: pods unusually narrow, 2-3 inches long.

Stein's Mountain, Oregon, W. C. Cusick, July, 1898, n. 2002 as in U. S. Herb.

In the *Streptanthus* of Gray's Synoptical Flora several species found place which do not fall naturally into any of the segregate genera proposed by me. The following seem to need mention.

S. platycarpus, Gray. This is unknown to me except by description. By the character of its broad petal-blades it should belong just where it has hitherto been placed, in *Streptanthus*, though the pods are small for that genus.

S. Lemmoni, Wats., is altogether too imperfectly known. From the description of the calyx it can not be an *Euclisia*. It is also wholly beyond the range of that genus. It might be an *Icianthus*; but there is no telling.

S. longirostris, Wats. Since I came to know the living plant in its native deserts I have considered Mr. Watson's first disposal of it under *Arabis* as less objectionable. At not one point of floral structure is it in contact with *Streptanthus* or with any one of its segregates; but there are not wanting points of agreement with *Arabis* as now maintained. The sepals are equal, all four alike, loosely somewhat spreading (ascending), enclosing short petals that show no distinction of blade and claw. Quite such flowers are in *Arabis* here and there; but in this last named group we have no rostrate siliques. For a recurrence of this carpological character we look to certain other far-western plants which, following my suggestion of many years ago, have been received into *Thelypodium*. Habitally also the present type harmonizes with "*T. lasiophyllum*," and this so perfectly that for years I have been regarding the little annual of interior deserts as a natural descendant of *T. lasiophyllum*, hence congeneric with it. I now propose the separation of that Californian type already in past history referred to so many different genera, and in commemoration of an eighteenth century explorer of California shall name it

GUILLENIA. The more typical species are

G. LASIOPHYLLA. Hook. & Arn. under *Turritis*.

G. RIGIDA. Greene, under *Thelypodium*.

G. INALIENA. Robinson, " "

G. ROSTRATA. Watson, " *Arabis*.

G. COOPERI. " " *Thelypodium*.

Despite its likeness to *G. rostrata*, and its desert habitat, the flowers in this are subsessile, the calyx closed, the petals with clear distinction of blade and claw. It is possibly a monotype.

G. FLAVESCENS. Torrey, under *Streptanthus*.

G. HOOKERI. *Streptanthus flavescens*, Hook.

S. campestris, Wats., by the specimens, as also by the original description, was a sorry medley from the very outset. By the specific name the plant from Campo must be received as the type. The material of that is fragmentary; but its calyx herbaceous, purple, the sepals all alike and exact, not spreading. It may well hold its place and name under *Streptanthus* until better known.

The plant of the San Bernardino Mountains mixed with the above in books and lists is exceedingly remote from it in both habit and character, and can not be consistently admitted into any of my streptanthoid segregate genera. I name it in the type of a new genus,

AGIANTHUS. Calyx almost that of *Euclisia*, nearly as irregular, its sepals thin, whitish, translucent, also loosely investing the *Euclisia*-like petals, stamens, etc., but the whole calyx remarkably short, each sepal broad and blunt at summit. Pods large, narrow, more or less tortuous. Plants all perennial, in foliage altogether much like *Cartiera*. Specimens of two species are before me.

A. BERNARDINUS. Basal leaves cuneate-obovate to spatulate-oblong, rather obscurely dentate mostly at and near the summit: pods very narrow, almost 4 inches long, spreading or even recurved and tortuous.—San Bernardino Mountains, Parish; also San Jacinto Mountain, H. M. Hall. both as *Streptanthus campestris*.

A. JACOBÆUS. Basal leaves more broadly cuneate-obovate remotely and lightly yet sharply toothed all around: Pods $2\frac{1}{2}$ –3 inches long, firmly ascending, slightly incurved, not tortuous.—Cuyamaca Mountains, San Diego Co., C. R. Orcutt, July, 1889; his n. 1507, as in U. S. Herb.

Mitellastra and Rubacer.

Naturally interested, and even deeply and somewhat peculiarly interested, in the new "NORTH AMERICAN FLORA," I was startled when for the first time I looked over the pages of the Saxifragaceae, as I read that queer innovation in generic nomenclature, the name *Mitellastra*; for I had not used or read the page of Mr. Howell's book whence the name, impossible as that of a genus, is said to have been taken. From my friend in the Oregonian field, most capable as an observer and a reasoner upon matters of mere taxonomy, I should with reason expect errors, and maybe grammatic impossibilities, as to Latin nomenclature.

Now, in the very metropolis of all North America, whence this new Flora of so great worth and such bright promise emanates, there should be available the services of some one in whose mind such mere fundamentals of phytography as I shall name have found a lodgment. One of these fundamentals is the knowledge that each genus and each species is an abstraction of the mind, and, as such, a unit; that every particular genus and every particular species is as certainly a unit as every individual plant is a unit; that, therefore, every generic name and every specific name is necessarily of the singular number. The other fundamental is, a fair knowledge of the declensions of Latin nouns and adjectives; for it is still everywhere professed that Latin is the language of botanical nomenclature.

One mentally equipped with these simple rudiments of phytographic knowledge sees at first glance that *Mitellastra* is a plural; that as the name of a genus it must appear as *Mitellastrum*. That violence to grammar which defaces the page as

it stands would have been less flagrant had the specific name appeared as *Mitellastra caulescentes*, for so, the substantive and participial terms of it would have been at that agreement which the law of the language so inflexibly demands; though the very idea which I thus put forward presupposes recognition of *Mitellastra* as the plural that it is, which quality the author neither saw for himself nor was taught to see.

What I have now said is conclusive and might suffice; but I am learning to forestall frail subterfuges. Here no shelter can be taken under the name of Asa Gray. He made the name *Mitellastra*. If I say that he made it for the name of a genus, or that there is the least probability that he thought of it as a future generic name, I state an untruth, and am become a great and good man's calumniator. He framed *Mitellastra* as a sectional name, and in the plural, as is correct. Mr. Rydberg, on page 98 of the said Flora, has propounded ten sectional names under *Heuchera*, all of them in the plural, as they should be; but if some botanist of the future, taking those his ten sections for genera, and the ten sectional names for generic names, shall proceed to write for species *Bracteatae bracteata*, *Pilosissimae pilosissima*, *Rubescentes rubescens*, and so to the end of the seventy, he will be following to the letter Mr. Rydberg in the case of *Mitellastra caulescens*; for, grammatically, the whole seventy-one will be exactly parallel.

That *Rubacer* means red maple, the author of that name himself placed beyond dispute when he printed that combination *Rubacer odoratum*. The ending *um* is absolutely fatal to the witless claim that any *Rubacer* is a *Rubus* and not an *Acer*. When on page 211 of this volume I presented that argument I called attention to its character as unanswerable. In a recent display of loosely scattering polemics¹ the author of the synonym *Rubacer* leaves unrecalled this particular point I made. There may be readers who may charge this to the supposed dis-

¹Torreya, vi, 165-169.

cretion of evasion; who will say the point was left out of view because of its obvious fatality to what Mr. Rydberg was contending for. I can and shall take my opponent's part against every such probable assailant of his scientific candor and sincerity; for I see it to be easily possible he may not have discovered in that argument of mine anything of the pointedness it carries. Its momentum as an argument lies in the difference of meaning that subsists between such Latin word-endings as *um* and *us*. It is evident that Latin endings indicating number, gender, etc., may chance to be slow in making their several impressions. Probably not until he reads, or is told, what I have said above, will it enter Mr. Rydberg's thought that *Mitellastra* is not the feminine singular that he guessed it to be, but a neuter plural.

The paragraph that occupies the greater part of page 166 I can make nothing of beyond a curious display of innocency of the art of word construction and a medley of self-contradictions, save only that into the midst of this marvel of a paragraph there is thrust this refreshing bit of mother wit: "If I prefer to call the old *Rubus odoratus* L. a raspberry-maple instead of a maple-raspberry, I am well within my rights." I am truly glad of this fine pronouncement, because it can not be disputed; but it can never have the least bearing on the plain fact that by that adjective ending *um*, *Rubacer* is a maple in its meaning.

More than two pages are given to the statements regarding the identity of *Rubacer* and *Bossekia*. They reveal to the careful reader much more of their author's mind and purpose than I shall here point out. One or two things are said in such just criticism of me that, were I sensitive and vain-glorious as I might be, I should feel deeply humiliated. At the same time, in this part of the paper, rash and unwarranted statements follow one upon another in continued and close succession. Here is a selection from among them:

1. "There is nothing in Necker's diagnosis that points directly to *Rubus odoratus*." This is untrue.

2. "It is only from the fourth and the last lines of the diagnosis that any clue can be had." Very far from the truth.

3. "Supposing that Necker had the first edition of Linnaeus' Species Plantarum, there are in it but two species of *Rubus* with simple leaves, *R. odoratus* and *R. Chamaemorus*." Also untrue.

4. "*Rubus Chamaemorus* has many pistils and many drupelets." Not so; for out of the 12 Linnaean Rubi, 9 have many drupelets, 3 from very few to few, and Chamaemorus is one of these; not rarely with only 5 or 6 drupelets, though these few are large.

5. "Necker must, therefore, refer to this [second] edition, or else to the third, which is practically identical." Certainly a most queer proposition to follow upon the very heels of the mention of *Dalibarda*, which Necker could never have quoted from any edition but the first! That proves that he had the first edition and quoted it. In it *R. odoratus* has precedence over both *R. Chamaemorus* and *Moluccanus*, which latter we are told is not in that first edition!

6. "Or else to some edition of the Systema, perhaps the 12th or 13th. In either case the problem becomes much more complicated, because in all of these there are not less than four species of *Rubus* with simple leaves." All this not worth the space it takes in Torrey's and here, since it is all deduction from quotations 2 and 3, both of which I here again pronounce utterly truthless. Mr. Rydberg will have to concede that all ground of bibliographic complication is forever removed, when he finds that in that book, glanced at all too hurriedly, all the simple-leaved Rubi hold places, *odoratus* the highest and *Moluccanus* the last and lowest.

7. "*R. Chamaemorus*, * * certainly intended by Necker as a part at least of his *Bossekia*." Wholly unwarranted statement. The character definitely excludes it.

8. *R. chamaemorus*, * "the European species best known at the time." Wholly irrelevant; because *Chamaemorus* can

not be put into *Bossekia* but by altering the published diagnosis of the latter. Omit the word "European" and what is left is false. *R. odoratus* "at the time" was known to hundreds of botanists in Europe who had never seen *Chamaemorus*.

9. "Should not this [*R. Moluccanus*], according to Dr. Greene's own interpretation, be the type of *Bossekia*?" The questioner concedes that Necker in making group distinctions emphasized habit; also that *R. odoratus* is at least a part of *Bossekia*. I now answer this one question by eight questions, any one of which is a severe rebuke of my respected colleague's utter recklessness in writing. (1.) Can Necker be believed to have referred to the same genus with *R. odoratus*, a blackberry pure and simple, weak, straggling and prickly? (2.) Before putting his question did our critic not ascertain that *R. Moluccanus* is a blackberry pure and simple, straggling and prickly-stemmed? (3.) Has our long-time specialist in Rosaceae yet to learn of native American blackberries which, as seedling plants, and up to the year of their first flowering and fruiting, bear none but simple leaves, then in their fuller maturity only compound leaves? (4.) Does he need from me the information that one such American blackberry came to be published at first for two distinct species because of this twofold appearance? (5.) Has he looked into the history of *R. Moluccanus* far enough to see that the earlier author, from whom Linnaeus borrowed all his knowledge of it, published as his type of the species an Asian blackberry with leaves compound? (6.) If so, did Mr. Rydberg not go on and ascertain that the simple leaved one was made by Rumph no more than a variety of the other? (7.) Is not then the Linnaean *Moluccanus*, after all, to be viewed as a mere younger state of *R. parvifolius*? (8.) Will our friend of the *Torreya* disputation say that Necker in all probability knew not these freaks of blackberries?

This column of impeachments must end here for want of time and space. But nine specifications of truthlessness indicated from these pages of *Torreya* should suffice for the present

purpose, and especially since I find no ground of suspicion that any one of those nine falsifications was made intentionally. The misfortune of their author seems to have been the assuming that, since the day in last April when I placed in his hands a volume of Necker opened at a certain page,¹ he has believed himself grown competent to discuss that author with safety; whereas I after many years of occasional wrestling with his terms and his taxonomy, know that I may stumble. No; my opponent has not meant those misstatements nine. He has but written his name large on the list of those who

“—— — rush in where angels fear to tread.”

Under no consideration can Necker have thought of placing a blackberry congeneric with *R. odoratus*. That was a most vain imagination, born of ignorance more dense than mine when I suggested for *Chamaemorus* a place, in Necker, under *Dalibarda*. I had never seen that type growing, nor knew that it is dry-fruited; otherwise I should have understood rightly that term “nuda” in Necker, which he took up from Linnaeus, as I now perceive. But this error of mine, which I rejoice in Mr. Rydberg’s having been able to correct, would not have been committed, even in my ignorance of *Dalibarda*, had I found *Chamaemorus* admissible to Necker’s *Bossekia*, the most essential character of which excludes it to a certainty. *Bossekia* has “very many” drupelets, *Rubus* has from “several to rather many,” plures being able to bear all that breadth of meaning, but no more; the “plurimi” in the *Bossekia* diagnosis, being absolutely superlative, means it has the greatest number occurring in any of these plants; and it is true.

Chamaemorus often has a fruit of no more than five or six drupelets, very large; *Rubus* of Necker, any small or moderate number of them, but perhaps never more than half as many as the *R. odoratus* average. Nor is this all. Even the calyx of *Rubus* and *Bossekia* has, according to Necker, its own character

¹ I had not written, as yet, a word about *Bossekia*: but the very name was that day new to the other party.

in each. In a word, the character of *Bossekia*, as Necker really gave it, excludes from the genus completely every *Rubus* known at that time save *R. odoratus* alone. Yet Mr. Rydberg says: "There is nothing in Necker's diagnosis that points directly to *R. odoratus*. It is only by inference that any one may come to the conclusion that that species is intended." The first sentence of this is already on my list of absolute falsities; nor do I think the cause of truth and science can ever demand its removal thence. But now a word upon the philosophy of that delectable phrase, "only by inference."

One side of the moon Mr. Rydberg and I, under favorable conditions, may see to be a hemisphere. The other side of it we shall never see or be able to visibly match with the hemisphere we do see (as we might match two different specimens of *Rubacer*). Do we know that the moon's invisible side has a convex and not a plane surface? Assuredly we do know it, and as certainly, "only by inference." Do we know that this planet whereon we botanize is spherical? Its sphericity no man ever saw or will see. We do know it a sphere, but "only by inference." Why have learned men and masterly botanists, Linnaeus, Jussieu, Endlicher, Bentham, Gray, and some hundreds more—why have they published thousands of plant genera by diagnosis only, citing not a type? Solely for the convenience of those who, competent to use such books, infer to a certainty the generic identity of things from those diagnoses alone. Did my friend when he published the *Rubacer* diagnosis not expect each possible finder of an unknown species of it, if a botanist, to be able to infer to a certainty the genus from his description alone? If not, then he wastes time, ink and paper in writing diagnoses; for these are then a dumb show; a useless mere formality. What use in a Gray's Manual, a Britton's Manual, a De Candolle's Prodrômus, or any of the untold thousands of other such books, but through this, that untold thousands of educated people, competent to use them, may infer to a certainty the genera and the species by the diagnoses alone?

This "only an inference" compels the inference of sorry limi-

tations in philosophy; and so does the following: "*Bossekia* is not properly published," etc. Mark the distinction. It is not said that *Bossekia* is not published, but only that its publication is not "properly" made; is not, as to form and method, conformed to the newest and latest edition of a certain "Code." One not too near-sighted must readily foresee here the open door to utter lawlessness as to the adoption of generic names. Under the distinction made, each earlier edition of Linnaeus' great *Genera Plantarum* may be closed and shelved. Genera may not be cited from it, because, though adequately published, they are not "properly" published! This thing has already been done, and I now see why. Again, and for a different illustration. All the new genera of Bentham, published in his *Genera Plantarum*, without naming species, have no status as genera. To the man who first identifies, by sure and certain inference, the species of such genus and gives them names, and not to Bentham, will be ascribed the authorship of each such genus! If he choose to ignore Bentham's generic name and coin a new one, Mr. Rydberg will adopt that new one, (despite his own saying that the law of priority is fundamental), and relegate the prior name to synonymy. In the case of Necker's genera, I may prove to all the botanical world the identity of one of his genera, declaring its type beyond all question. Mr. Rydberg may admit that it is published, but not "properly," and uphold stubbornly his own synonym of that genus, and make Necker's clearly published name the synonym. This will be lawlessness; and I shall look for a flood of it.

I am under renewed obligations to the writer in Torrey. He has lightened the darkness of my former ignorance about *Dalibarda*. He has given me a fine array of texts—several here unnoted—to head some chapters of a partly written volume. Since the first reading of his paper I enjoy a deeper insight into the meaning of that ancient worthy who once exclaimed:

"Oh! that mine adversary had written a book!"

An Orchid Note.

Solomon Conrad's paper of 1829, on *Corallorhiza Wisteriana*, falls short of being the original publication of that species; for Rafinesque a dozen years earlier had just made that plant the type of a new genus under the name of *Cladorhiza*. He calls the species "*Cl. maculata*," in evident allusion to the notably spotted lip of the flower. To this organ, the lip, he ascribes three essential characters. It is "spotted, elliptic, obtuse, crenate," which I note as a more perfect description of that organ than either Conrad or any one else since Rafinesque's day, in so far as I have read seems to have given. None but he mentions the crenulate character of it, though the figure in Britton & Brown clearly shows it.

I here present the fuller account, as to its history, of what I should call

CORALLORHIZA MACULATA. *Cladorhiza maculata*, Raf. Am. M. Mag., i. 429 (1817).

Corallorhiza Wisteriana, Conrad. Journ. Philad. Acad., vi, 145 (1829).

As a frequent plant in woods on the outskirts of the Philadelphia of the early nineteenth century, it might be expected that Rafinesque would have been the first to note its character, for he was familiar with the Philadelphia region at the time.

Certain Rosaceous Genera.

From the view of *Potentilla*, as a fair aggregate of many sub-generic types—the view I took nineteen years since¹—I have long since receded. Mr. Rydberg has taken a middle ground, which is logically untenable. But he has brought out several new characters for each of several segregate genera, and this so clearly that I must concede the untenability of my former position. But neither can I conform to his scheme. If *Horkelia* and *Drymocallis*, just alike in habit, are distinct, then is *Tridophyllum*, so peculiar in habit, flower and fruit, also an excellent genus.² If *Argentina* be separate from *Potentilla* it is by habit

¹ PITTONIA, i. 95-106.

² LEAFLETS, i. 188.

and inflorescence alone, and from this there seems to follow necessarily the conceding of equal rank to what I shall call

CALLIONIA. Perennials with typically a solitary slender stem ascending, never erect, bearing about two long-peduncled flowers, one in the axil of as many middle stem leaves, the stem after flowering becoming greatly elongated, trailing and sarmen-tose. Calyx rotate in anthesis, the 5 bractlets equaling or often quite surpassing the segments, their tips often seen projecting beyond the summit of the broad rounded petals.

Let no one wrestle with any supposed etymology of *Callionia*. One need not know that it has any. It is an euphonious designation of what to me is the most charmingly modest and beautiful of our potentillaceous types. The species are, at least in part,

C. CANADENSIS. Linn., under *Potentilla*.

C. SIMPLEX. Michx., " "

C. PUMILA. Poir., " "

We have, in the eastern United States, three groups of shrubs which, in colloquial speech, we distinguish as Blackberries, Red Raspberries and Black Raspberries, the latter otherwise known as Blackcaps. The old ruling, that these three very natural groups should be but sections of one genus, *Rubus*, I have long submitted to with mental reservation. A hint of my real opinion was given in my *Flora Franciscana* some fifteen years since. I wish now to express that opinion without reserve.

BATIDAEA (Dumortier, as subgenus.) Stems the first season erect, armed with straight prickles (usually soft and innocuous in Eastern species), and clothed with pinnately 5-7-foliolate leaves. Flowers inconspicuous; petals small, dull-white. Fruits separating from the receptacle; drupelets rather many, soft, very juicy and perishable; pyrene reticulate, obtuse and without keel on the back. Best known species *Rubus Idaeus*, Europe.

The North American species are many, mostly hitherto unrecognized.

B. STRIGOSA. *Rubus strigosus*, Michx., the original from Canada; but, between the high Northeast and the mountain dis-

tricts of the South, there occur several excellent subspecies to be distinguished. Those proposed below are western.

B. HETERODOXA. Stems and slender flowering branches deep red-purple, the latter sparsely hispid, otherwise glabrous, but pedicels with also a short pubescence: leaves very diverse, the lowest 3-foliolate, those next them simple, deeply 3-parted, the uppermost slightly lobed to merely ovate; the margins of all incise-serrate, all deep-green and plicate-rugose above, white tomentose beneath: calyx hispid and glandular, segments triangular, acute.

Woods at Clarke, Indiana, 29 May, 1897, L. M. Umbach, U. S. Herb.

B. AMPLISSIMA. Stem and branches vivid green, sparsely both hispid and with short fine gland-tipped hairs: foliage pinnately 3-foliolate, thin, very ample, odd leaflet ovate, $3\frac{1}{2}$ inches long, $2\frac{1}{2}$ inches wide, coarsely and doubly crenate, all green on both faces when mature, only the youngest hoary beneath: pedicels hispid with many short and few long and spinescent hairs all gland-tipped: calyx sparsely aculeate and pubescent, its segments ovate, acuminate.

Warren's Woods, Brookings Co., S. D., 17 June, 1893, Thornber, U. S. Herb.

B. ELEGANTULA. Stem and branches nearly glabrous, a few short scattered hispid hairs seen under a lens: leaves very thin and delicate, 3-foliolate, on slender petioles sparsely short-aculeolate and finely glandular-pubescent; odd leaflet ovate, acuminate, 2 inches long, all regularly and most elegantly double-serrate, the teeth all very acute, lower face whitish with very fine tomentum: pedicels glandular-hispid; calyx sparsely aculeolate, its segments ovate, but with greatly elongated acumination.

Pokegama Lake, Minnesota, June, 1891, J. H. Sandberg, n. 214, as in U. S. Herb.

B. ITASCICA. Stem and branches almost completely devoid of both bristles and pubescence, the whole, even to the pedicels, appearing glabrous: odd leaflet 2 inches long, rhombic-ovate, all three simply and somewhat crenately serrate, of thin texture

glabrous and glaucescent above, pale beneath: calyx without trace of hairs or acueli, but puberulent.

Itaska Lake, Minnesota, July, 1901, J. H. Sandberg, n. 1173, as in U. S. Herb.

B. DACOTICA. Stem stout, setose-hispid, with rather soft aculeae and hairs; flowering twigs with very few bristles and copious soft glandular-viscid hairiness: foliage thin, deep green above, whitish tomentulose beneath, also sparsely aculeolate on the veins; odd leaflet narrowly somewhat cuneate-obovate, or else obovate, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, doubly incise-serrate; pedicels and calyx hispid, segments of the latter long, caudate-acuminate.

Black Hills of S. Dakota, July, 1892, P. A. Rydberg, n. 657, as in U. S. Herb.

B. ACALYPHACEA. Main stem very hispid with stout straight prickles; flowering twigs less so, their prickles shorter, slenderer, deflexed, with very many unequal hairs intermixed, all strongly gland-tipped, the same double indument clothing petioles, rachis, and even the midvein of the leaves beneath; odd leaflet oval, acute or acuminate, all three incise-serrate, plicate-veined above, green beneath, even the veinlets there aculeolate: calyx aculeate and glandular-hairy, even to the tips of the long-acuminate segments.

Yellowstone Park, 28 July, 1902, E. A. Mearns, n. 2353, as in U. S. Herb. Remarkable nettle-leaved species, with strong armature.

B. SUBCORDATA. Less prickly than the last, more glandular also glaucous: odd leaflet subcordate-ovate, acute, doubly serrate, all white-tomentulose beneath and apt to be aculeolate on the veins: calyx more deeply cleft than usual, aculeolate and glandular-hairy almost throughout: fruits very small, often of but 6 or 7 drupelets and not equalling the calyx.

Yellowstone Park, E. A. Mearns, nn. 2553 and 3689, as in U. S. Herb, collected July and Sept., 1902. Also Union Pass, Wyoming, A. Nelson, n. 997.

B. LAETISSIMA. Stem without bloom, red-brown, hispid with slender weak prickles; twigs and thin delicate foliage all

light-green, not even the indument reddened: odd leaflet broadly ovate, 2 inches long, 1½ inches wide, merely acute, doubly serrate-toothed, all pale beneath with very light and thin tomentum, all veins aculeolate: calyx densely aculeolate but not glandular.

Middle or northern Colorado, apparently, and in the lower foothills only, Cowen, 17 June, 1895, n. 149, as in U. S. Herb.

B. UNICOLOR. Young stem and twigs glaucous, less hispid, mature foliage green alike on both faces: leaflets narrower; the odd one ovate to rhomboid and oblong-lanceolate, doubly serrate, the laterals small in proportion, all aculeolate on the lower part of the veins beneath: calyx with broad ovate-acuminate segments and both lightly glandular-hairy and aculeolate.

Near Red Lodge, Montana, 27 July, 1893, J. N. Rose, n. 52, as in U. S. Herb.

B. PERAMOENA. Mature stems nearly smooth, the bristles short and very sparse; twigs and pedicels showing rather more numerous and longer gland-tipped hairs; leaves ample, thin, green and glabrous on both faces when mature, rather copiously aculeolate on the veins beneath; odd leaflet ovate to oval, 2 inches long or more, acuminate, lightly incised, the lobes serrate: calyx both finely aculeolate and glandular-hairy almost to the tips of the long triangular-subulate segments.

In meadows along the banks of St. Mary's River, Idaho, June, 1805, J. B. Leiber, n. 1105, as in U. S. Herb. Of most elegant thin green long-pointed foliage.

B. CATAPHRACTA. Densely armed, both as to the main stem and twigs, with rigid prickles, some longer and straight, others shorter, widened at base and slightly deflexed, this armature supplemented by as many short, rather rigid gland-tipped bristles; leaves small, deep-green on both faces in age, the younger white tomentose beneath, the veins of all beneath closely beset with strong flat prickles, with others short and subterete intervening; odd leaflet ovate, acute, simply or doubly serrate, 1½ inches long; calyx and pedicels glandular-pubescent beneath a strong armature of prickles.

A dwarf petrophilous species from head of Pettit Lake, Idaho, L. F. Henderson, 1895, n. 3598, as in U. S. Herb.

B. *SANDBERGII*. Tall and stout, reddish-hispid as to stem, twigs, pedicels, petioles, and even the veins beneath, but prickles more uniform than in the last, none as stout, none obviously flattened except those of the leaves beneath: leaves of the twigs commonly 5-foliolate, deep green on both faces when grown, sparsely strigose hairy above, not so beneath; odd leaflet broadly oval to rhomboid-ovate, all merely acute, doubly or simply incise-serrate: calyx strongly aculeate and puberulent.

Packsaddle Peak, Idaho, Aug., 1892, Sandberg, McDougal and Heller, n. 859, as in U. S. Herb.

B. *FILIPENDULA*. Dwarf, but stout as to the stem, the short twigs and long pedicels slender, only the main stem very hispid: leaves small, pale beneath, the indument only very obscure except in those young and growing: odd leaflet deltoid-ovate to rhomboid, hardly an inch long, acute: fruiting pedicels slender, pendulous, aculeolate; calyx seldom bristly, commonly only puberulent.

Lost River Mountains, Idaho, Aug., 1895, L. F. Henderson, n. 4039, as in U. S. Herb.

B. *VIBURNIFOLIA*. Stem stoutish, tortuous, perhaps tall, sparingly hispid; twigs tortuous, thinly and softly hispidulous: leaves of a clear bright green on both faces, glabrous above, also beneath save as to scattered bristles or slender prickles along some veins; odd leaflet deltoid-ovate, $1\frac{3}{4}$ inches long, acute, sharply serrate, the veins elevated and conspicuous beneath: calyx with a few prickles at its base, the segments only puberulent: fruit uncommonly large, apparently amber-color or yellowish.

Selkirk Mountains, B. C., Aug., 1904, C. H. Shaw, n. 472, as in U. S. Herb.

B. *SUBARCTICA*. Stems tall, stout, hispid with rather sparse short slender prickles; twigs very leafy, scantily and shortly glandular-hispid, the bristles very diverse as to length and thickness: foliage firm, dark-green above, much plicate, pale

beneath, with a fine downy rather than tomentose indument; odd leaflet 2 inches long, ovate, abruptly acuminate, almost simply serrate-toothed: peduncles and pedicels densely glandular-hispidulous: calyx aculeolate at base, the segments cinereous-puberulent: fruit small, very downy.

Porcupine River, northeastern interior of Alaska, 1891, J. H. Turner; type in my herbarium.

B. ARIZONICA. Low but upright, the stem sparsely but stiffly aculeate; twigs, petioles, and even rachis of the leaf more densely hispid with shorter prickles; leaflets usually 5 even on fruiting twigs, the odd one cuneate at base and of more or less rhomboid figure, all acute, doubly incise-serrate, glabrous above, white-tomentose beneath even in fullest maturity: pedicels and calyx densely glandular-hirtellous and with frequent large and stout prickles: calyx large for the plant, its base aculeolate, its deltoid-ovate segments almost caudate-acuminate, often narrow, foliaceous at the very tip.

Mountains of Arizona and New Mexico to those of at least southern Colorado; the type from the San Francisco Mountains-**as** collected by myself in 1889.

MELANOBATUS. Stems greatly elongated and arcuate, glaucous, prickly, the prickles flattened and recurved. Leaves pinnately (rarely pedately) 3-5 foliolate. Flowers not showy, the calyx parted almost to the base. Petals small, dull-white. Fruit hemispherical, parting from the receptacle; drupelets small, the pulp scanty, firm rather than watery. Reticulation of pyrene running into a keel on the back.

Genus wholly American, recalling the Old World subgenus or genus *Glaucobatus* (Dumortier); but they are only bluish proper Blackberries, not Raspberries. The species of **MELANOBATUS** are few.

M. OCCIDENTALIS.	Linn.,	under	<i>Rubus</i> .
M. NEGLECTUS.	Peck,	“	“
M. LEUCODERMIS.	Dougl,	“	“

M. GLAUCIFOLIUS. Kellogg, under *Rubus*.

M. NIGERRIMUS. *Rubus hesperius*, Piper, Eryth., v. 103.

M. MICHIGANUS. More sparsely and feebly armed than *M. occidentalis*; leaflets longer, narrower, less incised; the odd one lance-oblong or narrow-ovate, 2½ inches long, all merely pale beneath, scarcely white even when half grown: pedicels with few and reduced prickles but a rather copious short glandular hairiness.

Woods near the Agricultural College, Michigan, C. F. Wheeler, 1895.

M. BERNARDINUS. Rather low, excessively and stoutly prickly even to the midvein of the leaflets: foliage small, deep green above, white beneath; odd leaflet 1½ inches long, quite as wide, broadly ovate to deltoid-ovate, somewhat 3-lobed now and then, otherwise doubly serrate-dentate: pedicels with few strong prickles and a dense glandular short indument.

Mill Creek Falls, San Bernardino Mountains, Cal., S. B. Parish, June, 1901, n. 5046.

PARMENA. Raspberries, but with the habit of upright Blackberries, though less prickly, sometimes almost unarmed. Leaves 3-foliolate, or some simple. Flowers few or solitary, large, with rose-red long petals: calyx 5-cleft, very closely reflexed under the fruit; this large, of very many drupelets. Pyrenes strongly favose-pitted, but low-keeled on the back.

P. SPECTABILIS. Pursh, under *Rubus*.

P. MENZIESII. Hook., " "

CARDIOBATUS. Technically a true Blackberry, small, trailing, very prickly, even to the round-cordate simple foliage. Stipules foliaceous. Flowers solitary in the leaf-axils, short-pedicelled: calyx quite divided, the sepals very unequal, one large, often foliaceous, more or less enfolding the narrower, the whole calyx erect in fruit, enfolding the very small fruit of few drupelets. Petals rose-red, showy.

C. NIVALIS. Doug., under *Rubus*.

PSYCHROBATIA. Slender and subalpine herbs, prostrate, rooting at the nodes. Leaves pedately compound, with foliaceous stipules. Flowers white, solitary on long filiform peduncles. Calyx of 5 nearly distinct sepals often toothed near the summit, as also the petals. Pistils very few, only two carpels maturing, becoming a pair of large glabrous red drupelets too weighty for their delicate peduncle and lying on the ground. Pyrenes sparingly wrinkled, not reticulate.

P. PEDATA. Smith, under *Rubus*.

COMAROBATIA. A prostrate unarmed undershrub, sometimes rooting at the nodes. Leaves simple, 3-lobed, or now and then quite divided into 3 leaflets. Peduncles erect in both flower and fruit, 1-3-flowered. Sepals ovate, entire, acuminate or cuspidate, unequal. Petals broad and obtuse, white. Pistils very few; ovaries silky-tomentulose, several maturing to large villous drupelets. Pyrenes lightly wrinkled.

C. LASIOCOCCA. Gray, under *Rubus*.

CHAMAEMORUS, Clusius, Hist. 118 (1601.) Unarmed, mainly herbaceous low upright perennials. Leaves simple; stipules large, oval. Flower solitary, terminal: calyx 5-parted almost to the base; sepals erect, partly covering the fruit; this of few large very juicy drupelets adhering to their receptacle. Pyrenes large, smooth.

C. ANGLICA, Clusius, l. c.

C. NORWEGICA, Clusius, l. c., 119.

Some Oriental *Rubus* Allies.

If I gave to the genus *PARMENA* an oriental name, it was with the fact in mind, that it seems to have its fuller development on the Asian shores of the Pacific. There the species are all simple-leaved, yet in habit, inflorescence, flowers and fruit, apparently at full agreement with *Rubus spectabilis*. Several of them will take names as follows under *PARMENA*.

- P. PALMATA. Thunberg, under *Rubus*.
 P. INCISA. " " "
 P. GRAYANA. Maximowicz, " "

A most interesting congener of the Northwest American *BOSSEKIA NUTKANA* (= *Rubus Nutkanus*, Moc.) occurs, as might have been anticipated, in Japan; that is to say,

B. PELTATA (= *Rubus peltatus*, Maxim.) With the habit, inflorescence, and flower of typical *BOSSEKIA*—even to the excessively numerous pistils that Necker makes the most essential character of the genus—the oriental species is not wholly unarmed. Its specific name points to the fact that the two basal lobes of the angled foliage, instead of forming a sinus as in other species, are quite grown together, so that technically speaking the leaf is peltate.

In habit and foliage suggestive of our American *Dalibarda*, yet extremely unlike it in character, is a Japanese type which I may denominate

CALYCTENIUM. Herbaceous perennial, prostrate, rooting at some nodes. Leaves orbicular, simple, dentate; stipules foliaceous but laciniate-parted. Peduncles solitary, terminating upright leafy branches, these and also the petioles aculeolate, the calyx very densely so, and with long straight prickles; segments of calyx unequal, large, 2 usually smaller and subentire, 3 deeply pectinate-pinnatifid. Petals white, abruptly unguiculate. Pistils rather many.

- C. PECTINELLUM. Maximowicz under *Rubus*.

A New Bland Violet.

VIOLA MINUSCULA. Allied to *V. blanda* and white-flowered, but extremely small, the largest plants only $1\frac{1}{2}$ inches high, growing in dense matted masses: leaves small, on petioles shorter than the blades, these subreniform-orbicular, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, hardly as broad, very obtuse, faintly crenate, glabrous on both faces, the petioles, especially of the later season, hirtellous: peduncles quite surpassing the leaves, prominently bracted below the middle; sepals oval and oblong-elliptic; corolla white, large as in *V. blanda*, not fragrant. Plant in summer not larger than in spring, producing most delicately filiform stolons and a few very short-stalked parthenogenetic flowers; the succeeding pods long and narrow.

This interesting violet has been sent me from western New York, Chatauqua County, by Mr. William B. Limberger, with full notes of its habitat, and characteristics as differing from *V. blanda*. It is said to be the very first of all violets to appear in the spring, in that region; being three weeks earlier than *V. blanda*. Its habitat is wet meadows, where it is associated with that small low caulescent violet, *V. cardaminefolia*, Greene. *V. blanda*, a plant always several times larger, has a different habitat in the region, and is never seen growing with or near *V. minuscula*.

On page 228 preceding I twice wrote, inadvertently, *GUILLENIA* *ROSTRATA*, where it should have been *G. LONGIROSTRIS*, etc.

ERRATA.

- Page 28, line 14, for on read or.
Page 42, “ 25, for margined read marginal.
Page 73, “ 3, after California insert by.
Page 73, “ 7, for diagnosis read diagnoses.
Page 79, for *Crythanthe* read *Cryptanthe*.
Page 88, “ 8, after had insert been.
Page 96, for *stellaroides* read *stellarioides*.
Page 158, “ 8, for Elthamensis' read Elthamensis.
Page 185, at foot of page, for 1905 read 1906.
Page 196, line 15, for Conduz read Tonduz.
Page 228, line 14, for exact read erect.
Page 230, for *caulescentes*, read *caulescentia*.
Page 240, line 2, for acneli read aculei.

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LEAFLETS

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New Species of the Genus *Mimulus*.

M. MINTHODES. Akin to *M. ringens*, but stem wing-angled much as in *M. alatus*, also the leaves lanceolate, narrowed at both ends and short-petioled, the petiole winged, the margins of all leaves lightly crenate-serrate: peduncles long, surpassing the foliage: calyx-teeth subulate, aristate-acuminate.

Rare or local in the southern United States, where *M. ringens* is also widely dispersed; differing from that by its wing-angled stem and exactly lanceolate foliage, while from *M. alatus* it is distinguished by its long peduncles and subulate calyx-teeth. The type specimens are in U. S. Herb. and were collected at Birmingham, Ala., Aug., 1888. Others quite like them, but younger, were gathered at Rome, Georgia, in the same year.

M. ACUTANGULUS. Allied to *M. ringens*, and with similarly spatulate-lanceolate or oblong-lanceolate foliage lightly appressed serrate, but stem sharply angled, the fruiting calyx very short and thick, its teeth short, abruptly aristate-pointed above a deltoid base, also erect, not converging over the capsule like those of *M. ringens*.

A northwestern type which, despite its short erect calyx-teeth and somewhat angular stem, has no marked character in common with *M. alatus*. The type specimens in U. S. Herb. are from Crow Wing County, in central Minnesota, J. H. Sandberg, 19 Aug. 1891. *M. ringens* itself appears to be common in Minnesota.

I next subjoin a few segregates of the group of which *M. cardinalis* is typical. Indeed, all the forms here brought to notice have been carelessly labelled and distributed for that

species. Everywhere in California and northward the deviations from the type seem best treated as marked varieties, or sub-species; but in Arizona, and southward in Mexico, all the forms have quadrangular stems, as well as a different type of foliage; with also some other definitely specific characters.

M. CARDINALIS, var. *GRISEUS*. Stems very stout, but weak and decumbent, much branched, grayish-hoary throughout, but especially as to stem, branches and peduncles, with a villos and somewhat viscid pubescence: leaves broadly oval, closely sessile, sparsely dentate with coarse triangular teeth, the intervals between these teeth denticulate.

On stream banks of Santa Catalina Island, off the coast of California, May, 1896, Blanche Trask.

M. CARDINALIS, var. *RIGENS*. Stems rather slender, perfectly terete, rigidly upright from roots not very obviously perennial: leaves numerous, ascending, not large, closely evenly and sharply dentate; peduncles rigid, of twice the length of the leaves: calyx rather short, its tube marked with fine red-purple dots.

Neighborhood of San Bernardino, in arid southern California; collected by S. B. Parish, July, 1896; in U. S. Herb. under his number 4189. It is in marked contrast with the far northern plant of cool mountain shades in a number of particulars.

M. CARDINALIS, var. *EXSUL*. Stems long, stout, decumbent or reclining, terete, densely leafy; leaves small for the plant, widely spreading, oval above a spatulate base, sessile, auricled-clasping, rather obtuse, not dentate, only lightly serrate-toothed, both faces softly viscid-pubescent: calyx short, its teeth deltoid and shortly acuminate: tube of corolla not exerted.

Inhabits the hot and arid island of Cedros off the coast of Mexico. Coll. Edw. Palmer, March, 1889, n. 681 as in U. S. Herb.

M. VERBENACEUS. Stems not stout, obtusely 4-angled, decumbent, 10 to 16 inches high, simple, densely leafy,

usually flowering at summit only; pubescence scanty, villous : leaves thin, elongated, elliptical and saliently as well as very regularly dentate above a spatulate and entire basal part, sessile by a subcordate but not dilated base : calyx villous, its teeth deltoid but with subulate tip : corolla with long tube exerted from the calyx by half its length.

Wet rocks above Clear Creek, Camp Verde, middle Arizona, J. W. Toumey, Aug. 1891, as in U. S. Herb.

M. LUGENS. Stems upright, rather slender, very distinctly 4-angled, lightly villous-pubescent : leaves elongated, the lower almost oblanceolate, the floral rhombic-lanceolate, all acute, saliently and closely serrate-toothed, the upper face marked in the middle by a large somewhat triangular dark-brown or blackish spot : peduncles slender, 3 or 4 inches long, twice the length of the leaves : folds of the calyx wholly dark-colored, as also the triangular-subulate teeth : corolla-tube of more than twice the length of the calyx.

Fort Huachuca, southern Arizona, Edward Palmer, 1890, n. 441 as in U. S. Herb. Also the same, by the same, from the Sierra de los Alamos on the Mexican side of the international boundary, in the same year.

M. RUPESTRIS. Stems slender, branching, 4-angled, largely prostrate, rooting at many of the nodes : leaves small, narrow, mostly elliptical, 3-nerved, closely, saliently and almost pectinately serrate-dentate : pedicels very slender, not equalling the leaves : calyx thin, its teeth triangular-lanceolate : corolla small, elongated, its tube twice the length of the calyx.

State of Morelos, Mexico, on wet cliffs at 7,500 feet on the Sierra de Tepoxtlan, C. G. Pringle, 6 May, 1900 ; his n. 8348 as in U. S. Herb. There is a fragment of something quite different mounted on one corner of the sheet.

The following are of the alliance that is headed by the *Mimulus luteus* of South America :

M. EROSUS. Annual, stoutish, 5 to 8 inches high, obscurely and obtusely 4-angled, rather short-jointed and more or less geniculate but not procumbent: leaves small, suborbicular or subreniform above a broadly cuneate petiolar base, the margins of all erose to strongly erose-dentate: fruiting pedicels of twice the length of leaves, filiform but firm: fruiting calyx strongly bilabiate and closed, coarsely purple-dotted: corolla of twice the length of the calyx, with long-exserted tube and small limb.

Santa Agneda, Lower California, Edw. Palmer, 1890, n. 233 as in U. S. Herb.

M. PALLENS. Annual, erect, very slender, 3 to 6 inches high, dull-green and glaucescent: leaves small, in few pairs and remote, very thin, oval to suborbicular, the upper broader and sessile, the lower narrower and on rather long winged petioles, all, even the petiolate ones, connate at the very base, some subentire, others toothed slightly; pedicels elongated, filiform: corollas clear yellow, large for the plant: fruiting calyx oval, closed by the usual folding of the segments; these all obtuse.

Vicinity of Durango, Mexico, Edw. Palmer, 1896; his n. 55, as in U. S. Herb.

M. PUBERULUS. Greene, in Rydb. Fl. Col. 311 (1906). Stems upright, terete, $\frac{1}{2}$ to 1 foot high, branching, viscidly hirtellous or at least viscid-puberulent throughout: leaves not large, the lower obovate, spatulate at base, upper oval or ovate, sessile, all more or less and variously toothed: corollas large for the plant, 1 inch long, yellow; pedicels very short, not equalling the mature calyx, this oval, with uppermost tooth very large and prominent.

Type in my own herbarium from Pagosa Springs, Colo., by C. F. Baker, 27 July, 1899.

M. LONGULUS. Annual, slender, suberect, often a foot high or more, simple, glabrous, glaucescent, sparsely leafy and few-flowered, stem obtusely quadrangular, the lower internodes commonly 8 inches long: leaves small for the plant, orbi-

cular to round-reniform, denticulate: corolla minute, pale-yellow; calyx accrescent, in maturity approaching a half-inch long, the teeth unequal, little connivent.

Margins of spring pools that in summer have gone dry, in low meadows along the Humboldt River, at Deeth, Nevada, 26 July, 1896; collected only by the writer.

The species can only be compared with my *M. Hallii* of Colorado; and that is low, with rather crowded leaves and flowers; has also a calyx with much more unequal teeth and these closely connivent.

M. MINUSCULUS. Small delicate perennial 1 to 3 inches high from slender subterranean rootstocks, the whole plant more or less sparsely and minutely hispid-hirtellous: leaves thin, ovate, saliently few-toothed, subsessile, barely $\frac{1}{2}$ inch long: flowers large for the plant, in the smaller 1 only and as if terminal, in the larger 2 or 3, on upright pedicels 1 inch long or more; calyx with 1 large and prominent and 4 very short teeth, all triangular; corolla large, $\frac{3}{4}$ inch long, light-yellow.

South Fork of Kern River, Calif., at 8,200 feet, J. T. Rothrock, 1875, n. 312 as in U. S. Herb.

M. CLEMENTINUS. Annual, with slender sharply 4-angled stems leafy and flowering throughout, all after the manner of *M. nasutus*, the corollas as small, but foliage different, the leaves simply and only slightly toothed, the lower with short winged petioles, the upper sessile: fruiting calyx obliquely round-ovate, the teeth subequal, that is, the upper one hardly prominent beyond the others.

San Clemente Island, off the coast of southern California, June, 1903, Blanche Trask. Type in U. S. Herb.

M. CORDATUS. Annual, a foot high, firmly erect, not slender, leafy mostly near the base, internodes of the obtusely 4-angled stem 2 inches long or more, flowers racemously congested near the summit: leaves purplish, cordate, lightly dentate, an inch long, on flattened petioles of equal length, the few cauline smaller and subsessile, bracts of the raceme small, closely sessile: corollas $\frac{1}{2}$ inch long, yellow, not dotted:

fruiting calyx on a slender pedicel of about its own length, of round-oval outline save as modified by the large and prominent triangular uppermost lobe or tooth.

Bear Mountain, near Silver City, New Mexico, 24 April, 1903, O. B. Metcalfe, a part of his n. 28 as in U. S. Herb., the other specimens under that distribution number being of a very different species. The present plant has some points notably recalling the Californian *M. nasutus*. Apparently the same is T. E. Wilcox's n. 31 from Fort Huachuca, Ariz., 1894, in flower only.

M. CUSPIDATUS. Of the height of *M. nasutus*, stems as quadrangular but more slender, with longer internodes and fewer leaves and flowers; herbage not reddened but pale-green and glaucescent; lower face of foliage more or less sparsely setulose-hairy, otherwise glabrous: leaves of suborbicular outline, the lowest on long and slender petioles, the lower and middle cauline with a merely spatulate to broadly cuneate base, these and the closely sessile bracts above them cuneate, all sparsely dentate and plainly cuspidate-pointed: pedicels slender, shorter than the calyx, this with not very prominent upper lobe: corolla small as in *M. nasutus*.

Known only as collected in wet shades among rocks along the upper Stanislaus River, California, by the writer, late in June, 1889.

M. PROCERUS. Stout, upright, presumably a yard high, the large terminal racemes alone a foot long, in every part hirtellous-puberulent: leaves below the inflorescence as far as known round-oval, petiolate, all the floral sessile, broader than long, the lower of these closely, deeply and almost pectinately dentate, the upper much reduced and entire: fruiting pedicels stout, ascending, much longer than the very large calyces, these broadly oblique-oval, $\frac{3}{4}$ inch long, more than $\frac{1}{2}$ inch wide, their teeth large, short and blunt: corolla yellow, large, but not so in due proportion to the plant.

Santa Lucia Mountains, California, R. H. Plaskett, June, 1898, n. 156, as in my herbarium.

M. PETIOLARIS. Perennial, upright, rather slender, more than a foot high, glabrous except as to upper part of inflorescence, all the foliage elongated and rather long-petiolate, only the floral bracts sessile: leaves 3 to 5 inches long including the petiole, blades oval to lanceolate, mostly tapering to the petiole, acutish or obtuse, saliently and doubly dentate: raceme simple, lax, pedicels slender, elongated: corollas smallish, $\frac{3}{4}$ inch long, yellow: mature calyx unknown.

Argus Mountains, Inyo Co., Calif., Apr., 1891. Coville & Funston, n. 740 as in U. S. Herb. Remarkable for long narrow long-stalked leaves.

M. VERONICIFOLIUS. Middle-sized perennial species, suberect from a decumbent base, sparingly leafy, glabrous as to the basal parts, at summit minutely puberulent: lowest leaves obovate, petiolate, the upper sessile, ovate, all serrate-dentate: flowers mostly 2 only, occasionally but one, large, long-pedicellate; calyx-teeth very unequal, the upper very large, obtuse; corolla very large, yellow.

At 5,000 feet in the Olympic Mountains, Washington, C. V. Piper, Aug., 1895; n. 2177 as in my herbarium.

Of the group of the tufted alpine, perennial, to which the Californian *M. implexus* belongs; differing from that by its veronica-like foliage and excessively large corollas, these 2 inches long and nearly $1\frac{1}{2}$ inches wide at the orifice. They are perhaps the largest in the genus.

M. LUCENS. Akin to *M. implexus*, differing by much more slender stems which are weak and decumbent; leaves exactly ovate, truncate or subcordate at base, of such delicately succulent texture as to be clearly translucent when dried under pressure: calyx sparsely and finely villous.

Along rivulets in deep woods of the Powder River Mountains, Oregon, C. V. Piper, Aug., 1896, nn. 2518, 2519 as in my herbarium.

I myself once identified this for Mr. Piper as *M. implexus*, but that was done too inconsiderately. It is as large a plant, but of a totally different anatomy, its herbage, though fleshy,

being of an extremely delicate and almost fibreless tissue, the leaves when dry being as translucent as a delicate green seaweed. It is, of course, a plant widely separated from the other geographically and ecologically.

New Western Asteraceae.

ASTER HALOPHILUS. Stems slender, decumbent, $\frac{1}{2}$ to 1 foot high, sparingly strigulose under a lens, leafy to above the middle, racemose-panicled at summit: leaves rather crowded, oblong-linear, entire acute, green and glabrous except as to the serrulate-scabrous margin, all one-nerved, deflexed: heads middle-sized; involucre turbinate, much imbricated, with scales glabrous and glandless: rays pale violet.

Salt marshes about Beck's Hot Springs, Utah, at 4,500 ft., 6 Sept., 1906, A. O. Garrett. In foliage and habit as well as size reminding one of *A. campestris*, but not closely related to that, the involucre being in every way different, and more like that of *A. adscendens*.

ASTER LEUCOPSIS. Rather slender, rigid, 1 to 2 feet high, decumbent at base, racemose to subpaniculate from the middle; plant whitish with bloom, very sparsely scabrous, the margins of the lance-linear entire leaves strongly serrulate-scabrous: pedicels of the many middle-sized heads with many spreading linear bracts; involucre turbinate, closely imbricated, the green tips of the scales conspicuous on a ground of white: rays not large, pale violet.

Along irrigating ditches in the vicinity of Salt Lake City, Utah, very common. Here described from specimens by A. O. Garrett, 5 Sept., 1905.

ERIGERON MINUSCULUS. Low caespitose perennial with mutipitous short caudex surmounting a stout tap root; flowering branches slender and wiry, only 2 or 3 inches high, monocephalous, leafy-bracted; basal leaves linear, an inch long,

upright, firm, green and glabrous like the stems, perfectly entire: involucre small, campanulate, the bracts unequal and in two ranks, densely glandular-scaberulous, acute: rays neither numerous nor narrow, deep bluish-purple; disk-flowers also not very numerous.

Clefts of rocks in Big Cottonwood Cañon, Salt Lake Co., Utah, 24 Aug., 1906, collected and communicated by A. O. Garrett. Ambiguous as to the genus, the glabrous stems and foliage and few broad rays recalling *Aster*; but the disk-corollas, etc., are those of the genus *Erigeron*.

ERIGERON MENDOCINUS. Tufted and rigid perennial a foot high, the stems decumbent at base, simple, leafy up to the inflorescence of about 3 large heads; leaves spatulate-linear, the lower and larger 2 inches long, acute, nearly glabrous except as marginally beset with stiff hairs abruptly bent upwards from the base: heads $1\frac{1}{2}$ inches broad from tip to tip of the rich lilac rays; involucre broadly hemispherical, its bracts in about 3 series; strigosely pubescent: achenes smooth, sparsely strigose.

Big River, Mendocino Co., Calif., July, 1903, Jas. McMurphy, n. 353. An exceedingly showy and beautiful member of that Californian group of Erigerons to which *E. Hartwegi* and *E. Breweri* belong.

PYRROCOMA CALENDULACEA. Stout, with several moncephalous bracted and subscapiform stems hardly surpassing the foliage, the whole only 5 or 6 inches high: leaves mostly broadly oblanceolate, subspatulately tapering to a petiole, all entire, of thinnish texture, glabrous or nearly so; cauline short, lanceolate, sessile, and like the upper part of the stem more or less villous-arachnoid: involucre nearly hemispherical, $\frac{3}{4}$ inch broad, not as high, bracts many but subequal, oblong-linear, acute, wholly herbaceous and thinnish, hoarily and somewhat viscidly villous, or in some specimens only sparsely so; rays many and showy, deep yellow.

Alpine species of the Colorado mountains; type from Union Creek Pass, at 10,000 to 11,000 feet, by John Wolf, 1873.

Here also I refer Hall & Harbour's n. 255, and other specimens by later collectors.

PYRROCOMA HOLOLEUCA. Small plants, 4 or 5 inches high, many-stemmed, all the parts, even to the involucre, more or less whitened with a loose cottony or flocculent indument: basal leaves lanceolate, acuminate, usually incise-serrate, sometimes quite entire: flowering stems many, slender, leafy-bracted, in young plants apt to bear two or more heads, in the more mature always monocephalous: heads low-hemispherical, $\frac{1}{2}$ inch wide exclusive of the many and quite showy though rather narrow rays; bracts of the involucre in 3 series, of herbaceous texture, densely white-lanuginous: achenes silvery-silky, the hairs closely appressed.

Yellowstone National Park, collected under the direction of Dr. E. H. Mearns, 1902; special station not named. The collector's numbers in U. S. Herb. are 3188, 3190, 3191 and 3191^a.

PYRROCOMA AMPLECTENS. Stems 1 or 2 from the root, upright from a slightly decumbent base, a foot high or more, monocephalous; all parts glabrous except the stem near the head of flowers: basal leaves narrow, linear-lanceolate, 5 to 8 inches long, rather obtuse, quite entire; cauline of the same form and large, 2 to 4 inches long, sessile and clasping the stem: head distinctly broad-turbinate, an inch high and more, quite as broad; bracts of the involucre green-herbaceous except at the very base, even of thinnish texture, oblong or oval, obtuse, forming more than two series, but subequal and little imbricated: rays large and showy, almost as in *P. crocea*.

Mogollon Mountains, New Mexico, at 9,000 feet, O. B. Metcalfe, 17 Aug., 1903.

PYRROCOMA DEMISSA. A robust dwarf, the herbage of subcoriaceous texture and glabrous: basal leaves seldom 2 inches long, with very short-petiole base, the blades oblong-lanceolate, acute, either entire or few-toothed, the teeth subserrate: pedunculiform stems decumbent, leafy-bracted, monocephalous.

lous, the heads $\frac{3}{4}$ inch broad, nearly hemispherical, their bracts in several series and imbricated, spatulate-oblong to oval, pungently acute, green-herbaceous mainly, but with callous whitened and entire margins: rays manifest, deep-yellow: achenes nerveless, glabrous and shining; pappus coarse.

Subalpine on Mt. Stanford, eastern California, C. F. Sonne; the type specimens collected in August, 1888, the plant not otherwise known.

PYRROCOMA MICRODONTA. Stems erect, a foot high, not stout, with smooth whitish and shining bark, toward the summit bearing a rather strict raceme of 5 or 6 heads; basal leaves lanceolate, entire, or the margins of some obscurely denticulate; cauline leaves ovate, lanceolate, sessile by a broad base, their margins rather closely and minutely callous-denticulate or spinulose: involucre between hemispherical and turbinate, $\frac{1}{2}$ inch high and about as broad, much imbricated, the almost corneous bracts with broad subsquarrose green tips, these marginally denticulate, on the back scaberulous: rays not very conspicuous, light-yellow.

Inyo County, California, at Resting Springs Valley, 6 Feb., 1891, Coville and Funston; being n. 269 of the Death Valley collection, as in U. S. Herb.

PYRROCOMA SESSILIFLORA. Stems many, ascending, a foot high or more, with glabrous straw-colored bark, subspicately floriferous from below the middle: basal leaves 3 inches long, linear-lanceolate, very firm, commonly entire, sometimes toothed, always sharply serrulate-scabrous, the flattened and subpetiolar base hispid-ciliate; cauline remote, lance-linear, sessile: involucre turbinate, small, sessile singly in the axils of the leafy bracts; those of the involucre cartilaginous, but with short, broadly triangular abruptly very acute green tips: rays few but large for the heads, light-yellow.

Collected somewhere in southern Nevada, at an altitude of 3,000 feet or more, in 1898, by C. A. Purpus; his n. 6340 as in U. S. Herb. Superficially recalling *P. glomerata* of the far Northwest; in character wholly different.

PYRROCOMA PRIONOPHYLLA. Stems upright, 2 feet high, stout, glabrous, the bark whitish, almost polished, racemose from above the middle: basal leaves a foot long, including the very broad and short scarcely petiolar base, narrowly oblong-lanceolate, less than an inch wide, very coarsely and evenly serrate-toothed, everywhere glabrous except as to the finely scabrous margin; cauline leaves much reduced, sessile, more finely and more saliently serrate: heads small for the plant, forming a short and rather strict raceme; involucre broadly turbinate, much imbricated, the bracts coriaceous, but with green tips which are pungently acute: rays rather small and few, light-yellow.

Eagle Valley, Nevada, C. F. Baker, Aug., 1902, his n. 1450 as in U. S. Herb.

PYRROCOMA SUBCAESIA. Small plants quite like *P. calendulacea* in habit and size, larger ones nearly a foot high and more than monocephalous, the stronger stems corymbosely sustaining 3 large and subequal heads; bark of stems reddened and sparsely villous-tomentose; herbage otherwise altogether of a dull glaucescent green and rather firm; basal leaves elliptic-lanceolate, acute; cauline spatulate-lanceolate to ovate-lanceolate, minutely but strongly reticulate, glabrous except as to the denticulate-scabrous margins: involucre low-hemispherical, large, 1 to 1½ inches wide, bracts spatulate-oblong, mainly herbaceous, very acute, loosely villous-hairy on the back, marginally villous-ciliate; rays 20 or more, clear yellow, showy; achenes closely low-ribbed and loosely pilose; pappus scanty, coarse.

Panguitch Lake, Utah, at 8,400 feet, M. E. Jones, 7 Sept., 1894.

PYRROCOMA CREPIDINEA. Many-stemmed and low, 3 or 4 inches high, whitened with a kind of soft silky wooliness: basal leaves lanceolate or elliptic, short-petioled, 1½ to 2 inches long, somewhat dentate; cauline leaves ovate-lanceolate, with broad subcordate-clasping base; the decumbent stems bearing usually three slender-peduncled small heads; involucre rather full-hemispherical, their small bracts in two

or three series and lanuginous: rays many, rather short; achenes hirtellous.

Near Alkali Spring, Buffalo River, central Wyoming, 5 Aug., 1901, Merrill and Wilcox, their n. 1137 as in U. S. Herb.

PYRROCOMA PLANTAGINEA. Smallish plant, inhabiting low subsaline soils; the basal leaves entire, broadly or narrowly lanceolate, apparently somewhat fleshy, glabrous, their petioles short and, like the stems, dark-reddish or purplish; flowering stems 2 or 3 to 5 or 6 inches high, commonly monocephalous, not rarely with 2 or 3 low-hemispherical heads; bracts of involucre rather herbaceous, in hardly more than two series but unequal, puberulent and often more or less lanuginous with loose deciduous wool which also often colors the younger parts of the stem: rays many, deep-yellow and showy: achenes silky and pappus quite fine and soft.

Apparently abundant in certain parts of the Yellowstone Park, and southward in western Wyoming. Rydberg and Bessey's n. 5051 as in U. S. Herb. represents a common monocephalous form of it; but it varies greatly.

PYRROCOMA LAPATHIFOLIA. Robust, upright, the several stems 2 feet high, loosely racemose above the middle: basal leaves 6 to 8 inches long including the very stout and rather short petioles, apparently of subsucculent texture when fresh, the blades oblong-lanceolate, or some with subcordate base, entire, light-green, glabrous; cauline few, short, sessile and half clasping, lanceolate, acuminate, spinulose-serrate: heads long-peduncled, the peduncles reddened, somewhat flocculent, quite woolly at summit just under the nevertheless glabrous bracts of the involucre; these very many and narrow-linear, yet little imbricated, encompassing low-hemispherical heads $\frac{3}{4}$ inch wide.

Remarkable species, with basal leaves not unlike those of *Rumex salicifolius* in size, form and texture; the cauline as different in form as can well be imagined. The specimen in U. S. Herb. purports to have come from somewhere in Utah, in 1875, by the hands of L. F. Ward.

New Composites from Oregon, Washington and Idaho.

SENECIO CHAPACENSIS. Perennial, the tufted leaves and low stems from the stout branches of a hard caudex, the whole plant 5-7 inches high, glabrous: basal leaves many, rather fleshy, short-petioled, obovate and oval, cuneate and entire at base, the obtuse or subtruncate apex coarsely crenate, some also laterally crenate: the stout pedunculiform stems with two or three sessile pinnatifid small bracts: heads of less than middle size, 6-18 in a mostly, simple fastigiata corymb; bracts of involucre 12-15, narrow-lanceolate: rays deep-yellow, oblong, somewhat narrowed, and sharply 3-toothed at apex.

Mount Chapaca, in Okanogan Co., Washington, at 4,000 ft., collected by A. D. E. Elmer, Aug., 1897. Collector's n. 592, as on sheet 352360 U. S. Herb. In Mr. Piper's Flora of Washington this is called *S. cymbalarioides*, though there is not one essential point at which it agrees with Nuttall's character of that species.

SENECIO LIGULIFOLIUS. Stems one or several, subligneous at base and decumbent around the crown of a taproot, 7-12 inches high, the whole plant canescently tomentulose, the wool apt to be more or less deciduous from the upper face of foliage in age: basal leaves mostly tufted on sterile shoots, the narrowly oblong obtuse blades not equalling the rather wide petioles, their margins entire, short-revolute, the whole 2-4 inches long, the tuft upright; cauline leaves reduced, few, sessile, entire or toothed, no revolute: heads middle-sized, not very numerous, in a fastigiata corymb; involucre narrowly subcampanulate, loosely tomentulose at base only: rays rather short, oblong, obtuse, the teeth very short and obscure: pappus fragile and deciduous; achenes glabrous.

Near Waldo, Oregon, 14 June, 1904, C. V. Piper. Sheet 527705, U. S. Herb.

SENECIO LEUCOCRINUS. *S. fastigiatus*, Nutt. (1841), not of Schweinitz (1824). Since this fine species is in need of a name I give it one that is suggested by its beautiful soft pap-

pus, which is also usually wavy below the summit, and which also is not deciduous from the mature achene, as it is in *S. ligulifolius*.

SENECIO AULETICUS. Low tufted perennial with nearly naked and mostly monocephalous stems 3-9 inches high, the stems and their bracts, as also the involucre floccose-tomentulose, the foliage hardly so: blades of basal leaves suborbicular to obovate, from less than $\frac{1}{2}$ to 1 inch long, lightly and often obscurely crenate or dentate, slightly succulent, on petioles of twice or thrice their length; cauline leaves mere sessile flocculent bracts: involucre campanulate, nearly $\frac{1}{2}$ inch high and as broad; rays deep golden yellow, elongated-oval, at least 5-nerved, at apex very obtuse and with three short and obscure teeth.

The type specimens of this very good new *Senecio* are from "eight miles south of Waldo," Oregon, by C. V. Piper, 14 June, 1904. They are in U. S. Herb., under the collector's n. 5079. His numbers 6254 and 6145 appear to be specifically the same, and are from the same general region.

PYRROCOMA BALSAMITAE. Stems few, stout, 1 to 2 feet high, spicate above the middle with few and rather remote middle-sized heads, the whole plant to the naked eye glabrous, of a light-green inclining to yellowish: leaves subcoriaceous, the basal 2 to 4 inches long, the oblong-elliptic blade little surpassing the narrow petiole, evenly crenulate or subserrate-crenulate, the lower cauline spatulate-lanceolate, the upper oblong, all the cauline sessile: heads broadly turbinate, $\frac{1}{2}$ inch high, nearly or quite sessile, elegantly imbricated bracts of involucre with linear base and rhomboid green tips, their whole margin very definitely villous-ciliate: rays not numerous, light-yellow.

Wet meadows, summit of Cascade Mountains, Oregon, 12 Aug., 1902, W. C. Cusick; his n. 2947 as in U. S. Herb. Foliage remarkably simulating that of the old-fashioned fragrant garden herb *Balsamita*.

PYRROCOMA HALOPHILA. Stems several, seldom 6 inches high, rather rigid, ascending, racemose above the middle; herbage pale and glaucescent, with or without traces of woolliness: basal leaves lanceolate, entire or evenly serrate; cauline reduced, entire, very lanuginous at the sessile base only: heads on slender pedicels, the involucre turbinate, less than $\frac{1}{2}$ inch high, bracts oblong-linear, the outer obtuse, the inner acute, all more or less lanuginous and most so marginally: rays few, short.

In an alkaline meadow, Goose Lake Valley, Oregon, 19 Aug., 1901, W. C. Cusick; his n. 2769 as in U. S. Herb.

PYRROCOMA DURIUSCULA. Stems, few, erect, very hard, rigid, glabrous, 2 feet high, simple and loosely spicate at summit, sometimes with one or more spicate branches: basal leaves narrow-lanceolate, pungently acute, perfectly entire, but margins scabrous; lower cauline lanceolate, sessile, sharply serrate: involucre turbinate, more than $\frac{1}{2}$ inch high, their bracts much imbricated, of hard texture, with pungently acute green tips and scabrous margins: rays few, short, deep-yellow: pappus not very coarse.

Stony ground somewhere in eastern Oregon at 3,500 feet altitude, W. C. Cusick, Aug., 1897; n. 1755 as in U. S. Herb. Also the same under number 530, collected in 1882.

PYRROCOMA LANULOSA. Of low growth, with copious basal leaves and decumbent stems of *P. hirta*, the foliage similarly incise-serrate, but pubescence of the whole plant widely different, in no degree viscid or glandular, but dense, white, softly villous, giving the appearance of white-woolliness: heads subracemose, 3 to 7, short-pedicelled; involucre subturbinate or broader, their bracts not many, subequal, lance-linear, pungently acute, whitish-pubescent on the back: rays few, short, inconspicuous.

This does not appear to have been collected elsewhere than in Lake County in southern Oregon; the collectors being Mr. Leiberg (1894) and Coville and Leiberg (1896). There are three sheets of it in U. S. Herb., that of Leiberg's n. 748 being regarded as the type.

PYRROCOMA TURBINELLA. Stems several, slender, ascending, 7 to 9 inches high, scarcely leafy, loosely corymbose panicled above: basal leaves 3 or 4 inches long, lanceolate, acute, remotely and rather coarsely incise-serrate, the short petioles, the basal part of stems very softly silky-lanuginous and quite retrorsely so; cauline leaves small, oblong, very acute: heads $\frac{1}{2}$ inch high, with involucre exactly turbinate; bracts imbricated but not very numerous, linear, very acute, erect, cinereously pubescent with a short, stiff viscidulous indument: rays few, not showy, light yellow: pappus not copious, rather delicate.

In dry ground, Cycan Valley, eastern Oregon, W. C. Cusick, 1901; his n. 2744 as in U. S. Herb.

PYRROCOMA CUSPIDATA. Stems slender, arcuately ascending, 7 to 9 inches high, more corymbose at summit, the heads about 3 only: basal leaves lanceolate, depressed, glabrous, finely and evenly serrulate or else quite entire; cauline reduced, entire, acute: heads $\frac{1}{2}$ inch high, broadly turbinate, the bracts strongly imbricated and numerous, linear-oblong, cuspidately acute, glabrous except as to the lower, these not pubescent but only ciliate: rays short, but rather many, golden-yellow: pappus firm.

Margin of Cycan Marsh, eastern Oregon, W. C. Cusick, 10 Aug., 1901; part of his n. 2741 as in U. S. Herb.

PYRROCOMA LIATRIFORMIS. Stoutish, rigid, two feet high, loosely racemose from above the middle: foliage firm, rather deep-green underneath a sparse but definite grayish pubescence: lowest leaves 6 or 8 inches long, petiole and blade subequal, the latter lanceolate, entire; those of the raceme reduced to sessile lanceolate bracts: heads turbinate, $\frac{3}{4}$ inch high, at summit quite as wide exclusive of the few rays; bracts of the involucre very many, strongly imbricated, linear and coriaceous below the lanceolate and greenish but whitish-villous tips, these apt to be a little squarrose.

Known to me only as collected at Pullman, Washington,

Aug., 1903, by Mr. C. V. Piper. The plant strikingly simulates in its whole aspect *Liatris scariosa*.

PYRROCOMA SONCHIFOLIA. Stem upright, less than a foot high, leafy to the summit and monocephalous: basal leaves 3 to 5 inches long, short-petioled, the blade broadly obovate-lanceolate, acute, irregularly and divaricately or even here and there retrorsely dentate, the cauline oblong-lanceolate, acute, sessile by a broad base, subentire, all the foliage thin, and, with the stem, more or less whitened with a villous-arachnoid indument: involucre $\frac{3}{4}$ inch high and as broad, hemispherical inclining to broad-turbinate; bracts in 2 series and subequal, narrow, very acute, viscidly villous; rays rather few and short.

Said to have been derived from the Yakima region, State of Washington; collected on Canby's expedition in 1882 by T. S. Brandegee. Foliage thin, curiously simulating that of some cichoriaceous plants.

PYRROCOMA SUKSDORFII. A foot high or more; stems rigid, upright above a slightly decumbent base, subspicate, rarely subracemose, above the middle; lowest leaves lanceolate, cauline spatulate-lanceolate below the inflorescence, the remainder lanceolate, sessile, all hard of texture, entire, almost pungently acute, pale-green, under a lens very conspicuously reticulate and somewhat scaberulous, the stems with scattered villous pubescence: involucre broadly turbinate, $\frac{1}{2}$ inch high and as broad; bracts much imbricated, with white-villous tips: rays somewhat numerous but small.

Prairies of Spokane County, Washington, W. N. Suksdorf, 18 July, 1889, as in U. S. Herb.

PYRROCOMA FOLIOSA. Stems several, erect, a foot high or more, notably leafy up to the heads with large sessile foliage mostly sharply serrate; basal leaves large, strongly petiolate, ascending, lanceolate, acute, strongly and sometimes incisely serrate, the whole of a light almost yellowish green, and, with the stem, more or less softly and viscidly villous, the texture thinnish rather than very firm: heads solitary or several, hemispherical, from less to more than an inch in diameter

without the rays; outer bracts of involucre foliaceous, exceeding the rays, inner successively smaller, all linear-lanceolate, acute, entire, ciliate with soft viscid hairs.

Collected somewhere in the Territory of Washington, by G. R. Vasey, in 1889; sheets 296812 and 296811 of U. S. Herb., the former, monocephalous, the latter with 3 or 4 heads and these smaller.

PYRROCOMA PRATENSIS. Stems clustered, erect, more than a foot high, notably leafy to the summit; basal leaves on firm petioles that are upright and longer than the lanceolate acuminate blades; cauline spatulate-lanceolate, sessile, all of a light-green but not yellowish hue, all saliently and pungently serrate-toothed, the pubescence scanty and villous without viscosity, the herb appearing glabrous to the unaided eye: heads 1 to 3 and subsessile, low-hemispherical, an inch broad without the rays; bracts in few series and little imbricated, the outer foliaceous, almost linear, very acute, far surpassing the inner, all whitish-hairy at base.

Dry field, in southwest corner of Camass Prairie, Idaho, 14 July, 1895, L. F. Henderson, his n. 3113 as in U. S. Herb.

PYRROCOMA SCABERULA. Stems several, upright, rather slender, 2 feet high, monocephalous, stiffly or almost hispidly short-hirsute: basal leaves 5 to 7 inches long, the blades exactly lanceolate, entire, scabro-hirtellous on both faces and much reticulate, of firm texture yet thinnish, the petioles narrow, not elongated; cauline few, lance-linear, sessile: involucre an inch broad, $\frac{3}{4}$ inch high, their bracts large, moderately imbricated, not numerous, spatulate-lanceolate, acute, scabrous-ciliolate: rays not very conspicuous.

Nez Perces Co., Idaho, 1896, A. A. Heller, his n. 3469, sent out for *P. integrifolia*, but most unlike that every way.

PYRROCOMA SERICEA. Stems few, firm but not stout, ascending, 3 to 5 inches, loosely white-woolly as also the small sessile cauline leaves; basal leaves lanceolate, very acute, entire or with few and remote very salient teeth, white on both faces with a long soft and almost silky wool: heads mostly solitary

and manifestly pedunculate; involucre low-hemispherical, more than $\frac{1}{2}$ inch broad, not as high; bracts subequal in 2 series, thin, narrow, lanuginous: rays many, rather conspicuous, orange.

Beautiful little plant, and of a marked specific type, collected somewhere in Idaho, by Edw. Palmer, in 1893.

New Plants from Arizona.

SENECIO QUERCETORUM. A stout hollow-stemmed sparingly leafy perennial a yard high, glabrous throughout, the angular stem notably glaucescent: basal leaves 8-10 inches long, lyrate, the terminal segment ovate, 3 inches long, the laterals small and variable, alternately larger and smaller, all closely and sharply dentate, but with deep and obtuse sinuses between the teeth; cauline leaves lyrate-pinnatifid, sessile by broad and clasping stipuliform bases: inflorescence an ample broad and much flattened compound cymose corymb of smallish heads: involucre subcampanulate, of 12-15 narrowly lanceolate acuminate glabrous bracts, with narrow scarious margins: rays about as many, narrow, elongated: pappus fragile.

Species known only as collected on "Oak Creek" in Arizona as long ago as 1883, by H. H. Rusby, distributed by him under n. 672, and with the name *S. Neo-Mexicanus*, to which the plant bears no manner of resemblance. As to size and general aspect of stem and foliage it recalls no other Senecio except *S. Breweri*, which is of the far distant middle Californian seaboard; and even between these two the differences are marked enough.

SENECIO BLUMERI. Many stems and tuft of basal leaves crowning an ascending tap root, the whole plant 10 inches high: leaves $1\frac{1}{2}$ -3 inches long, of firm almost subcoriaceous texture; blades obovoid, very obtuse, lightly and coarsely crenate, tapering to a petiole of their own length, glabrate and pallid above, beneath white-tomentose: stems nearly naked,

mostly with about 3 large heads; involucre $\frac{1}{2}$ inch high and much broader, floccose-tomentulose like the pedicels and stems; rays broad and short, deep yellow, conspicuously toothed at apex.

Stony knolls at 8,000 feet in the Chiricahui Mountains, Arizona, 1907, J. C. Blumer. Species of the group to which *S. Greenei* and *S. ionophyllus* of California belong, as well as *S. Franciscanus* of northern Arizona.

SENECIO STYGIUS. Tall plant, glabrous and leafy like the last, only in every way less robust, the root only annual or biennial: lowest leaves not seen, but cauline lyrate-pinnate, embracing the stem by an ample and lacerate stipuliform base: heads quite small, very numerous, slenderly pedicellate, forming a large loose subpaniculate corymb 6 or 7 inches across: bracts of the short subcampanulate involucre 12-15, oblong-lanceolate, acuminate: rays yellow, as long as the involucre, not broad at apex and distinctly 3-toothed: pappus delicate and fragile.

Grand Cañon of the Colorado, J. G. Lemmon, May, 1884. In U. S. Herb., the sheet not numbered.

SENECIO LATHYROIDES. Tufted perennial, with rigid ascending leafy stems 2 feet high, with a loose cymose panicle at summit: herbage wholly glabrous, the slightly tortuous stems striate and angled, very light-green: leaves all somewhat pectinate-pinnate, of 6 or 8 lateral lobes and a terminal, all very narrowly linear, the rachis itself of the same character, even the most reduced and diminutive floral bracts, in the same way pectinate-pinnate, none simple: branches of the cymose panicle naked, tortuous, each ending in about 3 broadly cylindrical heads $\frac{1}{2}$ inch high: calyculate bractlets at base of involucre stiffly somewhat ciliolate; bracts of involucre 20 or more, linear-acuminate, glabrous: rays long and showy, about 8-nerved, very obtuse at apex, the teeth obsolete.

At Pierce's Spring, Arizona, 18 April, 1894, M. E. Jones; his n. 5077 as in U. S. Herb. A plant of the same alliance as *S. spartioides* of Colorado, but with foliage recalling that of wild peas or vetches; the stem itself, and more so the

branches of the lax inflorescence, so tortuous as to suggest almost a reclining if not half-prehensile mode of growth.

SENECIO ENCELIA. Perennial, a foot high; leaves many, in a basal tuft and short-petioled; almost all parts of the plant white with a dense pannose tomentum, or this somewhat flocculent on the stem: lowest leaves suborbicular to oval and small $\frac{1}{2}$ - $\frac{3}{4}$ inch long, toothed across the obtuse summit, the others ovate and lance-ovate, entire, acutish, $1\frac{1}{2}$ -3 inches long including the short petiole, all of rather firm texture, only the lowest and oldest glabrate above, cauline reduced to few lanceolate sessile bracts: heads of middle size, in a compact and compound fastigiata corymb; bracts of involucre lance-linear, glabrous except at base: rays oblong, acutely 3-toothed: pappus fragile; achenes glabrous.

Pinal Mountains, southern Arizona, 26 May, 1890, Marcus E. Jones. Specimen on sheet 220118, U. S. Herb. The foliage, in form as well as indument, recalls the most woolly species of *Encelia*.

GUTIERREZIA LINOIDES. Suffrutescent, very slender, 2 feet high; stems loosely leafy below, very loosely corymbose at summit; the very lowest leaves narrowly oblanceolate, the others linear, mostly $1\frac{1}{2}$ inches long, rather sparsely scabrous-serrulate, the upper face also more or less scaberulous as well as resinous-punctate, all the foliage of the main stems deflexed, that of the sterile twigs reduced in size and widely spreading when not deflexed: involucre shortly subcylindric, about 5-flowered, the rays 2 or 3 and rather conspicuous, those of the disk about 2.

Limestone slopes of the Chiricahui Mountains, J. C. Blumer, 1907.

PYRROCOMA ADSURGENS. Stout, low, the several flowering stems less than a foot high, assurgent from a strongly decumbent base, very sparingly villous-hirsute, the hairs deflexed: basal leaves lance-oblong, 2 to 5 inches long, tapering to short winged petioles, crisped along the edges, a very narrow margin callous-whitened and scabrous-serrulate; cauline leaves copious, sessile, ascending, all the foliage glabrous: head soli-

tary, short-peduncled, turbinate, an inch high, more than an inch broad, the bracts many, strongly imbricated, coriaceous but with hard and cuspidate green tips, the outer somewhat spatulate-oblong, the inner broadly linear, all acute and rigid: rays rather many, not showy.

Mountains of northern Arizona, especially those near Flagstaff, where it has been collected by Rusby (1883), Lemmon (1886), M. E. Jones (1884), and MacDougal (1891).

SARACHA SESSILIS. Annual, 2 feet high, with several widely spreading angular branches from near the base; herbage wholly glabrous; leaves very thin and ample, the larger 5 and 6 inches long exclusive of the slender petiole, 3 and $3\frac{1}{2}$ in width near the middle, broad ovate, very acute at both ends, perfectly entire; umbels 3-flowered, sessile, or very nearly so in the axils of the leaves: corollas very small and white, fruiting calyx 5-lobed, apparently rotate, nearly 1 inch wide, imperfectly or not at all enfolding the rather small berry.

Shady nooks of the Chiricahui Mountains at about 6,000 feet, J. C. Blumer, 1907.

LUPINUS BLUMERI. Perennial, the ascending stems slender and dry, not succulent, a foot high or more, loosely leafy, sparsely pilose: leaves rather large for the plant; leaflets about 8, very unequal, the longest 2 inches, the shortest little more than 1 inch, narrowly oblanceolate, abruptly acute, glabrous above, beneath sparsely appressed-hairy, the margins beset with unequal pilose hairs: racemes few-flowered and short, nearly sessile, too few-flowered to appear definitely verticillate: corollas large, more than $\frac{1}{2}$ inch long; banner at first pale violet with orange center, this orange changing to very dark purple; wings about as large as the banner, violet; keel uncommonly broad and short, not equalling the wings, shortly somewhat woolly-ciliolate from below the middle to the apex: pod not known.

Chiricahui Mountains, at about 8,000 feet, J. C. Blumer, June, 1908. Said to be a handsome and showy plant, early flowering.

CICUTA GRANDIFOLIA. Rootstock an inch thick when dry, short-jointed, horizontal, producing from beneath many and closely approximate thick fleshy roots, these terete, straight, several inches long: basal leaves a yard long or more, bright green, glabrous; leaflets oblong-lanceolate, acute, sessile, very closely evenly and deeply serrate, 3-4 inches long: fruit large, round-ovate; ribs not greatly exceeding the intervals in breadth.

Margin of a stream at western shore of Mormon Lake, northern Arizona, 1908, collected by G. A. Pearson. Plant related to *C. occidentalis* of Colorado and Wyoming, but with much ampler foliage very remarkably incise-serrate; the rootstock and roots very characteristic.

PERSICARIA GRANULATA. Branched at the base, the branches ascending, a foot long, very slender, the internodes elongated and foliage sparse; leaves narrowly lanceolate, $1\frac{1}{2}$ - $2\frac{1}{2}$ inches long, entire, punctate, glabrous, the midvein beneath and the margins roughish with a few hair-points: ocreae thin and hyaline, naked at the orifice, the uppermost short and open: spikes few, oblong, $\frac{3}{4}$ - $1\frac{1}{2}$ inches long, on slender peduncles: ocreolae ovate, entire, glabrous except for a granular-scaberulous indument which is equally obvious upon the whole exterior of the perianth: achenes small, polished, the style cleft nearly to the base and the recurved branches inclined to be persistent.

Collected on the Rio Verde in Arizona, in 1867, by Dr. Smart; type in U. S. Herb., the sheet not numbered.

New Californian Asteraceæ.

CORETHROGYNE FLOCCOSA. Evidently large and bushy, perhaps shrubby at base; stem, branches and leaves silvery-hoary with a light floccose tomentum: cauline and rameal leaves oblong, obtuse, sessile by a cordate-clasping base, entire below the middle, above it sharply cut into close spreading serrate teeth: heads many, scattered singly at the ends of filiform twigs, the whole forming a large loose corymbose panicle, the pedunculiform twigs not floccose but green and rough with short gland-tipped hairs: involucre turbinate, less than $\frac{1}{2}$ inch high, their well imbricated bracts glandular-scabrous and viscid, their tips subsquarrose: rays deep-purple; achenes silky, crowned with dark red-brown pappus.

Collected at Elwood, near Santa Barbara, Sept. 1908, by Miss Eastwood.

CORETHROGYNE SCABRA. Suffrutescent, with rigid upright stems 2 feet high or more, leafy up to the not very ample virgate panicle: herbage wholly devoid of wool or hoariness, except as to basal part of stem when young, all parts in maturity dull dark green and very scabrous: leaves oblong-lanceolate, 1-1 $\frac{1}{2}$ inches long, sessile, acute, sharply and evenly serrate above the middle: branches of panicle widely spreading, mostly monocephalous: involucre almost campanulate, less than $\frac{1}{2}$ inch high, their many imbricated and squarrose bracts viscid-scaberulous: rays short, red-purple: achenes cuneate-linear, silky; pappus fuscous.

Los Angeles Co., collected by H. E. Hasse in 1890; again at Griffith Park, and on Cahuenga Hills, in 1902, by Ernest Branton; though specimens from Cahuenga Hills do not agree as to inflorescence, and may, perhaps, represent a second species marked by this lack of woolliness.

CORETHROGYNE SESSILIS. Branches, tall, erect, simple, leafy to the summit, the whole plant even to the involucre white with a thin tomentum: leaves thin, oblong-oval, sessile by a broad cordate-clasping base, 1 $\frac{1}{2}$ inches long or more,

subentire, or with few serrate teeth at summit: involucre large, campanulate, mostly sessile singly in the axils of the leaves which much exceed them, a few pedunculate ones at summit of stem or branch: bracts of involucre much imbricated, but almost concealed by the woolly investiture.

San Bernardino Mountains, S. B. Parish, 23 Oct. 1891.

CORETHROGYNE BREVICULA. Low, much branched from a ligneous basal part, the branches 5 to 8 inches high, widely corymbose-panicled from about the middle; branches and leaves with a thin but close and permanent tomentum: leaves small, oblanceolate, obtuse, entire: branches of panicle and bracts thereof rough and also viscid with many short-stipitate glands: involucre broadly turbinate, less than $\frac{1}{2}$ inch high, their much imbricated bracts with acute spreading tips viscid-glandular and recurved, also marginally beset with short-stipitate glands: achenes oblong-linear, thinly soft-silky; pappus rather copious, reddish.

Mountains of San Diego Co., Oct. 1899, C. R. Orcutt. A plant from the same general region, collected by E. A. Mearns, in August, 1894, is provisionally referred here, is as small, less shrubby, and with different involucre, though with the same pubescence.

CORETHROGYNE RACEMOSA. Evidently half-shrubby, the straight ascending branches uncommonly stout, densely and permanently white-tomentose, all subracemose from below the middle: leaves small for the plant, white-woolly on both faces, entire: heads mostly solitary and short-peduncled in the leaf-axils; peduncles and turbinate involucre roughly viscid-glandular: purple rays unusually large and showy; achenes rather loosely silky; pappus fuscous.

Mountains of San Diego Co., C. R. Orcutt, 1889. Specimens in U. S. Herb. on same sheet with those typical of *C. brevicula*, but species most distinct in habit, pubescence and inflorescence.

CORETHROGYNE FLAGELLARIS. Basal parts unknown; branches of a foot long perhaps reclining, at least very slen-

der, leafy and flagelliform, not numerous, each ending in a large campanulate head, both leaves and branches very white with a more or less persistent wool, this extending to the lower half of the involucre, but there ending abruptly; leaves of branches oblanceolate to oblong, mucronate-acute, entire: head $\frac{3}{4}$ inch high, $1\frac{1}{4}$ inches wide including the rather large rays: upper bracts of involucre green and very glandular, only the lower woolly: bristly tufts of style-tips conspicuous.

Along the seaboard at Redondo, Los Angeles Co., 25 May, 1902, Ernest Braunton. A new member of that coastal group of species which is vernal in its flowering. All other species here described are autumnal—even late-autumnal.

CORETHROGYNE LAVANDULACEA. Tall, rigid, perhaps suffrutescent; fastigiate branches rigidly ascending, hoarily pannose-tomentose, as are also the entire oblanceolate or oblong small cauline leaves; basal leaves not known: heads few, of middle size, corymbose at ends of branches: involucre broadly turbinate, nearly $\frac{1}{2}$ inch high, the very many straight linear bracts closely imbricated, pungently acute, minutely and viscidly glandular-scaberulous but not tomentose: rays broad, short, of a rich lavender-purple: achenes nearly linear, lightly silky-villous, crowned with the usual brownish pappus.

Santa Catalina Island, California, Mrs. Trask, Sept. 1898. Plant said to be common in one particular part of the island on dry slopes.

LESSINGIA BAKERI. Upright and rather strict, 1 foot high or more, with few rigid short subcorymbose branches above the middle: herbage in no part very woolly: cauline leaves ovate, cuspidate-acute, sessile, those of the branches smaller, not crowded or imbricated: heads subturbinate, $\frac{1}{2}$ inch high or less, some sessile in the axils, more of them corymbose in those at the ends of the branches; bracts of involucre arachnoid-pubescent, not really woolly: corollas light rose color.

Grassy slopes near Searsville, San Mateo Co., C. F. Baker, Oct. 1902; mistaken by myself, but hastily and without comparing, for my *L. hololeuca*, which does not belong to this division of the genus.

LESSINGIA MICRADENIA. Slender, 2 feet high or less, rather diffusely corymbose-paniculate from below the middle: lowest leaves oblanceolate, petiolate, serrate-toothed, upper and rameal oblong and oval, sessile, entire, both faces of all floccose-tomentose; slender pedunculiform monocephalous branchlets with many minute erect bracts, these and the involucre densely stipitate-glandular: heads small and few-flowered; bracts rather few and not strongly imbricated, their tips not very acute and none squarrose: corollas purple.

Mt. Tamalpais, and elsewhere among hills of Marin Co.; type in my herbarium, heretofore mistaken for *L. ramulosa*.

LESSINGIA BICOLOR. Branched loosely from the base, the branches few, rather slender, purplish, minutely puberulent and stipitate-glandular: basal leaves oblong-lanceolate, acute; cauline oblong-ovate, acute, sessile and cordate-clasping, all white-tomentose above, green and scaberulous beneath, the margins beset with a few stipitate-glands: heads few and broad, each at the end of a slender branchlet, campanulate, the inner bracts purple, the outer green, some tomentose, all more or less glandular: corollas small, deep-purple.

Santa Rosa, Sonoma Co., 18 Aug. 1902, A. A. Heller; distributed under the name *L. ramulosa*, but in truth a very different plant of quite remarkable characters.

LESSINGIA MENDOCINA. More than a foot high, simple up the middle, there parted into several long slender widely spreading branches bearing many wiry but almost filiform flowering twigs, these copiously bracteate below, floriferous only at or very near their ends: basal leaves unknown; cauline ovate-lanceolate, acute, spreading, floccose-woolly on both faces: involucre small, turbinate, many-bracted and closely imbricated, the bracts tomentulose below, the erect purple tips bearing each a conspicuous but small gland at the very summit: corollas small, deep-purple: pappus of rather firm bristles about equalling the silky achene.

Near Mendocino, Mendocino Co., Aug. 1898, H. E. Brown; in U. S. Herb. under collector's number 940.

LESSINGIA IMBRICATA. Stout, rigid, simple, or with a few rigid virgate branches, 6-10 in. high, soft-woolly; basal leaves lanceolate, petiolate; cauline short, ovate, acute, sessile and cordate-clasping, erect, those of the upper part of stem and of the branches crowded and imbricate: heads sessile in the axils of the upper leaves, and glomerate at summits of stems, nearly cylindrical, more than $\frac{1}{2}$ in. high, their bracts arachnoid-woolly: flowers not numerous, rose-purple, fading pinkish.

Foothills west of Los Gatos, A. A. Heller, 12 Sept. 1904; the specimens distributed for *L. hololeuca*, from which this plant differs widely by its virgate inflorescence, and long narrow heads.

LESSINGIA ARACHNOIDEA. Very tall, simple to above the middle, thence loosely cymose-panicled and rather few-flowered; stem and branches glabrous, glandless; cauline leaves villous-flocculent on both faces, the reduced rameal ones glabrous beneath: heads much above middle size, obovate and many-flowered; bracts of involucre numerous, evenly and closely imbricated, pungently acute at tip, the margins densely arachnoid-woolly: corollas purple: pappus very short, amounting to little more than a setose crown at summit of achene.

Beautiful and most distinct species, known only as collected in the vicinity of Crystal Springs, San Mateo Co., by C. F. Baker in 1902.

LESSINGIA SUBSPICATA. Some two feet high or more, with many virgate ascending branches from below the middle, the slender ultimate branchlets alone floriferous above the middle, and spicately, with also several heads sessile and glomerate at the end of the twig: only rameal leaves known, these ovate-oblong, acute, entire, glabrous and punctate beneath, white-woolly above, the margins with few and small stalked glands; bracts of flowering twigs small and erect, the uppermost with a head in the axil of each: involucre small, cylindrical, 3-5-flowered; bracts many, erect, acutish, villous-flocculent: achenes linear, villous; pappus setose, rather short.

At Buffalo Ranch, which must be among the western foothills of the Sierra Nevada in middle California, collected only by John B. Leiberger, 28 Sept. 1900. Plant with spicate heads, yet very distinct from the altogether white-woolly *L. virgata*, which plant is spicate everywhere, and without those filiform ultimate twigs which alone are floriferous in the present species.

LESSINGIA GLOMERATA. Plants 6 to 15 inches high, simple at first, but parted much below the middle into several fastigiately ascending very leafy branches, these again parting into closely bracted branchlets bearing heads only at summit and glomerately: basal and lower cauline leaves oblanceolate, petiolate, all the upper broad, short, sessile, bract-like but numerous, all, like the stem itself, white on both faces with a floccose woolliness: heads small, subturbinate, or between that and obovate, 5 to 10-flowered; bracts of involucre glandular-pulverulent, purple at the not very acute and slightly spreading tips: pappus not copious, a trifle longer than the oblong-linear silky achene.

Plains and hills of Butte Co., collected by C. C. Parry, probably near Chico, 1882; then by Mrs. Austin, near Colby, Sept. 1896.

LESSINGIA CYMULOSA. Upright, 2 feet high, not stout, parted below the middle into ascending branches, these subdivided to form an ample cymose panicle, the ultimate twigs distinctly cymulose, with 1 to 3 heads at the end of each: cauline leaves oblanceolate, thinnish for the genus, distinctly and permanently flocculent on both faces as is also the stem itself; bracts of the slender twigs short, pungently acute, only very sparsely woolly beneath, and there resinous-dotted: involucre very small, turbinate, about 5-flowered, their bracts oblong-linear, acute, glandular-scaberulous at the deep-purple tip: pappus of the slender achenes coalescing at base to form about 5 short paleae ending in the usual unequal bristles.

Specimens, all in U. S. Herb. from near Chowchilla P. O., Mariposa Co., 10 Oct. 1895, by Lester F. Ward. A large species, copiously floriferous with small heads subcymosely

clustered at the ends of numerous widely divergent branches, the involucre narrow, of comparatively few and strongly imbricated bracts.

LESSINGIA FASTIGIATA. Plants upright, slender, less than a foot high, simple up to the middle, there parted fastigiately into 3 to 5 suberect branches, these again simple to near the summit, there dividing abruptly into pedunculiform floriferous branchlets, with heads of flowers mostly glomerate at their ends: leaves of stem and branches oblanceolate to oblong-lanceolate, pungently acute, more or less serrate, white-flocculent on both faces: involucre narrow and few-flowered, subcylindric but with bracts rather numerous and well imbricated, even subsquarrose as to tips, without pubescence, but more or less glandular: corollas purple: pappus more or less paleaceous by basal coalescence of the bristles into 5 sets.

Type specimens of this excellent species are in my herbarium from foothills of the Sierra near Chico, by Mrs. R. M. Austin, 1896. Quite the same, but much too green, is material from North Fork of Feather River, by J. B. Leiberger, in July, 1900. H. P. Chandler's 1503 from Klamath River, in Humboldt Co., is with less confidence referred here.

LESSINGIA PALEACEA. About 2 feet high, slenderly and loosely paniculate from below the middle; glabrous and glandless as to stem and numerous branches and branchlets; leaves oblong, acute, few-toothed or entire, white-flocculent on both faces, those of the many filiform branchlets reduced to minute ovate more or less spreading bracts: involucre solitary at the ends of the many filiform branchlets, subturbinate, of numerous very unequal and much imbricated bracts, these obtusish, villous-tomentose except at the tips: flowers few in the head, purple: achenes crowned by about 5 subulate-aristiform long paleae instead of bristles.

Middle Fork of Cottonwood Creek, Fresno Co., 16 Sept. 1895, collected by L. F. Ward; distributed by C. L. Pollard; type in my own herbarium.

LESSINGIA TOMENTOSA. Stoutish, low, very diffuse, the spread of the short branches 4 to 10 inches, each of the very numerous branches ending in a large campanulate head: basal foliage not known; leaves of stem and branches rather crowded, small, oval or oblong, entire, sessile, white-tomentose on both faces: involucre low, much imbricated, its bracts linear-cuneiform, colorless below the short acute recurved green tip: rays yellow: pappus fuscous.

Southwestern part of the Colorado Desert, California, C. R. Orcutt, 21 Oct. 1889. A plant with habit and aspect all its own; singularly stout and depressed for a *Lessingia*; its heads very numerous and large, as well as quite solitary each at the end of its own branchlet.

Some Western Caulescent Violets.

VIOLA DREPANOPHORA. Allied to *V. adunca* but slender and delicate though upright, about 3 to 5 inches high, seemingly glabrous, but under a lens minutely though sparsely puberulent, the almost filiform petioles and peduncles retrorsely so and almost hispidulous: blades of the leaves cordate-oval, obtuse, lightly crenate, $\frac{1}{2}$ to $1\frac{1}{4}$ inches long, the petioles twice as long: peduncles far surpassing the leaves, bibracteolate slightly above the middle: sepals subulate-linear, very acute, small, glabrous: corolla deep violet-blue as to the limb of the petals, the greatly elongated stout, falcately upturned spur lavender-purple.

Wallowa National Forest, Oregon, J. T. Jardine, 1909. A most noteworthy and very beautiful new violet, apparently acaulescent, though certainly of the *V. adunca* alliance; the stout but sharply and falcately hooked spur as long as the limb of the petal, and very prominent.

VIOLA VERBASCULA. Caulescent, but leafy stems short, greatly surpassed by the long-petioled basal leaves; the whole 4 to 6 inches high, the tender and delicate herbage glabrous in every part; earliest leaves broadly cordate, $\frac{1}{2}$ to $\frac{3}{4}$ inch

long, the later oval-lanceolate, 2 inches long, subtruncate at base, all obtuse; slender peduncles bearing the flowers almost beyond the long-petioled leaves, bibracteolate not far below the flowers, the bractlets subulate-filiform, not opposite: sepals narrowly linear-lanceolate but obtuse; corolla purple, about $\frac{3}{4}$ inch long including the long horizontal subcylindric obtuse spur.

Hangman Creek, Spokane Co., Washington, 14 May, 1893, Sandberg and Leiberger, n. 33. *Verbasculum* was a mediaeval name for the subgenus of rugose-leaved species of *Primula*; and the leaves of this western violet are as primula-like as those of the eastern *V. primulifolia* itself.

VIOLA MAMILLATA. Leafy and floriferous stems of the season upright and slender, 4 to 7 inches high above a long ligneous partly subterranean and horizontal rootstock clothed darkly with dead remnants of stipules of former seasons: petioles and peduncles long and slender, the whole plant glabrous except as to a line of hispidulous short hairs on the veins of many leaves beneath: leaves from broadly cordate and $\frac{1}{2}$ inch long in the earliest, to subcordate-oval and $1\frac{1}{2}$ inches long in the later, all obtuse and lightly crenate: peduncles bibracteolate not far below the flower, the bractlets linear, entire, exactly opposite: sepals small for the corolla, lanceolate, obtusish, not venulose: corolla $\frac{3}{4}$ inch broad, violet, the limb of all petals round-obovate, obtuse, the odd one very retuse and rather larger than the others; spur long, straight, subcylindric, at the end abruptly narrowed into a distinct upturned mamilliform appendage.

Wet ground, under fallen timber, at Dyer Mine, Uintah Mountains, Utah, 30 June, 1902, L. N. Goodding, n. 1202 as in U. S. Herb.

VIOLA CORDULATA. Caulescent, low, the leafy stems 2 or 3 inches high, but peduncles often as long, bearing the flower above all other parts: herbage of thinnish texture, everywhere glabrous: leaves basal and upper cauline all much alike in size and form, cordate, obtusish, crenate, about $\frac{3}{4}$

inch long, more than $\frac{1}{2}$ inch wide: peduncles bracteolate near the flower, the bractlets long, narrowly linear, herbaceous: sepals large for the corolla, lanceolate, acutish; corolla barely $\frac{1}{2}$ inch long including the not very long but obtuse and slightly upturned spur, purple, the limb of each petal retuse or emarginate.

La Barge, Uinta Co., Wyoming, 27 May, 1894, E. Stevenson. Type in U. S. Herb.

VIOLA TIDESTROMII. Caulescent, low, only 3 or 4 inches high, with peduncles scarcely, or barely, equalling the leaves; herbage deep rather dull green, appearing glabrous, under a lens showing traces of a scaberulous pubescence: lowest leaves apt to be broader than long and subcordate, those larger and later almost orbicular, less than 1 inch wide, very obtuse, tapering to the petiole at the otherwise truncate or subcordate base, very plainly crenate: peduncles with large linear herbaceous bractlets above the middle, and opposite: sepals rather broadly linear, not acute: corolla light-violet, $\frac{3}{4}$ inch broad and well rounded, all the petals equal and obtuse; spur short, thick, obtuse.

Wasatch Mountains, Utah, in a low place near Ephraim Creek, 11 June, 1908, Ivar Tidestrom.

VIOLA OXYSEPALA. Thin and delicate member of the *V. adunca* group, 4 to 6 inches high, the flowers borne rather far above the foliage; herbage wholly glabrous: leaves small, cordate to oval, the earlier acutish, none any more than faintly crenate, the petioles long and slender: peduncles greatly elongated, almost filiform, bracteolate not far below the flower, bractlets very narrowly subulate, not opposite: sepals subulate-lanceolate, very acute, dark-green, veinless: corolla small for the group, pale, the petals all narrow; spur long, thick, curved upwards and obliquely acutish.

Wasatch Mountains, on slopes between Willow Creek and Ephraim Creek cañons, 15 July, 1909, Ivar Tidestrom.

Reconsideration of the Genus Marah.

It was the maturer opinion of the venerable Torrey that his once contemplated, though not in his day actually published genus *Megarrhiza* was better regarded as a peculiar section of *Echinocystis*; and this view soon afterwards met with the approbation of that specialist M. Naudin. When, now twenty-three years since (*Pittonia*, i. 1-3), I adopted that opinion, promulgated as it had been by two botanists far superior in age and experience, and myself transferred the Watsonian megarrhizas back to *Echinocystis*, I was unaware that this latter name itself had not the priority. Having discovered that *Micrampelis* of Rafinesque is the earlier name, and an entirely unobjectionable one, for the East American generic type, it was natural I should transfer the Pacific species and give them names under *Micrampelis*; and this was done (*Pittonia*, ii. 127-129).

The attempt, long persisted in, to hold the Pacific type as congeneric with the Atlantic and original *Micrampelis*, does not quite satisfy. As to foliage and as to flowers the two are indeed much alike; but in mode of growth, no less than as to form and duration of their roots, they are quite different; also as to the dehiscence of their fruits there is wide disagreement. Moreover, in the earlier of my two papers cited I find myself somewhat reprehensible in having described the seeds of the Pacific group as being "from nearly globose to much compressed." A seed, in order that it shall be describable as much compressed ought to be almost flat; and that is hardly true of the seeds of any of the Pacific species, although the variation of them, between one species and another, is not inconsiderable. But certain it is that no *Mara* has seeds approaching those of *Micrampelis* by any notable departure from the orbicular in outline. Even when somewhat compressed, they have never anything like that elongated melon-seed shape which helps to mark as distinct the Atlantic type. Add to these considerations the facts that all *Mara* species are perennial by enormous fleshy roots; that their seeds of such

distinctive form and outline have thick hypogeous cotyledons, and we have the characteristics of a genus naturally quite separate from *Micrampelis*.

The following is my census of the North American species of *Marah*, as far as they are known to me; though I may add that while yet an ardent resident student of Pacific Coast botany, I came to suspect that one or two of the accepted species were aggregates.

MARAH FABACEA.	Naudin	under	<i>Echinocystis</i> .
“	MURICATA. Kellogg.		
“	MACROCARPA. Greene	under	<i>Echinocystis</i> .
“	GILENSIS. Greene	“	“
“	OREGANA. Torr. & Gray	“	<i>Sicyos</i> .
“	GUADALUPENSIS. Watson	“	<i>Meganhiza</i> .
“	RUSBYI. Greene	“	<i>Micrampelis</i> .
“	LEPTOCARPA. Greene	“	“
“	WATSONII. Cogn.	“	<i>Echinocystis</i> .

An Oriental *Convallaria*.

CONVALLARIA JAPONICA. Rootstock short, very stout, densely clothed and even quite concealed by rather hard fibrous roots, its crown bearing a fibrous tuft, the remains of leaves of former seasons: leaves two only, subequal, elliptic, cuspidately acute, neither face with any trace of bloom, both of a bright, rather light green, the leaf as a whole of a notably fibrous anatomy: peduncle short, its summit scarcely equalling, or little more than equalling the bases of the leaves; raceme few-flowered, its bracts small, ovate-lanceolate, subscarious: perianth widely opening, broadly campanulate or almost saucer-shaped; stamens large, very short, the round-oval very obtuse anthers longer than the filaments.

All the Japanese material that I have seen answers to the above description, and is therefore by quite a redundancy of them, perfectly distinct from *C. majalis*. This oriental plant

has its nearest allies in certain species of the Virginian and Carolinian mountains of the southern United States, which have also, and without the slightest attention to their marked characters, been named *C. majalis*.

Nomenclature of the Bayberries.

When in 1894 I wrote the Bay-Region Manual I declined approval of that flagrant violation of fundamental principle by which our bayberries, otherwise called wax myrtles, came to be named as species of *Myrica*; for this name belongs of old to the tamarisk tree, a type known as *Tamarix* in most Latin-written botany of to-day. During three thousand years or more the name myrica recalled to every one who read or heard it nothing else but the tamarisk. In modern Greece the tree is still myrica, and even in Italy while in some provinces it is known as tamarigio, in others it is still known by its Greek name myrice. Neither Greeks nor Romans had any knowledge of our bayberry bushes.

It is little more than a century and a half since this senseless transfer of the classic name of the tamarisk of Europe to our American bayberries was proposed. I am justified in calling it a senseless transfer; for, at least, to those who know the names of plants as they were anterior to 1753, to call wax myrtles myrica species is no better than it would be to write of oaks under the name of horse chestnuts; and it is acting just as absurdly as any zoologist would be doing if, in writing about camels, he should call them sheep; for camels are camels in whatsoever language one makes mention of them; also sheep are sheep whether taken note of under this our English designation of them, or that of *oves* of the Latins, *probata* of the Greeks, or under any other name they bear in whatsoever speech of men. To illustrate further this eighteenth-century vice of the transference of generic names, I shall suppose that Linnaeus, who published our American genus of the raccoons as merely a long-tailed sort of bears, had had the zoologic

common sense to see that they were not bears, but of a distinct genus, and the genus in need of a name as such. Now *Ursus*, the Latin name of bear, being securely in place for the true bears, it would have been exactly like Linnaeus if he had picked up the Greek name for bears, which is *Arctos*, and had applied that as the scientific designation of those New World mammals, the raccoons. Thus, while to illiterate dabblers in zoology *Arctos* would have been a good enough generic name for our raccoons as distinct from the genus bear, still, to Greeks—yes, and to educated Romans as well, for they know Greek—Linnaeus would still be calling raccoons bears.

This hypothetic Linnaean transfer of the Greek name of bear to the raccoon is not an exact parallel to his transfer of *Myrica* to the bayberries; for it is confessed that raccoons and bears are not, after all, so very far apart taxonomically, while no one has ever pretended that tamarix and bayberry are closely akin. They are wide apart; so that such perversion of the name *Myrica* is, if possible, worse than it would have been to have applied the Greek for bear to the raccoon genus. No Greek of to-day, if, unacquainted with Linnaean tricks of nomenclature, he should open one of the Linnaean books at a *Myrica* page could at first glance have any idea that tamarix was not meant; and such Greek would be amply justified in his act, if he should throw the book into a corner as a piece of pretentious nonsense, after having discovered by reading the diagnosis, that some genus which Greeks never knew, had been designated by this their classic name for trees that had been known as myricas for some thousands of years.

In that book of mine which I have mentioned above, I entered one protest at least, against this abuse—this perverted use—of Greek generic names, and restored for the Californian species of bayberry the name *Gale*, which Tournefort had adopted in the year 1694 when the recognition of the genus was new, and it had become certain that, the ancients not having known the shrub, it had neither a Greek nor a Latin name. I called the fine large Californian bayberry tree *Gale Californica* (Man. p. 298).

Long after the publication of my book of San Francisco Bay botany, a student of the bayberries and their nomenclature came to me with the taxonomic proposition that the type species of Tournefort's *Gale* is generically distinct from the real bayberries; that *Gale* embraces only the European *Myrica Gale* of Linnaeus. On examination of the matter, under my fellow botanist's insistence, I am persuaded he is right about it, and so *Gale* will not hold for either my Californian species or for those of the Atlantic slope; and we—my friend and I—must go in quest of a generic name for our bayberry genus.

Realizing that one of my most daring disciples in the work of restoring natural genera in place of the artificial and complex genera of Linnaeus and of Bentham has written a large Flora in which, in my judgment, far better than Linnaean and Benthamian genera are set forth, I first of all consult this new Flora of the Southern United States, to see if this friend has also distinguished generically between the Old World *Gale* and the New World bayberries. I rejoice in the discovery that the name *Myrica* is not there at all. I am glad of its disappearance from another and an influential book, though I am far from venturing to credit Mr. Small with having rejected the name *Myrica* on those grounds upon which I myself, at an earlier date, had rejected it.

In this Flora of the Southern States I find a name for the bayberries which to me is brand new, the name MORELLA, and find it credited to Father Loureiro (1790). At first glance there is revealed in that name a definite hint of mulberries, for *Morella*, as a Latin word, can not seem to mean anything else but little-mulberry tree; either that or dwarf mulberry-tree. I understand, of course, the doctrine that no meaning is to be looked for in either the generic or specific term of any binary name of animal or plant. I am not far, I think, from a clear apprehension of how that proposition took its origin. However, that doctrine is not here under discussion. The fact is, that human intelligence, once tolerably well developed, inevitably scans the sense of any new name; looks to see, if possible, its meaning, and asks why the thing obtained that name.

No names seem to originate arbitrarily, and most names, even outside of zoology and botany as well, originally are framed to designate some mark or characteristic of the thing named ; and so, I can not help seeing that the name *morella* points not to bayberries but to mulberries. By the name alone I am led to wonder whether in Cochinchina Loureiro can have found bushes or trees, allied to bayberry or wax myrtle, whose fertile aments develop, not into hard wax-covered nuts, but into pulpy drupelets. I consult the book and find even better reasons than I had guessed for Loureiro's having named his new shrub *Morella*; for he says its mature female aments are not only pulpy, red and appearing like mulberries, but are edible. He relates that the Chinese cultivate the tree ; that in Cochin China it grows wild, with smaller fruits ; that these are both palatable and wholesome ; that the Chinese eat them raw ; that Europeans in China preserve them with sugar ; that the Cochinchinese cook them while immature, and that when ripe they make from them a wine which is not to be despised whether as to color, odor or flavor (Fl. Cochinch. p. 548).

It is always extremely venturesome to select out of the Kew Index any generic name that may have been demoted to synonymy by Bentham, without first carefully examining the original text of the publication of such genus. From the text of the author of *Morella* it becomes clear as day that no shrub or tree known in any part of America can be referred to that genus with the faintest semblance of reason.

What, then, are we to call our bayberries as a genus Latin-named? The false *Myrica* of Linnaeus must have for its type the genus *Gale* of Tournefort. My friend Mr. Small I seem to see must regard our bayberries as generically separate from *Gale*. I should most readily agree to that. But what is Mr. Small to call the Atlantic, and I the Pacific, bayberries? I recommend to my friend, and to myself, a further study of that column of Kew Index *Myrica* synonyms ; also that we neither one pick up the name that seems next older in history, and run with it into print without knowing at all what such name does really stand for.

Two New Southern Violets.

VIOLA PLANIFOLIA. Related to *V. cucullata*, but slender white woodstocks short and erect, apparently not solitary but in clumps: plants a foot high or less, with about 3 or 4 leaves and 1 or 2 flowers: petioles and peduncles sparsely hairy, some hairs deflexed, others spreading: leaves deeply cordate, plane, small for the plant, the earliest 1 inch long, the latest 2 inches, thin, light-green, serrate-crenate, nearly or quite glabrous: peduncles far exceeding the leaves, bracted above the middle; sepals narrowly lanceolate, obtusish, plainly 3-nerved, entire, scarious-margined, their auricles hispidulous: corolla blue, nearly an inch broad; uppermost petals largest, strongly retuse, laterals narrower, retuse, the odd one broad, much shorter than the others: capsules oval, not greatly exceeding the sepals.

Thompson's Mills, Gwinnett Co., Georgia, 2 May, 1909, collected by H. A. Allard.

VIOLA ALLARDII. Akin to *V. cucullata*, also of wet ground, but the rootstock very short, stout and upright, bearing many whitish fibrous roots; both leaves and flowers numerous for this group, and the leaves short-petioled, surpassed by the flowers, yet the whole plant no more than 3 or 4 inches high: herbage rather delicate, yet subsucculent, glabrous in every part: lowest leaves reniform to broadly cordate, the later deltoid-cordate, acute, crenate: peduncles bracteolate much below the middle, the bractlets narrowly subulate-linear, ascending, entire: sepals lanceolate, acutish; corolla blue or purple, large, nearly an inch long, but petals all narrow, the odd one as long as the others, all obtuse, the laterals with a tuft of long flattish hairs.

Open and very wet land near Thompson's Mills, Gwinnett Co., Georgia, 1 April, 1909, H. A. Allard.

Though almost undoubtedly a member of the bog-meadow group of stemless species, this one has so nearly no rootstock at all, and displays so large a tuft of whitish fibrous roots as

to make it peculiar among its supposed allies. The specimens, though in full petaliferous flower, are nevertheless rather too young.

Three New Astragali.

ASTRAGALUS SUBUNIFLORUS. Near *A. Nuttallianus*, the root annual, stem slender, erect, simple, or branched only above the base if at all, mostly 2 to 6 inches high, caulescent with an appressed coarsely silky pubescence, but upper face of leaflets sometimes almost glabrous, these in about 4 pairs, not crowded but rather remote on their rachis, in outline elliptic-oblong: peduncles filiform, nearly erect, usually 1-flowered, some of the later 2-flowered: calyx with short tube and much longer narrowly lanceolate-subulate teeth: pod somewhat shorter than in *A. Nuttallianus*, more acute, glabrous.

Near Tehuacan, Puebla, Mexico, 7 Aug. 1897, C. G. Pringle, n. 6678 as in my set of that collector's plants.

ASTRAGALUS PERTENUIS. Also near *A. Nuttallianus* and annual, branched from the base and these branches often more than a foot long, prostrate, slender, flagelliform, sparingly leafy, the whole plant, even to the pods, clothed sparsely with appressed straight hairs: leaflets in 3 to 5 pairs, remote on the elongated rachis, extremely diverse in form on each plant, those of the earliest leaves only a line long, cuneate-obcordate, those next them 3 lines long, oblong-cuneiform to oblong-linear and from truncate to acutish, uppermost foliage with linear acute or acuminate leaflets $\frac{1}{2}$ inch long or more: peduncles filiform, shorter than the leaves, often 1-flowered, none more than 2-flowered: pods small, 3 to 5 lines long, appressed-setulose.

A Lower Californian species, known to me in flowering specimens from Los Angeles Bay, and in fruiting ones from Cedros Island, all collected years ago by Edward Palmer.

ASTRAGALUS GERTRUDIS. Allied to *A. fallax*, the slender decumbent stems less than a foot long; herbage caulescently pubescent: leaves subsessile, leaflets oval to oblong, obtuse, retuse or truncate, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, in 7 or 8 pairs: peduncles equalling or surpassing the leaves; raceme short and dense, as much so in fruit as in flower: calyx short, subcylindric, 4 lines long including the short teeth: corolla purplish, twice the length of the calyx: pods rather less than an inch long, somewhat deflexed, almost lunate, very acute, coriaceous, obcordate in cross-section by intrusion of the lower suture, pubescent, sessile within the calyx.

Taos Co., New Mexico, 27 May, 1897, collected by Mr. and Mrs. Heller, n. 3598; distributed for *A. Greenei*, of which the pods are very different. The species is quite as near *A. fallax*. It is dedicated to Mrs. Heller.

The Genus Downingia.

A resolution was made by me some few years since to discontinue giving approval, and further currency, to a certain class of generic names, that is, such as are in the line of attempts to dedicate second, third, fourth or fifth genera to the same person. It is a new kind of procedure in nomenclature, this practice of dedicating, first a *Brittonamra*, then a *Brittonastrum*, then a *Neobrittonia* all to the same individual; and, while I have no great confidence in the validity of the late Asa Gray's genus *Greenella*, I myself am not so desirous of being commemorated by a genus, that I would countenance either the late Otto Kuntze's *Greeneina*, or the *Greeneocharis* of Gürke and Harms, even though *Greenella* should be merged in *Xanthocephalum*, from which I have never regarded it as any too distinct.

Now while I would not accuse those who seriously propose such names as meaning any dishonor to us whose names are thus familiarly used as nomenclatorial cheap conveniences, I still can not but remark that the really great names in

botany are not so abused. I have never heard that any botanical author, of however light mental equipment for name-making, was audacious enough to propound a new genus *Linnaeella*, or a *Linneanthus*, or a *Linneophytum*, a *Linneocharis*, a *Pseudolinnæa*, a *Macrolinnæa*, a *Microlinnaea*, a *Neolinnea*, or any one of a score that might as cheaply be compounded. I think, also, that it would be the sense of botanists in general throughout the world, that this treatment of the name of Linnaeus in botanic nomenclature would be ignominious, and not to be tolerated. It is only third or fourth rate men like Dr. B., Dr. C. and myself, who have each a half-dozen genera, more or less, named so flippantly, and to our dishonor.

The name *Downingia*, as dedicated to Andrew Jackson Downing by John Torrey, was a merited honor to a great man. For the later displacement of that name, I am responsible. *Bolelia* of Rafinesque was found by me to antedate *Downingia*, and I published the fact. At the moment of doing this I felt a repugnance to the name, and this not so much because of its being anagrammatic. I have no serious objection to certain euphonious anagrammatic names for genera, except when, as in the case of *Bolelia*, they are constructed upon personal names; and this one is plainly a transmutation of the letters of *Lobelia*. It is in reality dedicating a second genus to Lobelius. On that ground I now object to it. That dislike of the name which I felt twenty years since when dealing with it was, at that time, overcome by my sense of the right of priority; a feeling which, during the vicissitudes of botanical nomenclature within twenty years past has been much weakened. In view of the multitudinous generic names of the most barbarian, or mongrel, or otherwise insufferable character that have been launched forth upon botanical public within these two decades, it is become inevitable that a check must be put upon the recklessness of those who publish any kind of a villainous generic name, feeling perfectly secure that, no matter what they issue for a name, priority will save it to the end of botanic time. A reaction

against priority, under these conditions, was sure to come. The beginnings of it are already felt in more corners of the earth than one.

I am aware that, in the case of DOWNINGIA there is another earlier name for the genus, that is, *Gynampsis* of Rafinesque. But in respect to this, and a few other like instances, I shall maintain that, when a botanical author makes a succession of generic names for the same generic type, he has forfeited all right to serious consideration in the matter of the nomenclature of such genus.

Since the time of Torrey and of Lindley, when it was first founded, the making of the genus DOWNINGIA has been mine by individual discovery and first publication of almost all the additional species now known; and I congratulate myself that all except two of my own discoveries were published under DOWNINGIA at the first. The two I here transfer.

D. HUMILIS. Greene, Pitt. i. 226, under *Bolelia*.

D. LAETA. Greene, Erythea i. 238, under *Bolelia*.

Miscellaneous Specific Types.—I.

CLAYTONIA CHRYSANTHA. Perennial, akin to *C. lanceolata* but smaller and more slender: globose corm of the size of a small pea, the whole plant barely 2 inches high, the pair of lanceolate opposite leaves located above midway of the stem; raceme very lax, only 3 to 5-flowered, their pedicels greatly elongated: corolla very large for the plant, nearly $\frac{3}{4}$ inch wide in expansion, deep-orange, the petals lightly obcordate: capsule and seeds unknown.

Moist sedgy southward slope of Mt. Baker, Washington, at 5,500 feet; collected by M. W. Gorman, 6 Aug. 1909; the special locality being at the east side of the Deming Glacier. I had a similar beautiful yellow-flowered plant from some place in British Columbia, two years since, the specimens having

been lent me by the late Dr. James Fletcher of Ottawa; but that, not a subalpine plant, may have been the *C. aurea* of Nelson.

SANICULA APIIFOLIA. Perennial by a stout fusiform root $1\frac{1}{2}$ to nearly 3 inches long : stem solitary, 1 foot high or more, simple below, scarcely branched even above, the few branches more like peduncles and the plant strict in habit, glabrous : flowers rather showy and milky-white : ternate lowest leaves long-petioled, their segments broad, obtuse, variously but none sharply toothed : involucre of the flower clusters monophyllous but parted into ovate lobes, the whole whitish and almost scarious ; carpels tuberculate, but each tubercle bearing a stout subulate rather short prickle hooked at tip.

Columbia Falls, Montana, June, 1893, also 1894, R. S. Williams. In every way, from root, and very parsley-like basal leaves up to flower, entirely distinct from *S. septentrionalis*.

TOXICODENDRON RUFESCENS. Shrub never climbing or forming aerial roots, firmly erect 1 to 1.5 m. high, copiously and amply leafy, bearing small clusters of rather small fruits ; mature twigs and branches dull reddish-brown, rather closely lenticellate, glabrate, but the growing twigs, and even to the end of the first season, rusty-puberulent : petioles 5 to 8 cm. long, the compound blade about as long ; odd leaflet exactly though quite broadly ovate, very acute or else abruptly acuminate, commonly entire, occasionally with 2 or 3 coarse teeth on one or both margins, 8 to 10 cm. long, 5 to 6 cm. wide below the middle, its petiolule usually 2 cm. long, upper face vivid green, glabrous, lower loosely hirsutulous on all veins and veinlets ; lateral leaflets not much smaller than the terminal but notably inequilateral, their petiolules very short, barely, or hardly, 3 mm. long ; panicles of fruit 5 cm. long or less, the branches and main rachis all slender ; drupelets small, nearly spherical, a trifle elongated, glabrous and polished, only obscurely striate.

The original and only specimens of this new *Toxicodendron* are sent by Mr. H. Walton Clarke, without mention of special

locality or notes of environment ; so that for type station one may only cite the vicinity of Lake Maxinkuckee, Ind. The collection of the specimens was made by Mr. Clarke on Sept. 14, 1906. That part of the characterization, however, which relates to height of the shrub, and its upright habit, is but a repetition of Mr. Clarke's note upon this point.

The species has a near ally in New England, namely, the *Toxicodendron glabrum* of Philip Miller (1768), long unrecognized ; also somewhat recently republished as *Rhus littoralis* Mearns.¹ The New England shrub has a much firmer texture of foliage, and the very scanty pubescence of the lower face of the leaf is of altogether different character. The panicles are larger, with much more numerous drupelets, and these notably large, as well as somewhat pubescent.

PYRROCOMA CHEIRANTHIFOLIA. Low perennial, stout taproot and branched crown or caudex devoid of woolliness : basal leaves many, not rosulate but erect, linear-lanceolate, entire, acute, some of the earlier rather broader, narrowly lanceolate, remotely and lightly serrate-toothed : stems scapiform, only 5 or 6 inches high, strongly decumbent, scarcely leafy, usually monocephalous, occasionally with 2 heads, obscurely villous-arachnoid : involucre turbinate, hardly a half-inch high, their bracts in about 3 series, narrow, acute, largely green-herbaceous, lightly villous-arachnoid ; rays many, large and showy for the plant.

Common in fields along San Pete River, west of Ephraim, Utah, 7 Sept. 1907, Ivar Tidesdrom, n. 534 as in U. S. Herb.

ARNICA ABORTIVA. Of the size and habit of *A. cordifolia*, but foliage small : basal leaves not seen, the cauline in about 3 pairs, ovate and deltoid-ovate, dentate, firm, scaberulous and sparsely pubescent on both faces, only 1 to $\frac{1}{2}$ inches long, the very lowest on long naked petioles, the others on shorter ones broadly winged : heads 1 to 3, on long naked or bibractrate peduncles : involucre campanulate, $\frac{3}{4}$ inch high, the bracts biserial, the outer lance linear : acuminate, villous-hirsute, the

¹*Rhus littoralis*, Mearns, Proc. Biol. Soc. Washington, Vol. 15: p. 148 (1902).

inner narrower, either wholly hyaline, or with only a green midvein, rays short, yellow, their ovaries altogether abortive: disk-corollas with tube and subcylindric throat of about equal length; the former villous about the summit: achenes slender cylindrical, striate, hirsutulous; pappus dull white, barbellate.

Open woods in the Wind River Mountains, Wyoming, Dr. W. H. Forwood, 23 July, 1881. Type in U. S. Herb.

ARNICA PARVIFOLIA. Woodland plant of low stature and from horizontal rootstocks; pair of basal leaves cordate, more than 2 inches long, on slender petioles about as long, acutish, repand-denticulate or dentate, thin, green, both faces with a few scattered short hairs and minute glands; stem leaves in about 3 pairs, lanceolate or ovate-lanceolate, small, the blade seldom more than 1 inch long, sessile in the upper pair; head solitary, or rarely 2 or 3, large, short, peduncled; involucre campanulate $\frac{3}{4}$ inch high, of about 10 thin linear-lanceolate acuminate, bracts more or less villous and glandular on the back: rays large and long, about 12 or 14, yellow: achenes slender, sparsely setulose; pappus firm and delicate, white, barbellate.

Peculiar small-leaved and even leafy-stemmed ally of *A. cordifolia*, the type specimens in my herbarium from Marshall Pass, Colo., 19 July, 1901, by C. F. Baker, n. 515.

ARNICA LASIOSPERMA. Apparently cespitose, slender and low, in maturity only 6 inches high, firm and wiry rather than succulent, not obviously pubescent, the stem and leaf margins under a lens showing scattered hairs: leaves small, the cauline in 2 or 3 pairs, oblong-lanceolate to lanceolate, acute, entire, sessile: heads 1 to 3, on peduncles 2 inches long; involucre campanulate, of 10 or 12 oblong-lanceolate merely acute bracts: rays rather long, light-yellow; disk-corollas with densely appressed-villous short tube and about equal subcylindric glabrous limb: achenes cinereous with a dense fine appressed pubescence; pappus white, barbellate.

Subalpine in Estes Park, at base of Long's Peak, Colorado, 26 Aug. 1895, Geo. E. Osterhout.

Studies of Thalictraceæ.—I.

It is not as the name of a suborder, or subfamily, but as that of a proposed natural family of plants that I write THALICTRACEÆ. I have long carried in mind a conviction that certain genera, *Thalictrum* heading the line, have not the least natural affinity for, or genetic relation to *Ranunculus*, or to *Clematis*, to *Anemone*, to *Delphinium*, or to *Paeonia*. I do, however, seem to see what to me are marks of real genetic relationship among such genera as *Thalictrum*, *Anemonella*, *Isopysum*, perhaps *Coptis*, and more indubitably *Aquilegia*. My own idea about a rather intimate relationship as subsisting between the last named genus and *Thalictrum* found expression many years since in my books of Californian botany, wherein, removing *Thalictrum* afar from where all the Jussieus, De Candolles, Benthams and Englers of a hundred years and more had placed it, that is, on the *Clematis* side of *Ranunculus*, I located it away on the other side, and in closest juxtaposition to *Aquilegia*. I gave then no reasons for such protest against fossilized artificialism, nor shall I give reasons here.

Thalictrum itself falls into a number of groups so very unlike each other as to flower and fruit that doubtless the time is coming when segregate genera, a half-dozen of which have already long since been proposed, will be freely admitted in place of the conventional *Thalictrum* of the books that we have. Such an event, when it comes, will accentuate the demand for a recognized family of the THALICTRACEÆ.

Engaged seriously in the investigation of this aggregate *Thalictrum* for now more than twenty years at intervals, I have given a closer application to it during the last three years than I ever gave to any other genus, but hitherto with but few results that are to me quite satisfactory; and I have come to feel that it is the most difficult of all the phanerogamous genera of the North American flora. Also I find no evidence that other students of the group have even dimly apprehended

the most perplexing difficulties that its forms present. Has any one hitherto confessed a suspicion that, in our dioecious species the leaves are of one description in the male plant, and of quite another form in the female of the same? They are often very large plants, insomuch that nothing gets into the herbarium but the inflorescences and one or two of the upper cauline leaves. Familiar with many hundreds of herbarium sheets of this kind of material, I am driven well towards a state of hopelessness by the discovery that in one and the same individual, the basal leaves, such as seldom get into the herbarium, may be found to be perfectly glabrous, while the middle and upper cauline are notably or even strongly pubescent. With facts like these confronting me, and many more as perplexing, I am daily and hourly face to face with the discouraging circumstance that, among scores of reputable botanists who have endeavored to describe the species, there are still no descriptions of any species in the older books, or even in the newer monographs. This last named fact, however, has confronted, and has been the despair of, a number of good botanists; and these will be found to have taken up one name for a supposed species at one time, then dropped that and taken up another name for it, because this other later name seemed to carry with it something a little more like an intelligible description of a plant.

The present paper is devoted mainly to some results of a long and careful study of our white-flowered kinds of *Thalictrum*, all of which have usually passed for a single species, and under a name that has varied from generation to generation. With early and middle nineteenth-century writers the name was *Thalictrum Cornuti*. After the suppression of that appellation the name *T. polygamum* came into vogue, and most of the specimens in herbaria that are recent have the latter name on the labels; while in one or more of the twentieth-century books of American botany *T. corynellum* has displaced *T. polygamum*. An abstract of the history, and the real or supposed reasons for these consecutive changes of name may well find place here.

The earliest trivial name in any way representing an American white-flowered member of this genus is the *Thalietrum Canadense* of Cornutus. It is of the year 1635. That author's using an *e* rather than a *c* in the second syllable of the generic name bespeaks a doubt that existed in the minds of earlier botanical scholars as to whether the name was intended of old to be *Thalietrum* or *Thalictrum*. For almost two centuries the validity of *T. Canadense* was unquestioned. Tournefort, like others of his time, sustained it, and of course under the name at first assigned. Linnaeus in his day suppressed the then well established *T. Canadense* and renamed the species *T. Cornuti*. The change was as arbitrary as possible, yet the new name became current almost everywhere; and in, I think, all American books of botany down to the beginning of the last decade of the nineteenth century. During about 140 years, then, every kind of tall paniced meadow rue displaying clavate white filaments was named *T. Cornuti*; then all at once, and with little by way of apology, the best known of American botanists dismissed the name *T. Cornuti* and put in its place *T. polygamum*, a nomen nudum printed long, long ago by Muhlenberg. From 1895 forward to the present, books and catalogues sustain, on the mere word of Gray, the name *T. polygamum*. This is an outline statement only, and appertains to the history of the nomenclature of this type in our own country more particularly; but the aggregate species had been studied with care nowhere but in Europe; and we shall have to look to one of the greatest botanists of Europe to see what the real reasons were for suppressing Linnaeus' trivial name *T. Cornuti*. Asa Gray tells us (Syn. Fl. I, 18) that the necessity of this had been suggested by De Candolle (1818). This eminent botanist appears to have been the first to critically examine the page and plate of Cornutus, and in doing this he could but discover that both plate and description apply to no other plant but the Old World *T. aquilegifolium*. *T. Canadense* of Cornutus, Tournefortius and others, as well as *T. Cornuti*, Linn., were but synonyms of *T. aquilegifolium*, and all must be suppressed.

This he did, giving the Canadian plant the new name of *T. corynellum*. When eighty years later Gray discovered all this he, in his zeal for priority, suppressed the name *T. corynellum* which was perfectly valid, as being accompanied by a description, and forced to the front that nomen nudum, *T. polygamum*, Muhl.

The botanists in general must have inferred this resurrection of the Muhlenbergian adjective to mean that it was an older equivalent—and a sure and certain equivalent—of *T. corynellum*. The truth is, it can never be proven the equivalent of anything. All that is said of the plant is that its corolla is white, that it is polygamous, and also glabrous. About the stamens not a word is said over and above what is implied in the term polygamous; and polygamous is an extremely empty term to try to make any use of in defining a species, for it is a mark by which no individual specimen can be determined. To know a polygamous species to be such, one must have at least three individuals, a male, a female, and an hermaphrodite. *T. polygamum* is certainly no better than a nomen nudum. Moreover, it is so far from having been meant for a new designation of Linnaeus' *T. Cornuti* that Muhlenberg admits this last as a valid species separate from his *T. polygamum*; and still further, he attributes to another species flowers as white as those of his *T. polygamum*, that is, *T. rugosum* of Pursh. Then, to make matters if possible still worse for the status of *T. polygamum* as a tenable name of any white-flowered *Thalictrum*, Sprengel, the first to print Muhlenberg's *T. polygamum* name with an accompanying description, says of its filaments that they are filiform. A German, and a contemporary, and presumably a correspondent of the German Muhlenberg, must have had the means of knowing what the latter had had in mind under that nomen nudum which he had caused to be printed. So then, the very first paragraph or even line of description of *T. polygamum* ever printed (Sprengel, Syst. II 671) must lead the careful investigator, if to any conclusion at all, to that of Sereno Watson and some others, that what Muhlenberg had was nearer *T. purpurascens*, and probably

identical with that (see Wats. Index, 26). It is to be noted that De Candolle (Syst. I, 173) had without doubt or hesitancy so referred it, save as having distinguished between *T. purpurascens*, Linn., and his own *T. revolutum*, under which latter he writes *T. polygamum* as a synonym. But this name, having been printed without diagnosis, and therefore without title to the rank of a plant name at all, ought to be excluded even from synonymy, because it can not be connected with any species whatsoever except by guess. This however is not quite so nearly true of *T. Cornuti*; for in the publication of this name an earlier name was cited, and this earlier one was accompanied by a description so full and clear as to leave no doubt that such description was drawn up from a specimen of *T. aquilegifolium*. But, to write down *T. Cornuti* as a mere synonym of this Old World plant and leave the matter so, is to falsify the situation by leaving untold one significant item of scientific truth which stands in this connection. It is quite certain that Cornutus had in his garden at the time a *Thalictrum* from Canada, almost as certainly a white-flowered one, therefore one which might by any piece of oversight or carelessness become confused with the white-flowered variety of *T. aquilegifolium*. It is not important that it should be shown how, or by whose mistake, the fruits of *T. aquilegifolium* came to be described by Cornutus for those of his *T. Canadense*; but the plant from Canada—almost certainly sent from Quebec, and by Dr. Sarracenus, the botanical correspondent of Parisian botanists of the time—was not ephemeral in European gardens. It remained there for more than a hundred years, and may still be there. Hermann in Germany, and Morison and Ray in England, as well as Tournefort and others of the time knew, and distinguished, between *T. aquilegifolium* of Europe and *T. Canadense* of America, all these as subsequent to the time of Cornutus, yet in the same century. Then among contemporaries of Linnaeus in the century following, they had the plant in Germany and in England still, always distinguishing it from its European ally. Philip Miller describes both species, and, suppressing Linnaeus' name *T. Cornuti*, restores to the species

its original appellation. Thus it is clear that even if Muhlenberg's *T. polygamum* could have been a really published name, it would have had no status. It would have been long antedated by *T. Canadense*, Mill., and the same is true of *T. corynellum*, DC. Again as late as 1794 Moench has the two species in the Hortus Marburgensis; and he too rejects the name *T. Cornuti* and lists the plant under his own new appellation of *T. confertum*, which also again antedates by many years Muhlenberg's *nomen nudum*.

The plant of the upper St. Lawrence, frequent on both the Canadian side and on ours, the *T. Canadense*, Mill., also better described by De Candolle as *T. corynellum*, I shall not here describe anew; but I recognize it well, and am able to distinguish from it not only the excellent *T. dasycarpum* of Fischer, but also the following, all from regions well to the westward and southward of eastern Canada and northern New England.

The group as a whole is most unlike the Old World *T. aquilegifolium* and its allies, as is proven by its extremely different mature carpels. De Candolle well distinguished as a marked subgenus, under the name *Tripterium*, the Old World plants. It is quite as fitting that these American plants, in both flower and fruit so very different from *Tripterium*, should be designated at least subgenerically as **LÆUCOCOMA**, in allusion to their often massive and always beautiful white panicles. The whole group is aestival in its flowering, while our more than equally numerous species with green flowers are vernal. In respect to a number of the species there exists in the herbaria no evidence of their being other than dioecious, no hermaphrodite specimens occurring. Such plants I find to have been commonly mistaken for the dioecious *T. purpuracens*, so little discrimination is made by people in places of some supposed authority, the clavellate filaments being overlooked altogether. Again: while in the greater number of species the achenes are black when ripe, and the green herbage of them blackens in drying, there is one set of them marked by herbage the color of which is green in the dry, and by achenes that are only of an olive-green when perfectly mature. As to

differences in size, amplitude of panicles, forms of leaflets and characteristics of them as to texture, venation and pubescence, the whole genus outside of it is scarcely more diversified than is the *LEUCOCOMA* section in itself. Also its species range all the way from subarctic Labrador to Georgia in the southern United States, and from the Atlantic seaboard to the Rocky Mountains.

THALICTRUM BISSELLII. Slender, sparsely leafy, 2 feet high, the solitary basal leaf petiolate, the several and remote cauline sessile; stems terete, scarcely angled or striate: leaflets of lowest leaf of staminate plant glabrous on both faces, glaucous-green above, very glaucous beneath, suborbicular, 7 or 8 lines wide, subtruncate or subcordate at base, slightly and not very unequally 3-lobed at apex, with middle lobe about twice as broad as long, truncate, but, by two slight indentations broadly 3-crenate, the terminals and laterals little different save as to size; upper leaves of same staminate plant sparsely and minutely pubescent beneath: leaflets of pistillate plant rather longer than broad, more deeply 3-lobed, the middle lobe rounded at apex and perfectly entire; sepals of staminate plant obovate, obtuse, of pistillate equally obtuse and more rounded, almost orbicular: filaments short, clavellate almost from the base, much narrower at their widest than the short oblong-oval anthers: immature achenes small, slenderly fusiform and stipitate.

Type specimens collected in 1897, in the middle of July, at Southington, Connecticut, by C. H. Bissell, whose label records it as common there in wet meadows. The specimens are with me as a loan from the herbarium of the Agricultural College of New Mexico.

For a member of this white-stamened group this is a small one, the plants not larger than some of the largest of *T. dioicum*, and is quite as sparingly leafy as that is in its larger growths. The sheet of specimens is a remarkably complete one, bearing a complete staminate and a complete pistillate plant, each in flower, with also an inflorescence of the pistil-

late in nearly full grown fruit. The herbage does not in the least blacken in drying, though the immature achenes have blackened.

By the care with which Mr. Bissell gathered and pressed these complete plants, I feel assured that the male and female represent the same species precisely, and by their completeness they demonstrate fully how the foliage between a male and a female may differ, as well as how on the same individual the lowest leaves may be perfectly glabrous, the others very notably pubescent.

THALICTRUM VIRIDE. Tall and robust, the ample sub-corymbose fruiting panicle nearly a foot in breadth; whole plant, even to the mature carpels, of a deep green, in no part dull or dark when dry; petiolules with a few hairs, all other parts glabrous; leaves ample and open, one of the cauline 9 inches long and (from tip to tip of the basal pinnae) 15 inches broad, the primary petiolules 3 or 4 inches long below the first leaflets, all the petiolules primary and secondary very firm, leaflets very firm, light-green above, with veins still lighter, beneath paler and more prominently veiny; terminal leaflets of round-oval general outline, 1 to $1\frac{1}{4}$ inches long, obtuse at base, the apex with one large and two small lobes all mucronate-acute; laterals mostly similar but small, only a few oval and entire: achenes about $\frac{1}{4}$ inch long including style and short thick stipe, thick-fusiform, the thickest ribs often showing a few small setaceous erect hairs.

Type specimens, in U. S. Herb., from Waterbury, Connecticut, where they were collected by C. G. Du Bois, 30 Aug. 1888.

THALICTRUM SETULOSUM. Plant stoutish, a yard high or taller, the stems smoothish and quite glabrous throughout: leaves of firm texture, glaucous-green above, more glaucous beneath, both faces in a degree, but chiefly the lower, minutely and sparsely setulose-hairy: terminal leaflets of lower leaves more than an inch broad and long, rounded or subcordate at base, somewhat deeply 3-lobed, the middle lobe

largest, often unequally 3-lobed, laterals smaller, not always oval and entire; leaflets of upper leaves more elongated and narrow, also more acutely lobed, all leaflets strongly veiny beneath, less conspicuously so above: all plants probably more or less hermaphrodite, the flowers of the more fertile mostly with one or two stamens, often with none, their sepals caducous, those of the more staminate plant large, elongated-oval, somewhat persistent and deflexed; filaments very long, clavellate only above the middle and not strongly so, anthers very short in proportion, oblong-oval: immature carpels very minutely setulose, the mature less obviously so, very large, somewhat oblong-oval but obliquely so, the opposite ends being manifestly a little curved in opposite directions, neither quite sessile nor notably stipitate, not black, but dark greenish brown, the ribs rather low.

The type sheets of this species are in my own herbarium, and were collected at Monkton, Vermont, in July and September, 1880, by C. G. Pringle. The species is named in allusion to the short but bristly nature of the pubescence, the like of which I have met with in no other meadow rue. Its achene has a peculiar outline for a member of this group.

THALICTRUM MORTONI. Probably at least a yard high and not slender, the stems striate, glabrous, purplish: lowest leaves a foot long, the breadth somewhat less, the leaflets uncommonly large, doubtless of firm texture in age, not blackened in drying, of a rather deep green above, paler and glaucescent beneath and with a few rather prominent but slender and only slightly divergent veins, both faces glabrous; terminal leaflets $1\frac{1}{2}$ inches long, 1 inch wide far above the middle, obtuse at base, sharply yet not deeply 3-lobed at summit; laterals mostly 1 inch long or less, obliquely ovate to lance-oval, acute, usually entire: sepals of staminate plant obovate, very obtuse, of the pistillate oval, acute; filaments only slightly clavellate, and that from near the base, in no part as wide as the narrow linear oblong acute anthers: neither mature nor even full grown carpels known, those half grown fusiform, glabrous.

Known only from western Ontario, near Wingham, where it was collected by J. A. Morton, 13 July, 1890, the specimens in Herb. Canad. Geol. Survey.

THALICTRUM ALTISSIMUM. Plants very tall, often 6 feet high and even more, the stems erect, rigid, manifestly angled, dark with minute purple dots, glabrous to the summit, and even as to the branches of the panicle and pedicels of the flowers: basal leaves a foot in diameter exclusive of the petiole, this glabrous, but the ultimate petiolules plainly hirtellous: leaflets firm, deep green, smooth and glabrous above, beneath yellow-green and, especially along the veins, softly hirtellous, the margins revolute, terminals an inch long, round-obovate or subcuneate-obovate, either subcordate or nearly truncate at base, 3-lobed at apex, the middle lobe thrice as large as the laterals, all lobes conspicuously cuspidate-mucronate, lateral leaflets either oval and entire, or some of them broader and with one lateral lobe or tooth: sepals of staminate plant obovate, obtuse, white, of the fertile plant more elongated, acute: filaments all clavellate and erect; anthers oblong, very obtuse: achenes black, small for the plant, sharply ribbed, tipped with the persistent straight style.

This is the common summer-flowering white-stamened meadow rue of river banks and other wet places in Virginia, Maryland and northward into Pennsylvania. It flowers along the banks of the Potomac all through July, and its fruit ripens in August, and is black as soon as ripe. Both the leaves, leaflets, flowers and fruits are remarkably small, the plant itself among the very largest of its genus, and of a lax and poor aspect on account of the wide spread of the nearly naked branches, these floriferous at the ends only. They are nearly divaricate; and the lax open panicle itself often measures two feet or more from base to summit, yet, from its laxity and openness, is ill defined as an inflorescence. In this particular our plant of these Middle States is very unlike all far northern and northwestern and western plants that have, with this, been mixed up from early times under the name of *T. Cornuti*, and more recently under that of *T. polygamum*.

THALICTRUM PERELEGANS. A yard high, or taller, the green and somewhat polished stem finely striate above the middle, glabrous, very leafy up to the rather naked and not ample panicle; leaves large, none but the uppermost sessile, all of thin and delicate texture; outline of terminal leaflets broadly to rather narrowly obovate, obtuse at both ends, with three rounded lobes at summit, the large middle one notably mucronate, laterals often only smaller, but sometimes obliquely oval and entire, all of a deep blue-green above, very pale beneath and there bearing traces of a minute scattered pubescence, also rather prominently venulose: sepals of the more fertile plant orbicular, white, of the more infertile larger, somewhat elongated: filaments very long, also very gradually clavellate from near the base and not wider than the very short oval or oval-oblong anthers: achenes rather small, elliptical, black in maturity, all deflexed, those of the more fertile plant very shortly stipitate, of the more staminate on a very long filiform stipe.

A large but elegant species, known to me only as in my own herbarium, and as collected by my friend Thos. H. Kearney, at Lemon's Gap in the mountains of eastern Tennessee, in early September, 1897. Strictly of the white-stamened group, only the carpels blacken in drying, all other parts retaining perfectly their fine blue-green coloring. The deflexed attitude of the achenes is not so remarkable as is the fact that the about four of them that are in each bisexual flower are very conspicuously and slenderly stipitate. I judge this to be a woodland species; but the labels bear no notes of habitat.

THALICTRUM HEPATICUM. Stem tall, terete without striae, smooth, glabrous, purplish, without bloom: lowest leaves very large, a foot long and of somewhat greater breadth, of 120 to 140 rather small mostly deeply and subequally 3-lobed leaflets that are bright green above, glaucescent beneath and glabrous throughout, firm of texture and not revolute; terminals hardly an inch wide, of the same length, subcordate,

lobed almost to the middle, the lobes broadly ovate, obtuse but cuspidate-mucronate; some laterals like the terminals in form but smaller, others ovate, obtuse, entire or else with one small lateral lobe or tooth: panicle of staminate plant nearly naked, rather contracted: flowers (only the staminate plant known) white, with round-ovate obtuse sepals and many long stamens; filaments pronouncedly clavellate but only above the middle, below that quite capillary and contorted; anthers short-oblong, abruptly very acute.

Swamps of the Blue Ridge Mountains, northern Georgia, 10 July, 1900, Albert Ruth. Very marked species; as to foliage most of the leaflets closely imitating those of *Hepatica*.

Certain American Roses.

In the course of two thousand years' history of the genus *Rosa* perhaps no more remarkable taxonomic discovery was ever made than that which fell to the lot of Dr. C. C. Parry and his party in 1882, when, botanizing along the seaboard of the Mexican Territory of Lower California, they came upon that unknown shrub which Dr. Engelmann soon after published as *Rosa minutifolia*.

In general appearance that shrub is far removed from all other roses that were then known, insomuch that I much doubt whether such experienced botanists as those discoverers were would have seen in it a member of the genus *Rosa* at all, if the bushes had been devoid of all traces of buds, flowers or fruits; for it is only by its answering, as to flowers and fruits, to the artificial phytographic technicalities which are allowed to be definitive, that *Rosa minutifolia* is admitted to that genus.

During some fifteen years this Lower Californian curiosity remained practically a monotypic subgenus. Then in 1897, not much less than a thousand miles inland from the Mexican

seaboard, Mr. Wooton discovered in the mountains of New Mexico, at elevations of 5,000 to 6,000 feet, what he regarded as a second member of this strange group, and he published it as *Rosa stellata*. There are contrasts more pronounced than have hitherto been indicated between the Lower Californian shrub and that of the Organ Mountains in New Mexico. Let us indicate these somewhat formally.

R. minutifolia. Young twigs with sparse and short pubescence: larger spines not much dilated at base, of dull color and notably pubescent: leaflets 5, not crowded, but the pairs equidistant: stipules with narrow subscariosus body and divaricate foliaceous auricles.

R. stellata. Young twigs with copious stellate pubescence: spines much dilated at base, glabrous, white, polished: leaflets mostly 3, crowded at end of short rachis: stipules with very narrow body and ample foliaceous auricles divergent.

The excellent specimens of *R. stellata* distributed by Mr. Wooton are from two separate and rather well isolated mountain ranges in southern New Mexico, and he has noted clearly enough some of their divergences in his paper on them (Bull. Torr. Club, XXV, 152). Nevertheless, I seem to see that the discoverer of the New Mexican shrubs, in his diagnosis, has been betrayed by those curious trichomes of this type into the making of a synthesis which, on the whole, can hardly meet with general approval among students of roses. In other words, the *Rosa stellata* of the Organ Mountains and that of the Sierra Blanca are so very different in characters of stem, spines, leaves and indument that, on principles well established among rhodographers, they must be held specifically distinct. No expert in the knowledge of roses, contemplating figures 3 and 6 of Mr. Wooton's plate (Bull. Torr. Club, t. 335) would say that those two leaves, if taken from two plants from different regions, or even from the same hillside, are of the same species. The leaflets of one leaf are 5 and cuneate-obovate, notched all around the upper part from the middle or even from below that. Those of the other leaf

are 3 only, each being exactly triangular, notched only across the line of the truncate summit. The stipules also of the two are constantly very different. But it will be profitable to make exact diagnoses of these two plants; and first of all, there needs to be given a fuller statement of the characters of the typical Organ Mountain plant, to which alone, as the specimens before me seem to show, the name chosen applies.

R. stellata, Wootton (restricted). Stems when growing scarcely armed with other than white broad-based white prickles, but hoarily stellate-tomentose by trichomes radiating around a low murication or obsolete prickle: leaflets of the very short leaves mostly 3, sometimes 4 or 5, all alike triangular, entire on two sides, deeply toothed across the truncate summit, pubescent on both faces, also closely and minutely somewhat pustulate-roughened above; stipules proper very short, surpassed by their large foliaceous auricles.

The contrast between this and the shrub of the White Mountains (or Sierra Blanca, as the name of that range ought always to be written) may be shown by a diagnosis of its stem and leaves quite as brief as the above. I shall call it

ROSA MIRIFICA. Growing stems light-green without stellate or any other hairiness, the few stout white prickles supplemented by very many intervening short almost filiform recurved and gland-tipped prickles: leaflets more commonly 5, of at least twice the size of those of *R. stellata*, strongly cuneate-obovate, strongly crenate-serrate around the obtuse apex, glabrous on both faces, not in the least pustulate or roughened; stipules long, wholly herbaceous, their small divergent or subfalcate auricles not notably foliaceous, the whole stipule marginally beset with small sessile glands.

This account of the leaves of the Sierra Blanca rose does not quite harmonize with the figure above referred to; for the figure shows leaflets more obovate and less cuneate, and with sharp rather than obtuse teeth, an indentation that could not be called crenate-serrate. But such as I have described here are the leaflets on two good sheets, one in the National

Museum, and one in my personal herbarium, both as collected by Mr. Wooton in the Sierra Blanca.

There is now before me a third representative of this strange group of roses, and this from a region to the southward of New Mexico, taken by a zoological traveler in another isolated range, the Guadalupe Mountains of Texas. In compliment to the discoverer of it, I name the species

ROSA VERNONII. Next of kin to true *R. stellata* but growing twigs, also the peduncles, appearing retrorsely villous-silky; large spines more slender than in any of the foregoing, also not notably dilated at base, conspicuously deflexed, white and polished, numerous stout but short gland-tipped hairs or bristles intervening; leaves nearly all trifoliolate, glaucescent, nearly glabrous, faintly pustulate above; leaflets notably dissimilar, the terminal much the largest and cuneate-obovate, the small laterals not cuneate but obliquely oval, all deeply crenate almost all around, the crenatures broader than high and themselves glandular-dentate; calyx closely villous-hirtellous, also armed with a few stout prickles.

Known only as collected in the Guadalupe Mountains, Texas, by Mr. Vernon Bailey, 15 Aug. 1901, the specimens in flower.

Old twigs of this rose show a roughness made up of short stout points, quite as in *R. stellata*, and the whole secret of the villous appearance of its pubescence is this, that the trichomes are developed here on only the lower or earthward base of the short prickles, and these are so crowded that the hairs, somewhat elongated, overlap.

I append characters of another new rose from the far Northwest.

ROSA ALCEA. Dwarf and apparently compact, the branches, and especially the flowering twigs copiously spinescent, the spines all rather slender, straight, ascending, or on older branches the larger and more persistent almost divaricately spreading, but none deflexed or even recurved: leaves small,

of about 7 or 9 leaflets, these obovate, obtuse, closely serrate, green and nearly or quite glabrous above, glaucescent and soft-pubescent beneath; stipules broad and short, the petiolar vein beneath with a few firm spines, their margins more or less glandular-ciliate: flowers solitary, the short petiole sparsely armed with gland-tipped spines; calyx-tube with not a few stout sharp spreading spines, but sepals quite densely glandular-prickly; corolla large, the petals obcordate.

Species known only in good flowering branches collected at Moose Jaw, Assiniboia, by Mr. William Spreadborough, in June, 1892, and communicated to me by Mr. J. M. Macoun. The Canad. Survey number is 10,624.

The type of my *R. Macounii* (Pitt. iv. 10) is also from Assiniboia, but is very different from this.

Some Allies of *Hibiscus Moscheutos*.

Taking Gray's Synoptical Flora for the authority upon our hydrophile kinds of *Hibiscus*, a northern botanist would believe without a doubt that the broad-leaved pink-flowered plant of New England marshes is to be *H. Moscheutos*, Linn. Nevertheless Linnaeus, who rarely distinguished species where they were not well marked, said that this northern plant should be called *H. palustris*. Its leaves are not only broad, but are lobed, and this with some suggestion of the outline of maple leaves. They say that the flowers of this, commonly of a pinkish or light rose-color, are sometimes white. But let the New England plant lover, taught that his northern plant is *H. Moscheutos*, come southward in summer time to the marshes of Chesapeake Bay and its tributaries, and he will be apt to ask what this hibiscus is that has always large cream-colored corollas, and with long narrow lanceolate and wholly uncut foliage; for he will not believe, unless his faith in great books is immovable, that this and the other are the same.

The northern plant is *H. palustris*. Only the great yellowish-

white southern one is *H. Moscheutos*, and it is improbable that any man, either botanist or botanophile, knowing both, will doubt their distinctness. Indeed, one of the most capable of northern botanists, though of an earlier generation, namely Bigelow, knew nothing of any other native hibiscus in Massachusetts than *H. palustris*. A living botanist of the North, and one well travelled, once asked me what this great cream-colored narrow-leaved plant of these southern marshes could be; so confident had he been that the maple-leaved red-flowered one of the North had been authoritatively determined by great men to be what they had called it; and he seemed to think that our plant of these regions must be nondescript.

I distinguish readily between *H. palustris* of brackish marshes northeastward, and an ally which it has on swamps bordering the Great Lakes far inland. But the center of distribution for these fine malvaceous plants seems to be much further southward; and a few species of them not heretofore defined are now described.

HIBISCUS OPULIFOLIUS. Stamens, petioles and peduncles pale, but with bloom rather than with pubescence, the sub-stellate hairs being sparse: leaves 4 or 5 inches wide and scarcely longer, angulate lobed as in some maples and quite as in *Viburnum Opulus*, the lateral lobes at about midway of the blades and not prominent, the whole margin very regularly crenate-sub serrate, upper face green, glabrous and remarkably whitish-veiny, lower face whitened, but not alone with pubescence, this being rather sparse: flowers solitary in the axils, on peduncles 3 inches long and twice the length of the petioles, from which they are perfectly distinct: bracts of the involucre long and triangular-subulate, of more than two-thirds the length of the calyx, this cleft to the middle, the lobes short-oval, cuspidate: flowers tinged with rose, not large, the petals about 3 inches long.

Ontario, on Point Pelee, Lake Erie, 23 July, 1892, collected by Mr. John Macoun. Very well marked by its broad maple-like foliage dark-green above and whitish veiny, as well as by

its whitish glaucous stems ; the whiteness being due to bloom, not pubescence.

In early August, 1901, Mr. Macoun again collected the plant at Leamington, not far from Point Pelee. There is also in U. S. Herb. a specimen by Alfred Ricksecker from the shore of Lake Erie in Ohio, at Vermillion, a point quite opposite to Mr. Macoun's Ontario localities ; so that the species is likely to prove the common, if not the only hibiscus of the Lake Erie marshes. It differs from *H. palustris* not only in respect to its comparative lack of pubescence. Its leaves are lobed below the middle, not above it.

HIBISCUS PLATANOIDES. Akin to *H. lasiocarpus*, but stem glabrous, leaves short-petioled and the blades not cordate but nearly as broad as long, not even acute, but lightly and unevenly angled after the manner of those of *Platanus occidentalis* and dentate like them, not serrate, about 3 inches long, often quite as broad, whitened and sparsely stellate beneath, dark-green and strigose-hairy above but not velvety : peduncles few and umbellate at summit of the stem only ; bracts of involucre equalling the calyx, this cleft to the middle and the lobes triangular-lanceolate, very acute : corolla cream-color, 4 inches long, the petals not cuspidate.

South Pass, Louisiana, 20 June, 1900, collected by S. M. Tracy. The foliage as much like that of *Platanus occidentalis* in outline as can well be imagined. Mr. Tracy informs me that he could never identify it by any description extant.

HIBISCUS PINETORUM. Stems smooth and glabrous below, the upper part, together with petioles and peduncles dotted with scattered stellate or tufted short hairs : leaves long-petioled, the blade 3 to 5 inches long, ovate-lanceolate, with a pair of subhastate lobes at about the middle, above these acuminate and lightly subserrate-toothed, upper face dark-green and glabrous, lower whitened and closely pubescent, but on the veins beset with only scattered substellate hairs :

flowers in the axils only, the petiole and peduncle wholly distinct: bracts of involucre very short and somewhat spreading, not equalling the undivided part of the calyx, the lobes of this ovate, acuminate, distinctly parallel-veined: corolla $3\frac{1}{2}$ inches long, cream-color, the cusps of the petals very prominent.

Wet pine barrens in the interior of Georgia, in Dodge Co., between the railway stations of Copeland and Rhine, R. M. Harper, 6 July, 1903, n. 1874 of his collection as in U. S. Herb.

HIBISCUS LANGLOISII. Stems glabrous below, pubescent in the middle: leaves equally soft-tomentose on both faces, dark above, lighter but neither whitish nor even hoary beneath, blades broadly subcordate-ovate, 3 or 4 inches long and quite as wide below the middle, abruptly acute, serrate-dentate, on rather spreading petioles 3 or 4 inches long: flowers on peduncles distinct from the petioles and 2 or 3 inches long; bracts of the involucre linear-acuminate, very long, quite surpassing the calyx, this cleft scarcely to the middle, the ovate acute lobes ending in a linear apiculation: corolla 4 or 5 inches long, apparently cream-color.

Banks of the Mississippi in extreme southern Louisiana, June, 1882, Rev. A. B. Langlois; distributed for *H. Moscheutos*, to which it is not allied so much as to the rather enigmatic *H. lasiocarpus*, Cav., although a number of quite different and distinct plants of our southern States have too irresponsibly been concluded under that uncertain species, about the habitat of which nothing seems to have been known.

Two New Lupines.

LUPINUS APRICUS. Annual, 1 to $1\frac{1}{2}$ feet high, with few to several almost upright firm branches from near the base, these and the long ascending petioles rather shortly and

sparsely pilose: leaflets about 7, oblong-linear, acute, about 1 inch long, thin, sparsely appressed-pubescent: racemes subsessile, 2 to $3\frac{1}{2}$ inches long in full flower, of about 4 or 5 verticils, these rarely indistinct: broad upper lip of calyx cleft deeply, the lower entire, the whole exterior appressed-villous but not densely so; corolla purple, broader than long, the breadth about $\frac{2}{3}$ inch; keel naked: pod 1 inch long, appressed-villous, 6-seeded; seeds not strongly compressed, obliquely round-oval, grayish with a few markings and many small dots.

A common species of middle California westward. I came to know it as undescribed the year before my field work in California came to an end, now fifteen years since. When it was sent me, in fine specimens, by Mr. Carl F. Baker, in 1902, I assigned it the name now given above. Mr. Baker distributed it, as his number 610. A fine array of other specimens is at this moment before me, gathered later, in 1908, from the original locality, by Mr. Charles Piper Smith, now of Logan, Utah.

LUPINUS LATISSIMUS. Perennial, subcaulescent, with stout upright scapiform peduncles more than a foot high and surpassing the leaves, the plant pale with a somewhat velvety tomentum, except as to leaflets, these rather silky: leaflets rather constantly 5 only, very unequal, but all of remarkable breadth, the largest 2 inches long, more than $\frac{3}{4}$ inch broad above the middle, in outline somewhat obovate-elliptic, cuspidate-mucronate: raceme of very large flowers 5 to 7 inches long, dense, subverticillate: upper lip of calyx very long and acute but deeply cleft, the lower little longer, entire: corolla about $\frac{3}{4}$ inch wide, purple, keel short and broad, scarcely falcate, strongly ciliate below the naked apex: young pods short, oblong, densely silky-tomentose.

Collected at the Tassajara Hot Springs, Monterey Co., California, in June, 1901, by A. D. E. Elmer. A lupine of unusual aspect and mode of growth, the leaflets few and remarkably broad.

Some Western Species of Arabis.

Every year of the last fifteen, by the arrival at my study table of several specimens of *Arabis* from the farther West, I have felt the desirability of a general summing up of the membership of this group of crucifers, in the form of a monograph; but the time for undertaking such a task still recedes. Meanwhile a new invoice of these plants having lately come in to me from northern California under promise on my part that I would try to identify and report on them, I have been impelled to make a renewed study of other material of this kind lying in the National Herbarium hitherto unexamined.

For my own convenience and that of others I shall first present a short bibliography of my own contributions to the knowledge of the genus made within the last ten or a dozen years.

A. rhodantha, Fendleri, Pitt. iii, 155. *A. drepanoloba*, l. c. 306. *A. Albertina*, *arida*, *campyloloba*, *connexa*, *consanguinea*, *duriuscula*, *eremophila*, *formosa*, *gracilentata*, *gracilipes*, *maxima*, *oxylobula*, *oxyphylla*, *platyloba*, *recondita*, *rectissima*, *tenuis*, Pitt, iv. 189-198.

A. Austinae, Covillei, *epilobioides*, *inamoena*, *Leibergii*, *Missouriensis*, *oligantha*, *peramoena*, *pratincola*, *trichopoda*, Feddes' Repertorium, v. 242-244.

Out of a considerable number of new species here characterized, only the first is at all closely akin to true *Arabis*, the best representative of which in the farther West is *A. Blytharophylla* of the coast of California. That and its allies are marked by a truly green herbage which is of thin texture, with no other than a sparse and bristly pubescence. The petals of these, though purple in color, have a broad spreading limb, and the pods are always straight and erect.

ARABIS ACULEOLATA. More or less tufted montane perennial, with subscapiform slender few-flowered stems 6 to 10

inches high and floriferous almost subumbellately at summit only: lowest leaves in a small rosulate tuft, less than an inch long, obovate to oblanceolate, entire or with a coarse tooth or two, the upper face sparsely, the margins more closely, beset with white straight hispid hairs, the bases of the flowering stems similarly invested and quite densely so; cauline leaves few and sparse, oval or oblong, sessile, hispidulous-hairy in a less degree than the basal: raceme few-flowered and the flowers all near the summit; calyx purple, the sepals with a few bristles at tip; petals rich purple, 4 lines long; young siliques erect, rather short, on slender pedicels.

Mountains of southwestern Oregon, and apparently rather local; first collected by Howell, near Waldo, in 1884, and distributed for *A. furcata*; then gathered twenty years later (in 1904) by C. V. Piper in the same general region.

The second species here presented, though the specimens are past flowering, is readily seen to be of that well-marked broad-petalled group of which *A. pulchra* of Jones is typical. All of them belong to the desert regions of the Great Basin.

ARABIS NARDINA. Perennial, younger plants simple, older ones tufted, 4 to 7 inches high, the stem and all foliage very hoary with a minute and dense stellate tomentum; basal leaves forming a tuft, but upright rather than rosulate, oblanceolate, obtuse, entire, $\frac{1}{2}$ to 1 inch long, the cauline oblong-linear, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, sessile, obscurely auricled: pedicels of the short raceme, and also the calyx stellate-hoary like the foliage: corolla unknown: pods few, straight, erect or ascending on slender pedicels, about 2 inches long, 2 lines wide, abruptly acutish, glabrous, marked with a strong median nerve; seeds in two rows, suborbicular, rather broadly winged all around.

This is known only as collected in the Panamint Mountains, on the Death Valley Expedition by Coville and Funston, 20 May, 1891; their n. 776, and not listed in the Report. The label once bore the name, in Sereno Watson's handwriting, of *Arabis platysperma*, but the specific name was erased, evidently

by Mr. Watson himself, and no other written in place of it. The plant is certainly far removed from the group of *A. platysperma*, and no one familiar with *A. pulchra* and with the diverse aspect of things made congeneric with it, could fail to see that, despite its erect pods, this is of that group.

Though the Californian *A. Breweri* and its allies are greatly at variance with *T. pulchra* in habit, their rather showy and somewhat spreading purple petals indicate for them a place not so far removed. Of this alliance are the three species next following.

ARABIS KENNEDYI. Subalpine low tufted slender perennial 3 to 5 inches high, notably leafy up to the inflorescence after the manner of *A. Breweri*, but more slender, the herbage delicate, scarcely canescent: leaves of sterile basal shoots 1 inch long, the obovate to oval blades narrowed to slender petioles, both faces stellate, but loosely so; cauline leaves numerous, large, overlapping each other, spatulate-obovate to oblong-ovate and oval, rarely with a tooth or two, sessile, shortly auricled: rachis of the raceme glabrous, as also the pedicels and pods, but calyx as much stellate as the foliage: corolla small, deep purple: pods small and slender, 1 to 1½ inches long, very narrow, obtuse, straight or slightly curved, horizontally extended or slightly deflexed: seeds uniserial, flat, winged.

Mountains of Washoe Co., Nevada, at 8,000 feet, along Galena Creek, P. B. Kennedy, 1 Aug., 1906.

ARABIS ROSTELLATA. Low and multicapitous after the manner of *A. Breweri*, but the stout lignescent caudex more developed, commonly 2 inches above ground, the flowering stems with their fruiting racemes 3 to 5 inches; basal leaves smaller, mostly ½ to ¾ inch long, spatulate-obovate, regularly and evenly crenate-toothed, stellate superficially, the petiolar part more or less bristly-ciliate; cauline leaves ovate and oblong-ovate or oval, obtuse sessile and clasping: raceme few-flowered; flowers not small, deep purple, the thin sepals purple-

tinged and with a few short substellate hairs; pods $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long, ascending on ascending pedicels, slightly curved, a line wide as to the main portion, but distinctly narrower toward the base, and at apex rostrate-acuminate: seeds rather few, uniserial, the mature not seen.

Mt. Grayback, southern Oregon, 15 June, 1904, C. V. Piper; specimens in U. S. Herb., under the collector's n. 6156. A genuine ally of *A. Breweri*, but most distinct as to both foliage and pods.

ARABIS POLYTRICHA. Perennial, a foot high, with one or more upright stems from the tuft of basal leaves, the whole plant pale and glaucous, but most parts also rather roughly pubescent: basal leaves oblanceolate, entire, an inch long, more or less canescent with a pubescence of two kinds, one set of hairs (the principal one) 3-parted to below the middle, others (chiefly marginal) longer, simple and setiform; cauline leaves many, an inch long or more, sessile, almost linear, pubescent on both faces like the lower, shortly auricled; short pedicels of the long pods only bristly-hairy, some of the bristles forked, but not deeply: pods nearly 4 inches long, barely a line wide, strongly falcate-recurved, glabrous, glaucous, closely lineolate, all immature but small seeds in one row.

Hills east of Yreka, in extreme northern California, associated with the somewhat rare *Mirabilis Greenei*, according to the collector, Mr. George D. Butler, who obtained the specimens 8 May, 1909. The flowers are not known, but a calyx or two that have remained as unexpanded buds show sepals well beset with the forked hairs. Habitally this approaches my *A. campylobola*, but that and *A. Breweri* are in truth nearly related.

A group of low, often matted and many-stemmed species first came into view when Sereno Watson published his *A. Lemmoni*. Besides their low stature and multicapitous habit, they are marked by uncommonly broad leaves, and are whitish, with an unusually dense indument of stellate hairs, this less dense

in certain species which verge toward the *A. platysperma* group. Their flowers are apt to be larger than in other and taller species, and are perhaps always of a deep red-purple, not so very unlike those of the *A. Breweri* group. Their pods are many, and are usually almost horizontally spreading and secund; in this particular most unlike *A. Breweri*.

ARABIS OREOCALLIS. Low subalpine multicapitous perennial, the partly hypogeous branches of the caudex short, stout, covered below the living foliage by the imbricated persistent bases of the leaves of former seasons, the whole plant 4 or 5 inches high and grayish: basal leaves $\frac{1}{2}$ inch long or more, the obovate acute entire blade tapering abruptly to a broad petiole of its own length, both faces minutely and not very densely stellate; cauline leaves uncommonly many and well developed, approximate, large for the plant, spatulate-obovate to oval and narrower, sessile, obscurely auricled, greener than the basal, only sparingly stellate: raceme in flower short and corymbiform; sepals purplish-green and with few or no stellate hairs, always with a narrow purple-scarious margin; petals broad, obtuse, of a rich purple: pods (immature) few, short, narrow.

Collected in the Selkirk and Rocky Mountains, B. C., at 7,000 feet, by C. H. Shaw, July, 1904.

ARABIS BRACTEOLATA. Multicapitous dwarf 3 or 4 inches high, the basal leaves in small rosettes, with distinctions of obovate or oval blade and broad petiole not strongly marked, the leaf as a whole only $\frac{1}{4}$ to $\frac{1}{2}$ inch long, densely and canescently stellate: flowering stems slender, their leaves sessile and in the form of ovate-sagittate bracts less than $\frac{1}{4}$ inch long, glabrous, glaucous: flowers unknown: pods only 2 to 4, about 1 inch long, a line wide, obtuse, slightly arcuate and spreading, the valves thin, nerveless: seeds in 1 row, rather thick, short-oval, not winged, though with traces of a narrow scarious margin.

Collected at several stations in northwestern Wyoming, by J. N. Rose, late in August, 1893; the type his n. 399^a.

The rosettes of basal leaves, all so very small, resemble some sedums and saxifrages, while those of the stem recall the cordate bracts of certain streptanthoids.

ARABIS SEMISEPULTA. Perennial, low, the whole when in fruit only 3 or 4 inches high; subterranean parts consisting of a tap root and hypogeous branches, these each ending in a tuft of leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, firm, whitish with a dense stellate tomentum, the blade ovate, tapering to a long wide petiolar base; cauline leaves sessile, without auricles, these and the stem strongly stellate-pubescent: flowers not known: fruiting racemes short, of 6 to 10 narrow obtuse almost horizontally spreading but curved pods about $1\frac{1}{4}$ inches long, not tapering to either end: seeds round-oval, wingless and marginless.

Mt. Thielsen, Cascade Range, Oregon, near the summit; in loose lava gravel, collected by Coville and Applegate, 6 Aug., 1897; their n. 454 as in U. S. Herb.

ARABIS HORIZONTALIS. Perennial, the stout and deep tap root supporting at summit a few short subligneous branches, with tufts of leaves and several ascending flowering branches, the whole 6 to 10 inches high: basal leaves of very firm texture, an inch long, oblanceolate, acute, entire, finely stellate and hoary; flowering stems floriferous from near the base, but the cauline leaves not few, closely approximate, $\frac{3}{4}$ inch long, oblong-oval, sessile, shortly auricled, greener than the basal and only sparsely stellate: flowers small, only 2 lines long; petals purple, twice the length of the oval glabrous purple-margined sepals: pods straight, rather short, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, quite broad in the middle portion but tapering gradually to both ends, therefore lance-linear; horizontally spreading on short rigid pedicels: body of seed round-oval, but the seed as a whole orbicular by virtue of the broad encircling wing.

Crater Lake, Klamath Co., Oregon, 1 Aug., 1897, Coville and Applegate; their n. 334 as in U. S. Herb.

ARABIS POLYCLADA. Rather loosely branching caudex subligneous, but not rigid, 3 or 4 inches high, its branches bearing short leafy shoots and among them scapiform flowering stems 3 to 5 inches high; leaves of sterile shoots $\frac{3}{4}$ inch long, the small obovate obtuse blades shorter than the rather wide petiolar part into which they are rather abruptly narrowed, the whole whitish with a fine and dense stellate tomentum: flowering stem and its few leaves perfectly glabrous and glaucous, the leaves oblong, $\frac{1}{2}$ inch long or less, sessile, not auricled: flowers unknown: pods about an inch long, a line wide, neither obtuse nor acute, straight or very slightly bent, horizontally and secundly spreading on very short pedicels: seeds in one row, suborbicular, winged narrowly, but all around.

Farewell Gap, southern California, C. A. Purpus, 1897; the collector's n. 5229; also well represented in Coville and Funston's n. 1747 of 1891; from the same region, *i. e.*, mountains of Tulare County.

Six species next subjoined are all akin to that group with the smallest of flowers and the broadest of pods and seeds, of which the type is *A. platysperma*.

ARABIS ARMERIFOLIA. Low perennial, multicapitous above a tap root, forming a tuft of short subligneous branches half underground, each crowned with small leaves and, in its season, a slender subscapiform flowering stem or two, the whole 4 to 6 inches high above ground: leaves firm, not glaucous, erect, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, oblanceolate, obtuse, entire, glabrous throughout; the few cauline linear-oblong, sessile, shortly auricled, spreading away from the stem: flowers not seen: pods 2 to 4 on each scape, erect, straight, about $1\frac{1}{4}$ inches long, little more than 1 line wide, abruptly acute, valves thinnish for the group: seeds not very definitely biserial, small, suborbicular, encircled by a very broad wing.

On a pumice stone slope in Crater Lake Park, southern Oregon, F. V. Coville, 14 Sept., 1902; type in U. S. Herb.

ARABIS MULTICEPS. Perennial, with deep tap root bearing above ground a much and fastigiately branched caudex, its branches stout, naked below, leafy at summit, the whole caudex $2\frac{1}{2}$ inches high, $3\frac{1}{2}$ inches in breadth: leaves very firm, entire, glaucescent, the oblanceolate blade passing gradually to a stout petiole of its own length, the whole without trace of pubescence of any kind: flower stems scapiform, 4 to 6 inches high, with an oblong sessile bract or two near the base, bearing above the middle 4 to 7 straight linear abruptly acute pods $1\frac{1}{2}$ inches long, 1 line wide: seeds in one row, rather remote, winged.

Mt. Thielson, Cascade Range, Oregon, 6 Aug., 1897, Coville and Applegate; their n. 435 as in U. S. Herb.

ARABIS DENSE. Low and compact, above the single tap root formed into a thick leafy tuft 2 inches high, 3 in breadth, the partly hypogeous and denudate branches thick, scaly with imbricated bases of leaves of former seasons; the crowded and upright leaves oblanceolate, entire, less than 1 inch long, firm, green, glabrous: flowering stems barely 1 inch high: flowers unknown: pods only 1 or 2, erect, straight, $1\frac{1}{2}$ inches long, little more than a line wide, acute, glabrous: seeds in 1 row, orbicular, broadly winged.

On Eagle Cap, at 9,000 feet, in the Imnaha National Forest, Oregon, collected by A. W. Sampson and G. A. Pearson, 14 Sept., 1907. A low and almost pulvinately dense ally of *A. platysperma*, the pods extremely narrow for this group, but gradually pointed as in all this alliance.

ARABIS DIANTHIFOLIA. Perennial, woody at base, the usually solitary stems of the season 4 to 10 inches high: leaves few, the basal and cauline not dissimilar, all small for the plant, and upright, $\frac{3}{4}$ inch long and less, of rather hard texture, oblong-lanceolate, acute, entire, to the unaided eye glabrous, glaucescent, under a lens seen to be minutely and rather closely ciliolate with short deeply forked hairs, also beset superficially with small sessile pellucid glands: pods closely deflexed, $1\frac{1}{4}$ to 2 inches long, 2 lines wide, acute, the valves

strongly, even almost carinately, 1-nerved : seeds in two rows, large, thin and flat, broadly winged on one or two margins, sometimes all around.

Crater Lake, National Park, southern Oregon, 14 Sept., 1902, F. V. Coville, n. 1511 as in U. S. Herb. In general appearance at first and superficial glance resembling *A. suffrutescens*, but examination revealing an array of very pronounced characters.

ARABIS ARBUSCULA. Plant a foot high, the slender flowering stems supported by a much branched woody and leafy caudex 4 or 5 inches high : leaves of the basal woody branches $\frac{1}{4}$ to $\frac{3}{4}$ inch long, oblanceolate, acute, entire, canescent with sessile stellate hairs, some longer and merely forked ones intermixed, the few cauline oblong-linear, very acute, but at base abruptly widened and auricled, all nearly or quite glabrous : flowers unknown, but pods only 1 to 4 at summit of axis, these nearly 3 inches long, scarcely a line wide, rostrate-acuminate, slightly falcate : seeds in one row, the mature not seen.

Eight Dollar Mountain, in Josephine Co., southern Oregon, C. V. Piper, 13 June, 1904 ; the collector's n. 5065 as in U. S. Herb. Species most difficult to place, the strongly developed woody caudex pointing to the group of *A. platysperma*, while the foliage is rather that of the *A. retrofracta* alliance, the pods as far from one as from the other.

ARABIS PAUPERCULA. Low subalpine perennial with several more or less buried branches 1 to 2 inches high : leaves of sterile shoots $\frac{1}{2}$ inch long or more, of elliptic-lanceolate acute blade and slender petiole of about equal length, glaucous, sparsely stellate-pubescent : flowering stems scapiform, only 1 or 2 inches high exclusive of the pods, their 1 or 2 leaves sessile but not auricled, obscurely stellate : flowers unknown : pods very few, $1\frac{1}{2}$ to 2 inches long, a line wide, linear, straight, acute, strictly erect, midvein of valves not prominent : seeds in one row, oval, ovally winged, *i. e.*, the wing obsolete at base of the seed, narrow at the sides, very wide at upper end.

Farewell Gap, at 10,600 feet in the mountains of southern California, C. A. Purpus, 1897, his n. 5229½. It has the habit of the *A. platysperma* group, but with rather too much stellate pubescence, and the pods also too narrow.

Formerly every simple-stemmed western *Arabis* wearing the aspect of a rather tall biennial, and having erect small petals and long narrow straight pods, was named *A. Holboellii*. A number of segregates from that medley have long since been offered, and accepted, and others are here indicated.

ARABIS NEMOPHILA. Apparently biennial, the solitary stem erect, simple, more than a foot high, firm but not stout, unusually leafy up to the very short raceme; herbage green, with barely a glaucescent tinge: basal leaves 1 to 1½ inches long, of oblong-lanceolate entire or remotely toothed limb and rather narrow petiole, all thinly and minutely stellate but not in the least hoary; cauline leaves ¾ to 1¼ inches long, oblong, acute, sagittate-auricled, glabrous: flowers few, small, white; sepals green, with few stellate hairs at summit; petals twice as long, white or pinkish: pods straight, extremely narrow, 3 inches long, perfectly erect above short ascending pedicels: seeds in one row, immature.

Sequoia National Forest, Calif., July, 1908, Dr. Anstruther Davidson; specimens on sheet 612,692, U. S. Herb.

ARABIS INTERPOSITA. Perennial, with stem 1½ to 2 feet high, rigidly erect from amid several suberect leafy offsets; all basal leaves 1 to 1½ inches long, the narrowly ellipsoidal entire blades and narrowly winged petioles of about equal length, both faces substellate-canescens; cauline leaves oblong, sessile, sagittate-auriculate, these and the stem less stellate: flowers not seen: pods narrowly linear, straight, erect, 2 inches long; hardly a line wide; seeds thick, oval, widely winged at the upper end, narrowly so up and down the sides.

A good fruiting specimen on sheet n. 444,616 of U. S. Herb., mounted between two specimens of *A. Drummondii*, all as collected by W. C. Cusick, in 1902, somewhere in south-

ern Oregon or northern California, the exact locality not indicated.

In foliage and pubescence much like my *A. campyloblobo*, but as to fruit and seed widely different.

ARABIS HASTATULA. Perennial, a foot high, the several stems slender, decumbent at base around a leafy central axis: axial leaves 1 to 1½ inches long, very narrow, the lanceolate acute blades not as long as the petioles, these dilated at base and there with or without a long simple bristly hair or two, otherwise perfectly glabrous, light-green and glaucous; cauline leaves sessile by a hastately-auricled base, oblong, acute: raceme few-flowered, flowers nodding on short pedicels: calyx dark-purple, of less than half the length of the purple petals: pods (immature) filiform, straight, abruptly deflexed.

Collected at an altitude of 6,000 feet in mountains of the Imnaha National Forest, Oregon, 25 June, 1907, by A. W. Sampson and Gustaf A. Pearson. Evidently allied to *A. retrofracta*, but glabrous, or with none but simple hairs and these only marginal.

ARABIS SUBSERRATA. Stoutish, biennial or perennial a foot high or more, usually without branches: earliest leaves not seen, the lower cauline closely approximate, oblanceolate, short-petiolate, acute, often saliently serrate-toothed, 1½ inches long, of a pale glaucous green, also thinly and minutely stellate, those at midway of the stem and upward oblong, acute, sessile by a sagittate base, 1 inch long, sparsely stellate beneath, glabrous and glaucous above; stem, also rachis of raceme, glabrous, but pedicels and calyx with many mostly ternate short hairs; corolla nearly ½ inch long, rich purple: pods 3½ inches long, a line wide, glabrous, glaucous, usually slightly curved, spreading: seeds in one row, suborbicular, narrowly winged all around.

Western Washington, at Ellensburg and elsewhere in the same general region, collected in April and May, 1899, by Kirk Whited.

ARABIS POLYANTHA. Stout upright perennial a foot high or more, the leaves and stem hoary with a short and dense substellate tomentum; basal leaves oblanceolate, more or less dentate, 1 to 1½ inches long; cauline leaves rather crowded, all linear or lance-linear, revolute, sessile by an auricled base, appearing (by virtue of strongly revolute margin upwards) as if acuminate: flowers very numerous, forming an uncommonly thick and dense raceme, the rachis only sparsely stellate, but pedicels tomentulose, as are also the pale-green sepals and even the forming pods; petals nearly an inch long, apparently white, or only pinkish.

A. Rock Island, eastern Washington, 27 April, 1879, Kirk Whited; his n. 1043 as in U. S. Herb.

The specimens are scarcely past full flowering; the pedicels are deflexed, and so doubtless are the pods, and these probably straight and narrow.

ARABIS SETIGERA. Biennial or perennial, the stems mostly solitary, rigidly erect, a foot high, glabrous; rosulate basal leaves ¾ inch long, elliptic-lanceolate, scarcely petiolate, glaucous, superficially glabrous but the whole margin closely bristly-ciliolate, the bristles of the basal part of the leaf apt to be simple, the others usually forked but not deeply so; cauline leaves few, short, appressed to the stem, sessile, scarcely auricled, ciliolate like the basal: flowers not seen: fruiting stems racemose from below the middle; pods straight, closely reflexed on very short pedicels, 2 inches long, more than a line wide, acutish: seeds uniserial, narrowly winged at the sides, broadly so at the summit.

Corral Springs, Klamath Co., eastern Oregon, collected by J. B. Leiberg 2 Aug., 1894; his n. 610 as to label in U. S. Herb., on sheet 404,822.

ARABIS DACOTICA. Biennial, perhaps more enduring, a foot high and simple, from a single tuft of elliptic-lanceolate rather slenderly petioled basal leaves, these an inch long or more, of a pale bluish green, scarcely hoary, yet clothed on both faces

with subsessile trifid hairs, but the hairs of the petiole, and of lower part of stem long, simple, and setaceous, those of the stem deflexed: cauline leaves, oblong, abruptly acute, auricled at base, the lower of them with some simple hairs, the upper glabrous: rachis of the raceme and also the pedicels glabrous: sepals green, beset with a few short hairs; petals pale purple, surpassing the sepals by less than half their length: pods 3 inches long, a line wide, obtusish, nearly straight, on slightly deflexed pedicels; the valves traversed by a distinct median nerve: seeds in 2 rows, longer than broad but of singularly varying outline, also often winged on but one side, as often on two, the wings always rather narrow.

Fort Meade, South Dakota, 28 May, 1887, W. H. Forwood, the specimens on U. S. Herb. sheet 317,556.

The few species concluding this paper seem in no cases referable to any one of the groups above recognized.

ARABIS PENDULINA. Biennial or perennial, a foot high, with several suberect stems from around a tuft of basal leaves, these an inch long, oblanceolate, the blade glabrous superficially, the margins of it ciliate with short forked hairs, the broad petiole as much ciliate, but with stouter and simple setaceous hairs, those next the base of the stem quite strongly hirsute throughout; cauline leaves many, short, ovate or ovate-oblong, sessile, auriculate, erect, glabrous or the auricles above bristly-hairy: flowers small, purple: fruiting raceme long and loose; pods $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, obtuse, slightly curved, pendulous on the long rather slender pedicels: seeds distinctly biserial, oval, wingless, marginless.

In woods of the Charleston Mountains, southern Nevada, at 7,000 to 8,000 feet, C. A. Purpus, 1898; his n. 6104 as in U. S. Herb.

ARABIS SETULOSA. Perennial, the somewhat arcuately ascending and rather slender stems less than a foot high from among a few tufts of rosulate basal leaves, these $\frac{3}{4}$ inch long,

spatulate-oblongate, entire, loosely bristly-ciliate all around the margin, the bristles simple, upper face of leaves glabrate in age but when young setulose-hairy; cauline leaves oblong, sessile, obscurely auricled or not at all so: flowers not known: racemes in fruit rather short; pods somewhat arcuately recurved, but on horizontally spreading pedicels of nearly $\frac{1}{2}$ inch, their own length $1\frac{1}{2}$ inches, their width rather more than a line, obtuse at apex, at base gradually narrowed; seeds in 1 row at the narrow base, thence upward distinctly biserial, all wholly wingless and the margin obtuse.

At 6,000 feet in the mountains of Utah near Marysvale, M. E. Jones, 31 May, 1894. A graceful species in fruit; the pubescence strange for this group of species with pendulous pods.

ARABIS ACUTINA. Stems several, slender, rigidly erect, less than a foot high from a short hard woody caudex of few branches and with a few small leaves, these elliptic-lanceolate, less than 1 inch long, acute, pale and glaucescent, also roughish with a sparse stellate pubescence, the bases of the flowering stems similarly roughened; cauline leaves oblong, $\frac{1}{2}$ inch long or more, sessile, auricled, mostly quite glabrous: flowers small, pale-purple, the sepals thin, glabrous: pods about 2 inches long and a line wide, straight, ascending on rather long pedicels, very acute, the valves smooth without so much as a manifest midnerve: seeds in 1 row, round-oval, narrowly winged.

Mt. Thielson of the Cascade Range, Oregon, Coville and Applegate, 6 Aug., 1897; their n. 434 as in U. S. Herb; apparently the same also from the Three Sisters, Oregon, by M. W. Gorman, 19 July, 1903; his n. 1692.

ARABIS TENUICULA. Perennial, the much branched sub-ligneous caudex only 1 to 2 inches high, this also slender like all other parts of the plant, the almost filiform upright flowering stems only 3 to 5 inches high: leaves of basal shoots from $\frac{1}{4}$ inch long in the earliest to $\frac{3}{4}$ inch in the later, in outline

from obovate and petiolate to oblanceolate, all acutish, some quite sharply few-toothed, others entire, all very glaucous, stellate-hairy superficially, and with some long bristly but forked hairs on the basal and petiolar parts; cauline leaves $\frac{1}{2}$ inch long or more, linear, sessile, strongly auricled, either obscurely or quite saliently 3-toothed at apex, glabrous, glaucous: raceme very few-flowered; flowers small, light-purple: pods $1\frac{1}{2}$ to $1\frac{3}{4}$ inches long, little more than $\frac{1}{2}$ line wide, slightly acuminate, straight, erect or ascending on filiform pedicels $\frac{1}{2}$ inch long: seeds uniserial, very small, oval, winged only across the summit.

Collected somewhere in either eastern or southern Oregon "in clefts of rocks," in May, 1883, by W. C. Cusick. The label in U. S. Herb. bears the collector's n. 1124. A cespitose species, with all the parts remarkably slender and delicate.

New Papilionaceae.

BAPTISIA OXYPHYLLA. Main stem not known, but branches glabrous, wiry, beset closely with sessile trifoliolate leaves subtended by spreading conspicuous and persistent stipules; leaflets $1\frac{1}{2}$ inches long, rhomboid, cuneately tapering from below the middle, very acute at apex and ending in an almost spinescent sharp mucro, glabrous and finely reticulate on both faces, but the margins obscurely pilose; stipules more than $\frac{1}{2}$ inch long, spinescently acuminate above an ovate-lanceolate body: raceme probably solitary, large as that of *B. leucophaea*, conspicuously bracted, the bracts lance-ovate: calyx-segments exceeding the tube, triangular-subulate, very acute, pilose-ciliate: immature pod oval, long-pointed, pubescent.

Remarkable ally of *B. leucophaea*, found on Pearl River, southeastern Louisiana, in October, 1901, by Mr. Reginald S. Cocks. The rhombic leaflets and large stipules are so rigid, and end so sharply, as to make the plant appear almost spines-

cent; also the stipules spread away almost divaricately from the stem, instead of being erect and appressed to the stem as in other stipulate species.

BAPTISIA SALIGNA. Allied to *B. leucophaea*, larger, not blackening in drying; only the stems with some rather scanty spreading soft pubescence; leaves glabrous except as to a sparse strigose pubescence along the midvein beneath; leaflets oblanceolate, obtuse or emarginate, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, of a deep glaucescent green and glabrous above, beneath distinctly glaucous: flowers in a solitary raceme, much smaller than those of *B. leucophaea*; calyx campanulate, deeply 5-toothed, the teeth acutish, notably woolly-margined: pods not known.

Known only as collected near Tallapoosa, Georgia, in April or May, 1900, by Mr. P. M. Way, the type in U. S. Herb., sheet 370,935. Well marked by its long large leaflets, recalling the leaves of certain blue-green-leaved willows; the whole plant so far from being invested by the conspicuous pubescence of *B. leucophaea* as to appear glabrous as to all but its only rather obscurely villous stem.

BAPTISIA NUCULIFERA. Plant evidently much branched, closely leafy, with solitary large flowers in the axils of upper leaves; stem and midvein of leaflets beset with appressed long hairs, but herbage appearing glabrous, and in drying blackened; stipules apparently wanting, certainly fugacious if ever present: leaflets cuneate-obovate, very obtuse, commonly emarginate, $2\frac{1}{2}$ inches long in large plants, in smaller half as large, dark above, glaucous beneath, finely reticulate especially beneath: fruiting pedicels stout, $\frac{1}{2}$ inch long, calyx in fruit $\frac{1}{4}$ inch long, cleft below the middle, the segments subulate, very acute: pod ligneous, orbicular, so little compressed as to be nearly globose, little more than $\frac{1}{2}$ inch long and broad, ferruginous-silky, its stipe about equalling the calyx.

Specimen in fruit only, collected at Ruston, Louisiana, July, 1899, by Reginald S. Cocks, the label indicating that it was

at first taken for *B. tinctoria*, of which it has somewhat the mode of flowering; though there is nothing else by which to connect it with that species. Its aspect is more that of a broad-leaved and axillary-flowered *B. lanceolata*.

LUPINUS CLEMENTINUS. Perennial (?), 2 feet high, with stems or basal branches decumbent, leafy throughout with small leaves and everywhere rather shortly and roughly hirsute with coarse hairs: leaflets about $\frac{3}{4}$ inch long, cuneate-oblong, very obtuse, thin, alike green on both faces: racemes short, subsessile, the flowers large, scattered: corolla $\frac{3}{8}$ inch long and as broad, deep purple; keel petal narrowly falciform, naked: half grown pods very densely hirsute-tomentose.

Island of San Clemente, California, June, 1903, collected by Mrs. Trask, who records it as occurring on only one particular part of the island. The plant is not known to a certainty as being a perennial, but there are marks on the specimen which seem to indicate it as being other than annual.

LUPINUS HYACINTHINUS. Tall perennial, the several stems upright or nearly so, leafy to the summit, there ending in a sessile short raceme of large purple flowers, these but indistinctly verticillate; herbage rather dull-green by a short stiffish but appressed pubescence, this longer and denser on the upper face of leaves: petioles short, about equalling the leaflets, these about 7, oblong-linear, very acute, nearly 2 inches long: pubescence of rachis, pedicels and calyx denser and less appressed, rather villous-hirtellous: lips of calyx subequal, both entire: corolla $\frac{3}{8}$ inch long, the banner shortest of the petals, keel longest, somewhat strongly falcate, naked.

San Jacinto Mountains, southern California, 22 July, 1897, H. M. Hall, distributed as his n. 712.

Miscellaneous Specific Types.—II.

GARRYA MOLLIS. Branches of the fourth and third seasons back dark-green or purplish and obscurely puberulent; all the younger quite hoary with a thin tomentum: earliest leaves of newest twigs round-obovate, very obtuse or even emarginate, 1 inch long, the later and more usual 2 inches long, exactly elliptical, acute at both ends, all quite plane, very pale with bloom, and further whitened on both faces by a thin but dense silky tomentum: bracts of young undeveloped aments triangular-ovate, cuspidately acute, equally white-tomentulose with the foliage: fruit unknown.

Collected by Mr. G. A. Pearson, at an altitude of 5000 feet in the San Francisco Mountains of northern Arizona, 8 August, 1909. The whiteness of this shrub, a characteristic which is due to a heavy bloom, intensified by an almost white soft-silkiness, will place it in marked contrast to all other known members of its genus.

CREPIS ACULEOLATA. Acaulescent, 2 feet high, with thin glabrous foliage, the scapiform flowering stem glabrous to above the middle: leaves 8 inches long, the broad blade and slender petiole of about equal length, blade oblong-oval, obtuse, lightly runcinate-dentate, the base ending very abruptly and subhastately: heads rather few and large in a corymbose terminal cyme, the branches of this, also the stem from some distance below it, the pedicels of the heads and the bracts of the involucre armed with dark-colored stout straight prickly-like hairs each with a small gland at summit; heads $\frac{1}{2}$ inch high, bracts 20 or more, linear, acuminate; flowers numerous.

Collected somewhere in Utah, presumably southward, in 1875, by Lester F. Ward; his n. 606 as in U. S. Herb.

CREPIS PALLENS. Acaulescent, $1\frac{1}{2}$ feet high, glabrous, pale green, glaucescent: leaves of the thinnest texture, 6 to 8 inches long, of a somewhat elongated obovate outline, rather

abruptly tapering below to the short petiole, at apex very obtuse, the margins either almost entire or with a few remote but salient straight teeth : branches of cymose panicle sparsely and shortly hispid with dark hairs : heads 20 or more, about $\frac{1}{3}$ inch high ; bracts of involucre oblong-linear, obtusish, glandular and pubescent on the back, at summit ending in a simple or else deeply forked (and appearing double) stout bristly hair.

Wet meadows in eastern Oregon, W. C. Cusick, 1884.

CREPIS OBTUSISSIMA. Acaulescent, $1\frac{1}{2}$ feet high, with thin deep-green foliage very ample, glabrous above, beneath sparsely somewhat papillose-scabrous ; leaves 4 to 8 inches long, with blades broadly oval to broadly oblanceolate, very obtuse, narrowed abruptly to short broad petioles, the sides conspicuously and coarsely runcinate-toothed : heads smallish, 15 to 20 in a strongly corymbose panicle ; involucre nearly cylindrical, $\frac{1}{3}$ inch high, their some 20 bracts broadly linear, scarcely acute, sparsely viscid-villous with short appressed white hairs.

Ellensburg, Washington, 20 June, 1897, Kirk Whited ; his n. 420 as in U. S. Herb.

LITHOPHRAGMA ANEMONOIDES. Stems stout for the genus and not tall, 5 to 10 inches high arising from a cluster of fibrous roots and many granular bulblets or tubers an inch below the surface of the ground ; both basal leaves and the one or two cauline remarkably ample, quinately divided and with broad rounded abruptly acutish segments : pubescence of leaves, both superficial and marginal, short, subsetaceous, the longer hairs somewhat flattened, the shorter gland-tipped, that of the stem minute, spreading, glandular-setulose : raceme very short, of few large flowers : calyx densely setose, its tube turbinate, cohering with the ovary, segments ovate-triangular, acute ; petals large, flabelliform, deeply trifold, pinkish.

On dry hills under bushes at Klamath Falls, southern Oregon, 28 April, 1907, E. I. Applegate. Allied to *L. parvi-*

flora, but plant of remarkably stout habit and ample foliage, a single large cauline leaf under the short raceme ; the whole recalling some anemone.

COLLOMIA SCABRA. Annual or biennial, stout, much branched, the branches with short broad leaves and terminal strongly involucrate clusters of sessile flowers, the whole herbage coarsely scabrous and glandular: proper leaves oblong-oval, 1 to 1½ inches long, acute or acutish, those forming the involucre ovate or oval, ½ to ¾ inch long and at base nearly as wide, obtuse: green-herbaceous lobes of the calyx triangular-ovate, obtuse, much shorter than the scarious tube, the whole calyx stiffly short-hirsute and glandular-viscid: corolla white, or whitish, ¾ inch long, slenderly funnelform above a filiform base.

Stony beds of dry gulches in the Rattlesnake Mountains of southeastern Washington, collected by J. S. Cotton, 16 July, 1902. Perhaps next of kin to *C. grandiflora*, remarkable for its short and almost blunt leaves and bracts, and for the roughness of the whole herbage.

PERSICARIA CYGNEA. Of the amphibious group, with upright stout closely leafy stems, either terrestrial, or if aquatic with no tendency to float: leaves broadly lanceolate, 5 to 8 inches long including the short stout rigid petioles, of a rather light green and a firm texture, both faces closely strigose with short stout closely appressed hairs, those of the midvein only stouter than the others: peduncle of the solitary spike glandular-hispid with stout red setae that are gland-tipped; spike cylindrical, 2 to 3½ inches long, the flowers of a deep almost blood-red; bractlets glandular-scabrous and with very few short almost subulate marginal appendages instead of hairs or bristles.

Collected in Klamath Co., Oregon, 14 May, 1895, by E. I. Applegate, with no remark about habitat except the name of Swan Lake; so that as to whether it inhabits meadows, or shores, or has the bases of its stout upright stems in water, we have no knowledge.

Studies of Thalictraceae.—II.

Soon after having determined that the tall white-stemmed meadow-rue of the Potomac Valley was really nameless, I had fixed upon the name *T. praealtum* for it, in my mind; yet, when coming later to the actual writing of its description, I seem to have allowed another word of the same import to usurp its place in the manuscript, and in the proof-reading it was as inadvertently allowed to stand. I now therefore write *THALICTRUM PRAEALTUM*, to take the place of the synonymous *T. altissimum* of page 58 preceding.

The present paper, it will be seen, has to do with small montane species of a very marked and peculiar group.

THALICTRUM CHEILANTHOIDES. Plants tufted, the scapes slender, 3 to 5 inches high, often with a leaf of 1 to 3 leaflets in the middle; basal leaves $\frac{1}{2}$ to 1 inch long on slender petioles of equal length; leaflets 9 to 11, of a vivid green above, glaucous beneath, in outline from subreniform to cuneate-obovate, rather deeply broadly and obtusely lobed, the lobes alone with abruptly elevated veins as to the green upper face, the whole of the glaucous lower face traversed by veins much less elevated: pedicels of the flowers almost filiform, long and ascending, though with a slight downward curvature: sepals oblong, obtuse, greenish: filaments linear-oblong, prominently and rather sharply mucronate, the mucro more or less distinctly curved and hook-like: fruit not seen.

Summit of Bald Peak not far from Santa Fe, New Mexico, at 12,000 feet, collected by Paul C. Standley, 11 July, 1908; his n. 4324 as in various herbaria. Distinct from all other western montane allies of *T. alpinum* by the green coloring of the upper face of its foliage, in which respect it evinces an affinity for real British *T. alpinum*; but it has not the shining green that is so characteristic of genuine *T. alpinum*, as well as of some of its American varieties or subspecies of our

northeastern seaboard, such as were indicated by me in the *Ottawa Naturalist* (1909), vol. xxiii, pp. 17-19.

THALICTRUM LEIOPHYLLUM. Plants very large, the scapes 6 to 9 inches high, the leaves erect, some of them 4 inches high including the long firm petiole; leaflets 9 to 17, glaucous on both faces, hardly less so above than beneath, also both faces devoid of notable venation and very smooth, of remarkably thin texture, even those remaining over from the preceding season hardly more than firm-membranaceous, nearly all broader than long and all lightly but evenly and distinctly crenate-lobed; pedicels almost filiform yet rather wiry, wholly curved and gradually so bearing the fruits at a distance from the rachis, or occasionally almost pendulous: mature carpels 1 to 4, short and thickish, not strongly oblique at summit, also rather lightly ribbed.

Denizen of open bogs at much lower than alpine stations in southern Wyoming. The specimens before me are, first of all, such as were collected by Elias Nelson, in Chimney Park, 1 Aug., 1901. These, which I name as typical, are from the herbarium of the University of Wyoming as a loan. All these are in nearly or quite mature fruit. The characters of the almost white-glaucous leaves of such very thin texture and with only a delicate and inconspicuous venation suffice to mark this as specifically distinct from other Rocky Mountain plants of its kindred which have whitish yet quite coriaceous and roughly veiny leaflets, all of which are also of cold dry alpine heights. At substantial agreement with these Nelsonian specimens are two sheets in the same herbarium gathered by Mr. Geo. E. Osterhout, in Big Creek Park, Wyoming, one in July, 1896, the other in the same month of 1898.

Out of the 12 good specimens thus at hand, 11 are wholly pistillate. The other has a few stamens accompanying the pistils; and these show an excellent character in the anthers, for these are uncommonly long and linear, as well as very blunt and pointless at apex.

The species the descriptions of which are next subjoined

belong to alpine summits of various and widely separated arid regions from Colorado to California. They all differ from *T. alpinum* of Wales, Scotland and eastern Canada in having a more coriaceous foliage that in none is green above, but is almost white-glaucous on both faces. The marks by which they differ among themselves might in several instances be considered varietal rather than specific were they all from the mountains of Colorado, or all from those of Utah and Nevada, or all from those of middle and southern California. But, knowing as I do how extremely different the climatic conditions are between either the Rocky Mountains of Colorado, or those of Utah and the White Mountains of southern California, and by how many hundreds of miles they are sundered from each other in space—how completely isolated each type is, and for ages has been—I reasonably hold these forms to be of higher rank than those occurring within the small and climatically uniform district of the islands and peninsulas of eastern Canada, where I have found real *T. alpinum* to exist in four distinguishable varieties.¹

THALICTRUM SCOPULORUM. Plants not tufted, often solitary, usually 3 to 7 inches high, the scapes wiry, floriferous from below the middle, the leaves short-petioled and spreading, or at most ascending: leaflets very small, usually 11 to the leaf, coriaceous, both faces glaucous, yet the upper somewhat lustrous, also marked with white veins that are continuous from base to and through the lobes, these very obtuse, also the sinuses mostly closed, the lobes meeting or even overlapping each other: pedicels slender, not greatly elongated even in fruit, curved downwards throughout their length: sepals ovate-oblong, acute: anthers almost linear, long-pointed, or at least acute: carpels few, oblong-obovate, rather strongly ribbed, sessile.

Common on rocky and bleak alpine summits of the mountains of Colorado, a good type being Hall and Harbour's n.

¹ Cf. *Ottawa Naturalist*, xxiii, 17-19.

10, as in U. S. Herb., where also are better specimens by John Wolf, from 10,000 feet in South Park, 1873. Specimens from the same State, from various more recent collectors, are before me, to the number of about 30 plants, all at agreement with the above description, and wrongly labelled *T. alpinum*. These many sheets show a vast preponderancy of staminate plants, and many that are hermaphrodite, only an insignificant proportion of them being purely pistillate.

THALICTRUM SUSPENSUM. Larger plants 9 inches high or somewhat more, the leaves alone often 4 inches, and even 6 in height, the length chiefly that of a very slender and wiry purple petiole, this either ascending or suberect, the leaf proper only 1 or 2 inches long, of about 9 to 11 leaflets, the rachis and petiolules almost filiform; leaflets pale, glaucescent and dull above, glaucous beneath, cuneate-obovate to flabelliform, broadly and rather deeply 3- to 5-lobed, but lobes commonly abruptly acutish, veins rather prominent on both faces: fruiting raceme often 4 or 5 inches long, the fruiting pedicels $\frac{1}{2}$ to $\frac{3}{4}$ inch long, filiform and seeming pendulous in large plants: achenes commonly 3, quite as often 2 only, sessile, subclavate except as curving outwards, distinctly and very closely and evenly striate.

High summits above Durango, in southern Colorado, by Baker, Earle and Tracy, 24 July, 1898; their n. 437 as in my herbarium. Plant as large as *T. leiophyllum*, but the foliage coriaceous and veiny. The greatly elongated pedicels are not slender, but rather firm and stiff despite their superficial aspect of being pendulous. It is in deference to this character, supplemented by those of the long-petioled and upright leaves, and the narrow flabelliform leaflets, that I feel constrained to place the plant as specifically separate from *T. scopulorum*.

THALICTRUM DURIOUSCULUM. Plants 4 to 7 inches high, the foliage short and compact, the stems stout, rigidly erect, striate-angled, in no degree purple tinted: largest leaves $1\frac{1}{2}$

long, short-petioled leaflets rather constantly 11, not very glaucescent above and somewhat shining as well as conspicuously though very delicately venulose, the lower face very glaucous and more coarsely veiny, the lobes shallow and very obtuse: pedicels often $\frac{1}{2}$ inch long, abruptly recurved, the longer seeming pendulous, the fruit often of a single achene, less commonly of 2 or 3, narrowly obovoid above a short thick stipe, the body but little inequilateral and style not much curved, the ribs few and coarse, intervening striae rarely manifest.

A very hard and rigid small species, represented by numerous specimens on sheets 303,811 and 303,812, U. S. Herb. Collected by M. E. Jones, near Fish Lake, Utah, in August, 1894.

THALICTRUM ELEGANTULUM. About 6 inches high, the leaves 2 to $2\frac{1}{2}$ inches long, their petioles short but slender, these and the equally slender stem without purple tint and pale green; leaflets usually 21, glaucescent and dull as well as prominently venulose on the upper face, very glaucous beneath and also there prominently veiny, the lobes abruptly acutish: stem with a solitary and simply ternate leaf below the middle; pedicels about $\frac{1}{4}$ inch long, filiform, recurved, not pendulous: achenes most commonly 3, rarely 2 or 4, very shortly and stoutly yet not indefinitely stipitate, of subfalcate-oval figure with short uncinata style, also somewhat stoutly ribbed and with some intervening shorter striae.

Clover Mountains, Nevada, S. Watson, Sept., 1868; his n. 5 as in U. S. Herb.

THALICTRUM MONOENSE. Plants slender, 3 to 5 inches high; foliage short and compact; leaflets only 11, mostly as broad as long, obtusely about 3-lobed, dull glaucescent green above and there mostly veinless except as to the lobes, these marked by 1 to 3 slender but sharply prominent whitish veins, the lower face very glaucous and venulose: flowering pedicels short, slender, pendulous: sepals oblong-lanceolate,

acutish, thin, slightly purple-tinted : stamens about 6 ; ovaries 3 or 4, stipitate : fruit not seen.

White Mountains, Mono County, California, 12 July, 1891, Coville & Funston, No. 1806 ; type specimen on National Herbarium sheet No. 294. Doubtless related to *T. duriusculum* of Utah, but upper face of foliage differing as to hue and venation, also dull-green, whereas that of the Utah species is distinctly lustrous as in *T. alpinum*.

A Fascicle of Violets.

VIOLA REPTABUNDA. Acaulescent and related to *V. primulifolia*, but small and low, fully developed late summer specimens 3 or 4 inches high, blades of largest leaves $1\frac{1}{2}$ to 2 inches long, subcordate-deltoid, acute, obsoletely crenate, glabrous on both faces, in texture rather firm : pods from late apetalous flowers oval, obtuse, strongly nodding on their short but otherwise upright peduncles : such low autumnal plants surrounded by many runners a foot long, rooting and forming new plants at frequent intervals, these also fruiting in autumn.

Sandy swamp near Moultrie, Georgia, R. M. Harper, 25 Sept., 1902 ; his n. 1675 as in U. S. Herb. The petaliferous flowering of such a type is not needful to establish it is distinct from and all varieties of *V. primulifolia*.

VIOLA SENECONIS. Akin to *V. primulifolia*, much taller, at petaliferous flowering 6 or 7 inches high, in summer development not very much larger : blades of largest leaves nearly 3 inches long and 2 in breadth, of subcordate-oval outline, rounded and very obtuse at summit, only slightly and very abruptly tapering at base to the long petiole, the whole margin coarsely and very evenly crenate : petaliferous flowers small for the plant, white, their peduncles often 6 or 7 inches high, their bractlets linear-filiform, inserted at about the middle ;

apetalous aestival and autumnal flower on upright petioles almost as long.

Southeastern Maryland, on the Nanticoke River, near Vienna, 23 Aug., 1906, collected by Forrest Shreve and W. R. Jones; their n. 1340 as in U. S. Herb. There is another sheet of the same from further northward, and not far from Baltimore, by C. O. Thurston, 19 May, 1889. It is from these specimens that the character of the early flowers is drawn. The species is named in reference to the form of its very broad and rounded leaves, recalling as they do those of genuine *Senecio aureus* as we have it in the damp woods of Maryland and Virginia.

VIOLA LUNELLII. Acaulescent, low, with small foliage and few large blue-purple flowers, all parts glabrous: most typical leaves, at time of petaliferous flowering exactly cordate-ovate, acute, less than an inch long, not cucullate, the very earliest and smallest usually reniform and obtuse, others intermediate between those and the typical and acutely cordiform: peduncles stoutish, surpassing the leaves, their small green bractlets triangular-subulate, inserted much above the middle: sepals short for the corolla, oval-oblong, very obtuse, even almost retuse now and then; corolla $\frac{3}{4}$ inch long, of almost the same breadth, petals subequal, the upper pair with oval limb, these and the laterals obtuse, the odd petal rather broader and so deeply emarginate as to be almost obcordate.

An inhabitant of wet meadows or swamps near Leeds, North Dakota, 31 May, 1910. At first glance recalling my *V. cognata* of wet meadows in Wyoming and Montana, being of about the size of that species; but the type of leaf outline is so different, that the best specimens recall so very dissimilar a plant as *V. Selkirkii*, to which *V. Lunellii* is nevertheless in no degree related. Dr. Lunell himself pointed out to me the fact of his inability to reconcile the plant with my description of *V. cognata* because of the entirely dissimilar calyx, which my Dakota correspondent finds in his plant, made up of sepals

that are not only very abruptly obtuse, but have a gland at the end, or sometimes a notch, and two glands.

VIOLA DASYNEURA. Caulescent yellow violet akin to *V. glabella*. Stems 8 to 10 inches high, slender for this group, glabrous throughout, or with a line of hirtellous hairs at summit under the flowers; even the petioles with but a line of hairs up and down the furrowed inner side: leaves small for the group, and thin, deep-green above, the veins there scaberulous, lower face paler, hirtellous-hairy either on the veins only or also between them; stipules obliquely oblong and lance-oblong, obscurely serrate-toothed: peduncles 2 or 3, subterminal, filiform and much elongated, bearing the rather small yellow flowers quite above all the foliage; sepals lanceolate, acuminate, ciliolate; ovaries glabrous.

Sandy soil about Standish Pond, near Tecumseh, Michigan, 5 May, 1899, Lyster H. Dewey; two sheets in U. S. Herb.

VIOLA HURONENSIS. Tufted stems of the season upright, 3 inches high at petaliferous flowering, arising from the branches of a short caudex crowning the tap root; all the herbage excepting the lower face of the mature leaves, rather densely hirtellous-puberulent, this indument more conspicuous on stem and stalklets, also obviously retrorse: stipules linear as to the body, but with 3 or 4 subulate spreading lobes: leaves many, small, the blades seldom more than $\frac{1}{2}$ inch long, broadly subcordate-ovate, obtusish, some nearly truncate at base, all abruptly joined to the long slender petiole, at apex obtuse, or at least not acute: flowers borne scarcely above the leaves, on slender peduncles bibracteolate not far below the calyx, the bractlets linear, intensely green-herbaceous, entire; sepals long, lance linear, acute; corolla blue, $\frac{3}{4}$ inch long, but narrow, the spread of the subequal petals not great; spur very long, straight except at the obliquely acute and somewhat falcate end.

Near Port Franks, Ontario, on summits of high sand hills

skirting the shore of Lake Huron; collected by Charles K. Dodge, 12 May, 1906.

VIOLA UNCINULATA. Caulescent and of the *V. adunca* alliance, but stem undeveloped and not obvious, the whole plant above ground scarcely 2 inches high, in every part glabrous: leaves from suborbicular to broadly ovate, $\frac{1}{4}$ to $\frac{3}{4}$ inch long, often as broad, seeming entire, in reality very remotely and obscurely crenate: peduncles $1\frac{1}{2}$ to 2 inches long, bearing the flowers much above the leaves, bibracteolate above the middle, the bractlets delicate, subulate: corolla nearly $\frac{3}{4}$ inch long including the very long nearly horizontal and almost cylindric spur which beyond the obtuse end is abruptly narrowed and prolonged into a slender and hook-like appendage a half-line long; limb of petals rather broad, very obtuse; sepals oblong-linear, rather obtuse.

Collected near Crater Lake, Klamath Co., Oregon, 17 Aug., 1896, by E. I. Applegate, the fine specimens on sheet 855,292 U. S. Herb. *V. retroscabra* of southern Colorado has a somewhat similarly appendaged spur, and so has *V. mamillata* of Utah (p. 32 preceding).

VIOLA ANISOPETALA. Dwarf and compact, only $1\frac{1}{2}$ to 3 inches high at petaliferous flowering, but flowers large in proportion and borne an inch above the tuft of leaves, the plant thus seeming like an acaulescent violet, the whole plant almost, or in some altogether, glabrous: leaves rather firm, from reniform-cordate in the earliest to cordate and oval in the later, all very obtuse, minutely crenate, the blades $\frac{1}{2}$ to $\frac{3}{4}$ inch long, tapering abruptly to the short and not slender petiole; stipules remotely and subpinnately lacerate: peduncles not slender, notably bibracteolate much above the middle, the bractlets linear, acute erect: sepals lance-linear, acutish, nerveless: corolla $\frac{3}{4}$ inch long, not as broad, light violet or blue, the odd petal out of all proportion longer than the others, broad and emarginate, or even obcordate, the others perfectly rounded at the apex; spur short though well pro-

jecting almost horizontally, subcylindric, straight, obtuse. Apetalous summer state with slender very leafy stems 3 to 4 inches high: leaves about $1\frac{1}{2}$ inches long, cordate-ovate, abruptly somewhat pointed at summit, yet the very apex almost obtuse, the margin lightly and rather minutely but closely serrate rather than dentate, of a dull deep green, but the venation conspicuous as being paler, all angles of stem and petioles, as well as margins of foliage and stipules, delicately scabro-puberulent: sepals lance-linear, acute, glabrous.

Meadows in the vicinity of Leeds, North Dakota, the specimens both early and late, communicated by Dr. J. Lunell, in 1909.

VIOLA CENTELLIFOLIA. Low and delicate, caulescent, but leafy stem nearly obsolete, the leaves rather many and with long petioles, but flower apparently one only to each stem; herbage light-green, the leaves membranaceous as in members of the *V. blanda* group, their outline round-oval to oval, very obtuse, truncate or subcordate at base, lightly crenate, delicately hirtellous-roughened marginally and along the veins on both faces, the petioles scaberulous along the angles: peduncle surpassing the leaves, bracteolate above the middle, the bractlets subulate; sepals oblong-lanceolate and lanceolate, very acute; corolla $\frac{1}{2}$ inch long or more, apparently white, spur shorter than the limb of its petal, straight, obtuse.

Collected somewhere in the Blue Mountains, Oregon, 29 June, 1899, by Mr. C. L. Shear. Without its flowers this pale thin-leaved violet would pass readily for acaulescent and a member of the *V. blanda* group; but the flowers being indubitably those of the *V. canina* alliance, a careful inspection brings to light the short proper stem, and also the stipules of the caulescent species. The cut of its seemingly radical leaves is so nearly that of *Hydrocotyle* and its allies as to have suggested the name I assign it.

New Species of Sambucus.

SAMBUCUS ORBICULATA. Twigs of the season minutely puberulent, all the older parts of the branches glabrous: leaflets 5, or those of earliest foliage 3 only, all except those of leaves next under the corymb suborbicular, 1 inch long or more and of nearly or quite the same width, of rather firm texture, beneath scabrous-pubescent, but between the veins rather than along them, the margins not deeply but closely cut, in those of the most rounded leaflets dentate, in those of the later and more oval ones serrate, all cuspidate-acute at apex and very abruptly inequilateral at base.

Santa Lucia Mountains, Calif., May, 1898, R. A. Plaskett; his n. 141 as in U. S. Herb. The specimens were barely in flower at time of collecting. The species is of the group of *S. caerulea*, Raf.

SAMBUCUS CORIACEA. Growing branches of the season rusty-tomentose: leaflets 3 to 5, round-oval, 1 to 1½ inches long, the width somewhat less, inequilateral at base, yet not abruptly so, both margins ending below somewhat cuneately, in general deeply, closely and sharply serrate, the very apex a triangular cusp broader than high, the whole of an almost leathery texture, the veins not obscure on either face and as to the upper face hispidulous-scabrous, all the lower face, veins and all, more closely hispidulous: corymbs short-peduncled: berries black, apparently without bloom, also thinly puberulent.

Collected somewhere in the mountains back of Santa Barbara, Calif., in September, 1908, by Alice Eastwood; her n. 218 as in U. S. Herb.

SAMBUCUS FIMBRIATA. All parts, even the tenderest young twigs, glabrous, the branches of a year old with a smooth cinnamon-brown bark without trace of lenticels: leaves of quite subcoriaceous texture, the leaflets 5 to 7, round-oval to oval-elliptic, very large and broad, from 2 inches long and 1½ inches wide in the smallest pair to 3 in length and 2 in width

in the terminal one, very unequal at base, one side there $\frac{1}{4}$ to $\frac{1}{3}$ inch shorter than the other and both sides ending almost truncately, the margins so deeply and closely serrate as to appear in a manner fimbriate, each serrature ending in a slender point of some length, the very apex of each leaflet an abrupt subulate entire point $\frac{1}{4}$ to nearly $\frac{1}{2}$ inch long: inflorescence broad and flat-topped; fruit not seen.

Collected in the Canada de las Uvas, mountains of Kern Co., Calif., at an altitude of 2,700 feet, by Coville and Funston, 5 July, 1901, being n. 1165 of the Death Valley Expedition collections. Allied to *S. caerulea*, Raf., as habit, foliage and flowers plainly tell.

The two following are of the red-berried division of the genus; and there are clear indications of the existence of yet other species remaining undescribed, especially on the Pacific slope of the continent.

SAMBUCUS ACUMINATA. Shrub low, the scales of its large winter buds ovate, acute, scabrous-ciliolate; growing branches, rachis of leaves, also veins of leaflets on both faces scabrous, often almost hispidly so: leaflets 7, approximate, $3\frac{1}{2}$ to $5\frac{1}{2}$ inches long, lanceolate, acuminate, rather unequally serrate except as to the abrupt and long acumination, this mostly entire; base of leaflet unequal, the shorter margin ending acutely, the longer obtusely: thyrsus on a stout peduncle of 2 or 3 inches, the cluster of large red berries broader than high: seeds rugose.

Apparently frequent at subalpine elevation in the isolated San Francisco Mountains of northern Arizona. The oldest specimens in U. S. Herb. were gathered by Edw. Palmer in 1869 and consist of flowering branches only. The same was obtained in 1901 by both Leiberg and McDougal; also by Brandegee in 1902; all these in flower only, but at agreement in the marked characters of the foliage both as to form and indument. The specimens in mature fruit were obtained in Sept., 1909, by G. A. Pearson of the U. S. Forest Service.

SAMBUCUS BOREALIS. Branches of the preceding year in their maturity cinereous as if with bloom, but the growing ones of the season not at all glaucous, obscurely scabrous-puberulent: mature foliage remarkably small for that of an elder bush, the leaflets 5 only, oblong-elliptic, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, very closely and evenly serrate, ending at apex in a sub-falcate acumination, the base cuneate, but obliquely so, the longer margin and the shorter tapering to the short but definite petiolule, the texture thin, upper face glabrous, the lower tomentulose: fruiting thyrsus of red berries rather ample, the small oval seeds strongly rugulose.

Itaska Lake, Minnesota, collected in June, 1891, by J. A. Sandberg; his n. 1086 as in U. S. Herb. The small size of the foliage and the peculiar indument of it are both very characteristic.

A New Name for the Bayberries.

At the time of presenting the former paper on the nomenclature of the Bayberries (page 37 preceding), I did not suppose that any one would find it needful to propose a new Latin name for them. I thought that among a goodly number of such as had been proposed already, some one or another would be found valid. But Mr. Tidestrom, in a recently issued fascicle of the *Elysium Marianum* has not only distinguished two genera of these shrubs, but has assigned a new name to each, **ANGEIA** for the original type of *Gale*, and **CEROTHAMNUS** for the true bayberries of North America.

The most significant action here is that of the suppression of the name *Gale*; this presumably for the reason that it is an English vernacular or common-people's plant name. Dodonæus (1583), himself a Belgian, merely records this common name in the form of *Gagel*, but does not regard it as admissible into Latin nomenclature, and formally assigns it

the name *Chamelacagnus* (Pempt. 768). Still earlier the type had been known by the two-worded generic name, *Myrtus Brabantica*. Gerarde (1597), though using English in his text, gives all the Latin names that have ever been proposed, and also three English generic names, one of which is Gaule. Mr. Tidestrom seems to have found J. Bauhin (1650) the first Latin writer to employ *Gale* as a Latin generic name. John Ray, in his Latin *Historia Plantarum* (1688), while citing at the head of his chapter Bauhin's *Gale*, yet himself prefers Dodonæus' *Chamelacagnus*, as appears from his concluding sentence. The Danish herbalist, Simon Pauli, had expressed the belief that this shrub of Europe, the leaves of which were used in Denmark for a tea, is the same as *Thea* of the Chinese; to which Ray objects somewhat impatiently: "*Thea* is a shrub as far from being related to *Chamelacagnus* as China is distant from Europe." Nevertheless Ray, in his *Synopsis* (1696) accepts *Gale* as the Latin name of the type. Tournefort (1706), Petiver (1717), Dillenius (1719), Vaillant (1727) and others of the period maintain it without questioning its fitness to serve in that capacity; and after its attempted suppression by Linnæus (1737), it was restored by Du Hamel (1755) and by Adanson (1763). Even as late as 1902 it figures as the generic name of the type in a monograph by Chevalier, cited in the *Elysium Marianum*.

So then, during some 250 years there appears quite a splendid succession of botanical authors who found no fault with *Gale* as a Latin generic name; and there may be ground for questioning that this name is in the same category with such other vernacular names as *Gansblum* (Gooseblossom), *Hondbessen* (Dogberry) and one or two others that were seriously proposed by Adanson. Neither *Hondbessen* nor *Gansblum* has been adopted by any one hitherto, in as far as I am aware; and the reason for neglecting them is plainly this, that being such as a Teutonic peasantry has assigned them in the terms of their own vernacular, they are unfit to serve as generic names in Latin botany. To show the ridiculousness of approving such names we have but to suppose the name *Erophila verna*

reduced to a synonym by so imbecile a proposition as *Gansblum verna*, or what would be no worse, *Gooseblossom verna*. No botanist of our country was ever so unlettered or so crude of intellect that he would have been willing to adopt, if it had been proposed, such an appellation as *Dogwood florida*. In order that, as a generic type, with binary name, the tree be so accredited in books that use a Latin nomenclature, the name dogwood may be turned into Greek, and then we shall have *Cynoxylon floridum*, a name which will not offend, but rather commend itself to the mind of every even half-taught botanist.

But now, as to the case of Gale, it may be questioned whether this name is in the same category with *Gansblum* and *Hondbessen*. It must not be overlooked that, while the last two obtain the same pronunciation in Latin which they have in Dutch or Flemish, and are therefore each exactly the same in Latin as in the vernacular, it is otherwise with this English name Gale; for here, in the vernacular, the final vowel being silent, the word is a monosyllable. In Latin the final vowel is pronounced, and so, without alteration by a single letter, the word is now dissyllabic. There is, then, this one very wide difference between Gale English and Ga-le Latin. Nor is this all; for even the vowel *a* has in Latin quite another sound than that which belongs to it as an English word. In view of these considerations, which arise from the principle that a word is a word, not according to how it is written but how it is spoken, it does not seem to be well settled that *Gale* Latin is not available for the Dutch Myrtle.

As regards the new name CEROTHAMNUS for our Bayberry shrubs and trees, it seems as if some statement ought to have been made of the reasons for ignoring Rafinesque's name *Cerophora*. As I glance at the pages of Rafinesque wherein these shrubs are treated of, I perceive such transposition of types, and consequent uncertainty about the application of his new names, generic and subgeneric, as invites to the ignoring of his nomenclature of them altogether.

In that tract of his wherein the Bayberries are dealt with,¹

¹Raf. *Alsographia Americana*, pp. 9-12.

the first thing which the author does is to transfer that old Greek name *Myrica* to yet another American type, different from that to which Linnæus had applied it; and this done, and the Linnæan type being for the moment without a name, Rafinesque hastens to invest that with a new name, *Cerophora*. Let us remark in passing, that we are not to censure Rafinesque for thus taking a name away from an old genus, applying it to a new one, and then creating a new name for the old genus. He was a professed disciple of Linnæus; and this kind of trick he learned from Linnæus, who practiced it a hundred times and more; and his disciples for a hundred years kept it up.

As for *Cerophora*, and its applicability, the first lines of Rafinesque's paragraph indicate his purpose to have been mainly that of being rid of the name Gale, which he says is Dutch, whereas in truth it is English. But, passing from the consideration of the name *Cerophora* as a substitute for the Linnæan *Myrica*, to what particular type does the new name apply? When the author immediately after the name cites *Gale*, Tournef. as its equivalent, we seem compelled to regard *Myrica Gale*, Linn. as its type; but yet, the very name *Cerophora* seems to contradict that; for the gale shrub is not wax-bearing. And the thought is contradicted again when, proceeding to define two subgenera of *Cerophora*, he plainly makes our exclusively American wax-bearing shrubs the typical subgenus. There must, then, forever remain two opinions as to the tenability of *Cerophora*, Raf.; and I find myself at accord with the author who has proposed the new name CEROTHAMNUS.

Miscellaneous Specific Types.—III.

ABRONIA LATIUSCULA. Root not known, probably perennial: stems a foot long and more, evidently procumbent, stoutish and firm, rather loosely leafy and floriferous, the internodes 2 inches long or more, purplish and very glaucous, glabrous, or with only here and there a scabrous hair: leaves short-petioled, flat and suborbicular, the lowest quite orbicular, $1\frac{1}{2}$ inches long and broad, the later smaller and manifestly broader than long, some of the floral round-ovate, all very obtuse, the petiole mostly somewhat shorter than the short blade, this green and nearly glabrous on both faces, but above dotted sparsely with whitish low pustules, the texture thinnish: petioles firm, quite surpassing the leaves: bracts of the inflorescence not large, oval or ovate: perianths of middle size, the tube flesh-color, the limb white or pinkish: fruits small for the plant, obtusely and unequally 5-angled, puberulent on the sides, viscid-hirtellous at summit.

Plant from Fallon, Nevada, obtained in the spring of 1910; name of collector not known.

APOCYNUM ABDITUM. Of the alliance of *A. cannabinum* and as small-flowered, but flowers white: plant 2 feet high and slender, glabrous except as to lower face of foliage: leaves lance-oblong to elliptic, the lower and larger 2 to $2\frac{1}{2}$ inches long, those of the ascending branches half as large, all deep-green above, with light-colored veins, glaucous beneath and with a sparse villous-hirsute hairiness along the veins: flowers produced only in terminal compound cymes, not very numerous in the cyme; sepals white, lanceolate, acuminate, nearly as long as the corolla, this white, campanulate, the lobes oblong-oval, scarcely acute, spreading campanulately.

In moist soil, in the bed of a deep cañon at some point in northern Arizona, 1909; the collector G. A. Pearson. The species decidedly an elegant one; the properly terminal cyme quite surpassed by those at the ends of the laterals, this quite as in *A. cannabinum*, the common green-flowered species of

the Atlantic States ; but the corollas are very different in form as well as color.

BATRACHIUM USNEOIDES. Doubtless perennial, certainly wholly submersed, the naked basal part of the long stems slender, gradually stouter upwards, from below the middle made up of short internodes, the ample dense coarsely capillary and sessile leaves concealing the stem whether in the water or withdrawn from it ; leaf-segments unusually coarse and firm, not collapsing, scarcely reduceable by pressure and not drying to a flattened mass, the whole branch thus densely clothed appearing much like a tuft of some dark-colored lichen : flowers on stout peduncles and little exerted from the mass of usneoid leaves ; sepals oval, glabrous, spreading ; corolla white, apparently almost $\frac{3}{4}$ inch wide in full expansion : carpels not seen.

Lake City, Arkansas, collected by A. H. Howell, 1 May, 1910. The label carries no information as to whether this grows in stagnant or running water. By the density, coarseness and stiffness of its foliage, it is strongly in contrast with all other species known to me.

GERARDIA NEOSCOTICA. Low annual, 6 to 9 inches high, the smaller simple, the larger branched from near the base, the branches ascending, floriferous almost throughout and very leafy : stem and branches plainly angular, wholly glabrous : leaves large for the plant, an inch long or more and of notable breadth, being narrowly lance-linear rather than linear, only sparsely scabrous-roughened above, the margins strongly scabrous-serrulate : flowers small for the plant, mostly alternate, shortly and slenderly pedicellate : calyx-tube veinless, its teeth or segments notably large and foliaceous, also obviously unequal, the larger exceeding the tube in length, glabrous except as to the plainly scabrous-serrulate margins ; corolla purple, little exceeding a half inch in length, the lobes of the not widely spreading limb extremely short.

Known only as collected by the writer, in an open space

among thickets of sweet fern and blueberry bushes, near Middleton, Nova Scotia, 12 August, 1910. By its long calyxlobes and almost tubular corollas the plant fails to fall into that aggregate of lesser gerardias called *G. pauperpaula*. I say aggregate because this last is one thing as it occurs in New England, and quite another as a denizen of western Ontario, southern Michigan, and elsewhere about the Great Lakes. I am unwilling to undertake the segregating of them, however, until I have the better knowledge of them that comes of field study of each in its own region.

GERARDIA MESOCHORA. A foot high, more or less, simple to above the middle, there parted into several slender branches, these floriferous for more than half their length, the flowers usually alternate: stem and branches not strongly angled and their roughness obscure: leaves narrowly linear, seldom notably acute, rather strongly muriculate-scabrous above: flowers rich purple, large for the plant, the corolla commonly more than an inch long, in full expansion as broad as long, its lobes much broader than long and nearly truncate: anthers not exerted nor very copiously hairy, but one side of the filament excessively so and its hairs greatly elongated: fruiting capsule depressed-globose, distending the calyx-tube, hardly surpassing it, the calyx-teeth as short stout subulate points arising above it.

To this description answers a plant common in the Western Midland and prairie regions of northern Indiana and Illinois, Wisconsin, Iowa, Minnesota and even eastern Nebraska. In northern Illinois and southern Wisconsin, I knew it familiarly in earlier years, never doubting that it was, what every one has hitherto called it *G. purpurea*.

The eastern plant, that is, of the Eastern and Middle States, which most resembles this, and which may or may not fitly bear the name invented by Linnaeus, has stems more angular and scabrous, corollas not as large by one-third at least, its flowers opposite on the branchlets, and a capsule which is truly globose, not so greatly distending the calyx-tube, and

which commonly surpasses not only the tube, but the calyx as a whole, sometimes inclining even to oval, but never depressed globose.

My last field observation of *G. mesochora* was made at Knox, Indiana, late in August, 1899; and the specimens made then and there, preserved in my own herbarium, are the best I have seen, and are typical of the species.

GERARDIA CRUSTATA. Annual, stoutish and rigid, erect and rather strict, the few and more or less definitely paniculate branches strongly ascending, only the more or less crustaceous angles scaberulous: leaves narrowly lance-linear, firm and hard, glabrous on both faces but the whitened and crustaceous margins scabrous: flowers mostly alternate, subsessile, forming a rather dense spiciform inflorescence: flowers not large for the plant, the purple corolla but $\frac{3}{4}$ inch long, all its lobes rather lightly ciliate, broad and obtuse, or the middle one and largest definitely emarginate, or at least retuse: fruiting calyx campanulate, exceeded by the oval capsule, its segments rather deep, triangular-subulate, its whole margin, as well as the midvein, showing the white incrustation.

Sapulpa, Indian Territory, 21 Sept., 1894, collected by B. F. Bush, and distributed by him erroneously for the *G. heterophylla* of Nuttall. Type specimens in my herbarium.

GERARDIA LANGLOISII. Commonly 2 feet high, stoutish, much branched, in appearance shrubby or at least suffrutescent, yet probably only annual, the mode of branching quite strict: stem and branches strongly scabro-hispidulous both on the angles and between them: leaves all small for the plant, narrowly linear, scabrous: flowers small for the plant, subsessile, approximate, always alternate on the many short strict suberect branches: corolla purple, $\frac{3}{4}$ inch long, its tube uncommonly long, narrow and not ventricose, very densely strigose-pubescent, the lobes of the limb not large, more than usually unequal: calyx under the flowers rather deeply campanulate,

its teeth very short and broad ; fruit and fruiting calyx not seen.

Known only as collected by the late Father Langlois, in prairies near Eunice, Louisiana, 12 Sept., 1894.

GERARDIA ASPRELLA. Annual, 2 feet high or less, loosely and widely branching above the middle ; everywhere muriculate-scabrous, but the roughness shorter than in the preceding : leaves narrowly linear, not acute, strongly revolute, those of the inflorescence more lance-linear and with clear distinction of blade and petiole : flowers mostly alternate, distinctly and rather slenderly pediculate : calyx under corolla (the fruiting not known) marked by 5 raised and very scabrous veins running each to the end of the short deltoid and incurved tooth : corolla $\frac{3}{4}$ inch long or more, its tube rather narrow and not ventricose, the limb notably wide in proportion, the throat, and also the stamens long-hairy.

Near St. Martinsville, Louisiana, 27 Sept., 1892, A. B. Langlois. The collector, taking under consideration the roughness of the plant, and its only middle-sized and rather narrow corollas, had labelled his specimens *G. aspera* Dougl., to which the plants bear no particular resemblance.

STEIRONEMA GRAMINEUM. Small, rather weak and delicate but upright, 7 to 11 inches high, clothed throughout with very narrow linear leaves mostly 2 to 3 inches long, often subfalcately curved, neither very firm nor yet flaccid, sessile, the pairs almost connected at base and there with a substipular fringe as a connective, the blades all plane, entire, acute : flowers very small, mostly solitary and much scattered : calyx-segments triangular-lanceolate, attenuate-acute : corolla cleft almost to the base into oblong-obovate or oval cuspidate lobes, these dark-dotted ; bases of the lobes granulate, but hardly so the long filiform filaments which greatly exceed the short oblong-oval anthers.

Species small and almost grassy by the narrowness of its foliage, known only by two sheets in U. S. Herb., col-

lected somewhere in the mountains of northern Alabama, in 1878, by G. R. Vasey. As to character of corolla and stamens the plant is very different from any and every other known member of the genus.

STEIRONEMA VERTICILLATUM. Stems simple below and stoutish, but parted much below the middle into many rather slender leafy and floriferous branches, the whole plant 1 to 2 feet high and rather diffusely paniculate: leaves small, lanceolate, the lowest on rather long petioles that are scarcely ciliate except at the very base; those of the many flowering branches more broadly lanceolate, subsessile in verticils of 3 to 6, the whole with as many flowers as leaves; calyx-segments ovate-lanceolate, abruptly acute, in fruit about equalling but not surpassing the capsule: anthers of a trifle greater length than the filaments, these roughened with sessile granules.

Leeds, North Dakota, 8 Aug., 1901, and again 22 July, 1906, collected by Dr. J. Lunell, and distributed by him for *S. lanceolatum* var. *hybridum*; but the plant that has been called *hybridum* is of the Carolinas, and most unlike this. The new species is named in reference to the fact that, while freely branching and copiously floriferous, nearly all the flowers are in verticils at the nodes formed by whorls of leaves. The plant appears to be almost aquatic; for, in the specimens, the lowest leaves have been prematurely killed by water in which the plants seem to have stood all through the time of their flowering and fruiting.

STEIRONEMA LUNELLII. Stoutish and low, less than a foot high, at base decumbent above a short stout rootstock: basal leaves small, round-oval, on long petioles much dilated at the insertion and devoid of hairs, the proper cauline ones lanceolate-oblong, obtuse at base, scarcely acute at apex, $1\frac{1}{2}$ inches long, on petioles of less than an inch, these fringed at their dilated and almost stipular base only: floriferous upper part of plant branching freely, the leaves and flowers mostly in verticils: calyx-segments ovate, acute, a little surpassing the

mature capsule: bottom of corolla only sparingly granular, the granulation of the filaments not sessile.

Stout low plant growing along sloughs and ditches near Leeds, N. Dakota, and collected by Dr. Lunell in flower 6 July, in fruit 14 Aug., 1910.

The almost constantly verticillate character of the copious inflorescence of these two species marks them almost as a group of their own; this notwithstanding that in some other species one observes an occasional whorl of three or four leaves and flowers. In these it is perfectly and strongly characteristic, though this is far from being the principal character in either species.

STEIRONEMA PUMILUM. Not slender, nor yet stout as the foregoing, arising from a system of slender horizontal rootstocks, 3 to 7 inches high, simple except at summit and densely leafy: leaves all rather narrowly ovate, subcordate, very acute, 1 to $1\frac{3}{4}$ inches long, on short ascending or spreading petioles, these distinctly ciliate throughout: flowers only 2 to 6, all at the summit of the stem: calyx-segments oblong-lanceolate, not notably acute, little surpassing the capsule: granulation of the bottom of the corolla dense, also extending conspicuously half way up the segments: anthers much longer than the filaments, these broad, but hardly subulate.

Collected in damp meadows at Leeds, North Dakota, 21 July, 1910, by Dr. Lunell, who in full notes accompanying the specimens, has clearly pointed out its characters as distinct from the larger plants of the region, which the collector has taken for *S. ciliatum* of the books, namely,

STEIRONEMA MEMBRANACEUM. Much more slender than *S. ciliatum*, 2 feet high, simple to the summit and there very few-flowered, all but the terminal axils vacant: leaves all ovate, acute, obtuse at base but not subcordate, 2 to 3 inches long, deep-green and of thinnest texture, the margins delicately and closely serrulate-ciliolate, their petioles $\frac{1}{2}$ to $\frac{3}{4}$ inch long, distinctly but delicately ciliate: segments of calyx

lanceolate, acute: base of corolla only very sparingly granular; filaments more nearly ligulate than subulate, smooth and glabrous, very short, of much less than half the length of the much elongated anthers.

Occurring in thickets, at Towner, N. Dakota, and collected in fine specimens by Dr. Lunell, 21 July, 1908; apparently distributed by him for *S. ciliatum*, the best that could have been done by any botanist guided by nothing better than the indefinite and loose descriptions of that species that are in all the books.

Nothing, however, at present existing in herbaria, whether from North or South, East or West, has at all the characters that mark conspicuously as new this present plant.

Some Southwestern Mulberries.

Almost fifty years since Mr. S. B. Buckley published a new kind of mulberry bush from western Texas under the name *Morus microphylla* (Proc. Philad. Acad. vol. for 1862, p. 8). The leaves, as the name indicates, were very small for those of a mulberry, and Mr. Buckley reported that the species was not a tree, but a mere bush. It was the product of its dry and over-heated southwestern desert environment. After this, as in the course of events botanical exploration was carried further westward by hundreds of miles, and into still more starved and arid regions, that is, into New Mexico, Chihuahua and Arizona, mulberry bushes, smaller and with still smaller foliage were collected and sent in as "*Morus microphylla*." The name fitted, and that was enough—is always enough—with the indifferent and indolent multitude of people botanical, to warrant the application of Buckley's name to all of them.

With not much less than half a hundred good sheets of specimens of these things before me, I think I can not do better than indicate some of the specific differences which I readily detect in this aggregate of small mulberries of the Southwest; and, since the original description published by

Buckley is too meager, and leaves out of the account some good points, I attempt at the outset to give a new description of it.

Morus microphylla (Buckley, l. c.). Twigs of the season on mature fruiting branches of a light reddish brown and obscurely puberulent, the branches glabrous: leaves of such branches and branchlets without lobe or sinus, of ovate outline, though often distinctly inequilateral, $1\frac{1}{2}$ to $2\frac{3}{4}$ inches long, 1 to $1\frac{3}{4}$ inches wide below the middle, at base not subcordate but nearly truncate, crenate-serrate except as to the abrupt and prominent entire apical point; the texture very firm, both faces almost alike green, the upper glabrous and smooth, yet under a lens closely low-tubercular, the tuberculation absolutely blunt as well as low; lower face of a rather more vivid green, roughish to the touch by the presence of minute and sparse hispidulous hairs on the veins, and even on the general face: petioles firm, $\frac{1}{2}$ inch long or more.

This description is drawn wholly from specimens obtained near Austin, Texas, by Mr. F. V. Coville, 27 May, 1904. I use them partly for the reason that they are the best specimens of all that are in U. S. Herb. from western Texas, and therefore lend themselves best to careful diagnosis. That the vicinity of Austin is the original station for Buckley's species I dare not say, for the reason that that author gives no closer geographic limit than "Western Texas." True, there are Buckleyan specimens at hand that were collected by him at Austin in 1881, and at that time sent to Dr. Vasey at Washington. These, however, were not type specimens, collected as they had been almost twenty years after his publication of the species. They are poor fragments: but they are plainly of the same species of which Mr. Coville gathered his excellent material. Nevertheless, what Buckley's original of 1862 may have been, and whence he had it, that is, from what particular station, I have no means of ascertaining. Also I doubt not that, having once established a species, he afterwards referred all western mulberry bushes to that, without discrimination. The original description has in it a vagueness that gives rise

in my mind to a suspicion that his species may have been an aggregate at the very outset. Here also I must remark that Mr. Coville had declined to give his own fine specimens any specific name at all, when consigning them to U. S. Herb. There are several mulberries in the arid West to which that name *microphylla* is more appropriate; so that the name has long been a misleading one to those who knew something of far southwestern mulberry forms in general.

I must now give account of another sheet of Buckley's specimens, also from Austin, gathered by him as early as 1875, and sent to Dr. Vasey. They are twigs from another tree, and are at an earlier stage of growth, being hardly out of flower; or else they represent a later flowering of perhaps a young and immature bush.

Twigs as in the other specimens as to color and faint traces of indument: petioles also the same: leaves of round-ovate circumscription, $2\frac{1}{2}$ inches long, 2 inches wide, strongly 3-lobed and quite constantly of one pattern, the serrature more sharp and truly serrate, not crenate-serrate, the apex equally an entire acumination: texture much thinner, and upper face very distinctly muriculate- or even strigose-scabrous; lower face as in Mr. Coville's specimens save that the hispidulous roughness is more general and more copious.

Despite the discrepancies as to texture and roughness of foliage, which may be partly due to differences in age and maturity, I assume that all these sheets of specimens represent one species, and that probably the one to bear the name *microphylla* by right of priority, though not by right of reason and fitness.

MORUS PANDURATA. Branches and leafy twigs slender, somewhat flexuous, puberulent when young, later glabrate: leaves on slender petioles of $\frac{1}{2}$ inch or more, subcordate-ovate in circumscription, some without lobe or sinus, some contracted in the middle and panduriform, their length 2 to $2\frac{1}{2}$ inches, breadth toward the broad base $1\frac{1}{4}$ to $1\frac{3}{4}$ inches, abruptly mucronate, evenly subserrate-dentate, the teeth acutely and

prominently mucronulate, the texture firm-membranaceous, upper face deep-green and doubly muriculate-roughened, a larger and very sparse set of murications conspicuously hair-tipped, the many times more numerous intervening ones not at all so, and naked; lower face of a much more vivid green, also merely hispidulous along all veins and veinlets, otherwise glabrous: fruit not seen.

Kerrville, in arid western Texas, July, 1889, Munson Hopkins; the type specimens on sheet 218,836, U. S. Herb., labelled by some one as a *Celtis*.

MORUS ARBUSCULA. Apparently an intricately branched low shrub, the branches stout, rigid and divaricate, their bark light-gray; leafy and fructiferous twigs of the season green or somewhat reddened, obscurely puberulent: leaves numerous, approximate, slenderly short-petiolate, very small, ovate, sometimes very broadly so, obtuse or subtruncate at base, at apex abruptly rather long-acuminate, the blade as a whole an inch long or less in the smaller to barely $1\frac{1}{2}$ inches in the largest, the margin with few and coarse serratures; leaf-texture very firm, the color of a very vivid green, deeper and less vivid above, brighter underneath, and there marked by whitish veins, upper face muricately roughened, lower smooth, glabrous except as to a few small short hair-points on the larger veins: fruit small, nearly spherical on very short villous-hirsute peduncles.

A Texan species, collected on the Fredericksburg Road, about ten miles north of San Antonio, 7 May, 1910, by Mr. S. H. Hastings.

MORUS VERNONII. Shrub or small tree of slenderer habit, the branches of two and three years' growth pinkish gray and glabrous, those of a year old showing a trace of the short-villous subtomentose pubescence that is plain on the growing leafy twigs of the season: petioles slender, $\frac{1}{4}$ to $\frac{1}{2}$ inch long; leaves of several patterns lobed and uncut on the same branch, all rather small, some with very distinct ovate-acuminate

terminal lobe well separated from a broad and more than twice larger lower part itself scarcely 2-lobed, such leaves being of round-ovate general circumscription above a subtruncate broad base, the whole $1\frac{1}{4}$ to 2 inches long, 1 to $1\frac{1}{4}$ inches across at and below the middle; uncut leaves mostly somewhat deltoid-ovate, truncate at base, about 2 inches long, $1\frac{1}{4}$ inches wide above the base, many leaves notably below these dimensions, the texture of all rather firm-membranaceous, color neither vivid nor exactly dull though light green, upper face of all with a few slender hirsutulous hairs on the veins only, the general area rough with many low but hairless muriculate points and scattered hair-tipped pustulations, lower face much more rough to the touch by many hispid short hairs on all veins and veinlets, as well as copious smaller and shorter ones on the general area; serrature of all sharp, but unequal: fruit unknown.

Of well marked foliar aspect and character, collected in June, 1901, by Mr. Vernon Bailey, in the Chisas Mountains, Texas.

MORUS VITIFOLIA. Twigs of the season somewhat villous-puberulent, traces of this indument obvious on branches of two or three years: petioles about $\frac{1}{4}$ inch long more villous: leaves much diversified in cut on the same branch, but those of the most vigorous sterile branches pronouncedly and elegantly somewhat 5-lobed, the terminal lobe almost the largest, somewhat rhombic-ovate, separated from the lower limb by narrowly oval almost closed sinuses, the lower limb of two lobes each with a short sinus below the middle suggesting its division into two; other strongly lobed leaves simply but deeply 3-lobed, with narrow but more open sinuses; uncut leaves less numerous, very broadly ovate, but at base truncate; dimensions from $1\frac{1}{2}$ by $1\frac{1}{4}$ in the simpler form, to $2\frac{1}{4}$ by $1\frac{1}{2}$ in the strongly lobed forms; texture of all rather firm-membranaceous, color rather vivid light-green; upper face low-tuberculate under a lens, and smooth to the touch or harsh according to the presence or absence of sharp hair tips,

lower face everywhere rough with hispidulous pubescence, this more pronounced on all veins and veinlets, but plentiful over whole area : fruit not seen.

The type specimens of this elegant grape-leaved mulberry bush are in U. S. Herb., as collected in the Doña Aña Mountains, New Mexico, 28 Aug., 1906, by Wootton and Standley.

MORUS GOLDMANII. Low slender shrub, in habit like the last, but smaller and with different foliage : growing twigs only obscurely and minutely puberulent, the red-brown branches glabrous : leaves all small, the largest only $1\frac{1}{2}$ by $1\frac{1}{4}$ inches, the smallest less than 1 inch long, the lobed form inclining to be 5-lobed, its terminal part being more or less distinctly parted into 3 secondary lobes, the sinuses between this compound terminal lobe and the basal part of the leaf being not oval or in any way rounded, but rather openly V-shaped, the uncut leaves smaller and fewer, subcordate-ovate ; texture hard, almost subcoriaceous, color light but dull green, the marginal indentation rather coarse and uneven, also more dentate than serrate, veins of the upper face sunken but hirtellous, the area rather coarsely and harshly muricate-scabrous, lower face villous-hirsute at base along the veins, the veinlets sparsely hispidulous, the area in general much more minutely, sparsely and sharply muriculate : fruit not seen.

Specimens in U. S. Herb. from an altitude of 4500 feet in the Little Florida Mountains of the extreme southwestern part of New Mexico, by E. A. Goldman, 5 Sept., 1908.

MORUS BETULIFOLIA. Stout and compact shrub with rigid and tortuous gray branches : growing leafy shoots rather slender, of a reddish brown and lightly villous-tomentose : fruiting branches with no lobed leaves, all being exactly cordate-ovate, 2 to $2\frac{3}{4}$ inches long, $1\frac{1}{4}$ to $1\frac{1}{2}$ inches wide toward the base, coarsely subserrate-dentate and with an abrupt short acumination, those of vigorous young sterile shoots

evenly 3-lobed, about $2\frac{3}{4}$ inches long by more than 2 inches wide across the basal lobes, all leaves of firm-membranaceous texture and vivid-green on both faces, the upper face hispidulous along the veins and sharply pustulate-muriculate between them, lower face hirsute along the veins and strigulose-pubescent between them.

Of the Organ Mountains in southern New Mexico, where it was collected in copious and fine specimens by E. O. Wootton and P. C. Standley, 9 June, 1906, the collection well represented in U. S. Herb.

MORUS CANINA. Leafy twigs of the season reddish, glabrous, the branches yellowish: foliage as far as known without lobes; leaves smaller than those of *M. microphylla*, broadly subcordate-ovate, $\frac{3}{4}$ to $1\frac{3}{4}$ inches long, $\frac{1}{2}$ to 1 inch wide, closely and sharply serrate-dentate, at apex subfalcately short-acuminate, subcoriaceous, dull light green and coarsely muricate-scabrous above, beneath of a yellow-green hue and polished, hispid along the veins, and with a sparse showing of pustulate-strigose hairs between them.

Dog Spring, southern New Mexico, 25 May, 1892, Dr. E. A. Mearns.

MORUS ALBIDA. Twigs of the season lightly velvety-tomentose, the maturer branches glabrous and of a decidedly yellowish gray: petioles $\frac{1}{2}$ inch long, velvety: leaves of vigorous sterile branches 3-lobed and rather regularly so, about $2\frac{1}{4}$ inches long, $1\frac{1}{2}$ wide, those of fruiting twigs cordate-ovate and much smaller, about $1\frac{1}{2}$ inches by 1 inch, all evenly and sharply serrate as well as with a short acumination, upper face extremely rough with a close low tuberculation of which the very sharp points can be felt, but hardly seen with an ordinary lens, lower face rather softly strigose-pubescent, the veins and veinlets showing but few rather short and not very rigid spreading hairs; texture of leaf firm membranaceous, color of a decidedly light green.

Berend Creek, Sierra Co., New Mexico, 22 May, 1904, O. B.

Metcalf, who reports that the tree grows in dry sand, at an altitude of about 5,000 feet in the mountains. It bears more likeness to *Morus alba* than do other southwestern species.

MORUS CRATAEGIFOLIA. Probably a small tree, the stout branches of two or three years light-grey, glabrous, but leafy twigs of the season, as well as the short stout petioles attached to them hirsute-tomentose: leaves small, of some diversity of form on the fruiting branches but in general broadly subcordate-ovate, coarsely serrate, abruptly acuminate, those inclining to be 3-lobed only incisely, not sinnately so, dimensions only 1 to 1½ inches by ½ to 1 inch; texture hard and subcoriaceous, color deep rather dull green as to both faces, the upper very harsh with coarse dense murications, lower strongly stiff-hirsute or almost hispid along the veins, the area rather sparsely, finely and very sharply muricate.

Collected at the mouth of the Blue River, a tributary of the Gila, in southeastern Arizona, 14 June, 1905, by Walter Hough. In what is their most usual cut, the foliage much resembles that of some of the more incised crataegi.

MORUS RADULINA. Branches more slender than in the last, neither quite straight nor yet obviously flexuous, only puberulent, not tomentulose even when growing: leaves smaller, broadly cordate, some without lobes, a greater number 3-lobed as in the last, more notably acuminate, the margins crenate-toothed: texture almost subcoriaceous, the upper face dull-green, minutely and closely muricate-scabrous, the points scarcely visibly hair-tipped, lower face of a lighter and more vivid green, hispid along the veins and veinlets, the general area between them only sparsely scaberulous: fruit unknown.

Specimens collected somewhere in Arizona, Aug., 1896, by B. E. Fernow; in what part of the State is not really indicated by the merely local name Beaver Creek.

MORUS CONFINIS. Fruiting twigs of the season densely leafy, reddish, villous-tomentulose, branches yellowish-brown, glabrous, foliage of fruiting branches very copious, the smallest

known in the genus, and uniformly devoid of lobes and sinuses, their outline subcordate-ovate, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, incisely and sharply serrate, and, for the size of the leaf coarsely so, the apex cuspidate, but hardly acuminate, the upper face dull, very roughly muricate-scabrous and with scarcely visible veins, the lower of a bright yellowish green, the much lighter veins and veinlets raised and very conspicuous, hispidulous with short hairs, the general area only sparsely and obscurely muriculate.

Santa Rita Mountains, extreme southern Arizona, C. G. Pringle, April and May, 1881. A sterile branch from the same locality, by David Griffiths, 1902, has nearly all its leaves regularly 5-lobed. Presumably it represents the same species.

MORUS MICROPHILYRA. Branches rather slender and tortuous, yellowish-brown and glabrate, but twigs of the season, as well as the short petioles and slender pedicels of the fruit quite villous: leaves of fruiting branches much diversified as regards width but none lobed, mostly of very broad cordate-ovate outline, some almost suborbicular, the more rounded 1 inch long and of the same width, the more ovate $1\frac{1}{4}$ inches long by 1 inch broad, all rather evenly and lightly serrate, the apex subfalcately short-pointed, both faces subcinereous and rather soft to the touch with a fine strigose pubescence: pedicels filiform, as long as the fruit itself.

Santa Eulalia Plains, Chihuahua, Mexico, collected by Mr. Wilkinson in 1885. The average pattern of the leaf here is precisely that of linden trees, though so very small; and the species is named in allusion to this.

MORUS GRISEA. Sterile branch stout, straight, at intervals of 2 inches parted into rigid ascending leafy twigs, the bark of both branch and twigs copiously short-tomentose: leaves of broadly cordate-ovate outline, $1\frac{1}{2}$ inches long, of the same breadth just above the base, but deeply and regularly as well as quite constantly 3-lobed, the lobes subequal, or now and then the terminal lobe smaller than the two basal, this one always cuspidate-acuminate, the whole leaf margin rather coarsely serrate-toothed, the texture uncommonly firm, almost subcoriaceous, both faces colored much alike and subcinereous, the upper extremely rough with a dense investiture of hair-tipped pustular elevations, the lower densely hirsutulous along the veins and sparsely tomentulose between them, the whole lower face as soft to the touch as the upper is harsh and rasp-like: fruit unknown.

The fine specimen of this is on U. S. Herb. sheet 41506, and purports to have been collected forty years ago, by Dr. Edw. Palmer, at "Hell Cañon, Arizona"; I presume in the northwestern part of the State, in some arm or tributary of the Grand Cañon.

A Further Study of *Agoseris*.

It is now twenty years since the name *Agoseris* was restored by me to its place as the rightful name for a large cichoriaceous genus of western North America. In the paper wherein this proposition was announced (PITTONIA, II., 176-179) some twenty-three species were indicated. In the course of the two decades that have intervened, I have discovered and published a few others from various parts of the farther West. In the year 1906 Mr. Rydberg was able to list for Colorado alone twenty-two species, eight of these having been added to the Colorado flora by himself, and two of them by Mr. Geo. E. Osterhout, an excellent botanist resident in Colorado. Yet at the time when Mr. Rydberg was preparing the Flora of Colo-

rado, one fine species from Colorado collected by myself in 1896 was yet unpublished. I place this first in the line of new species herein described.

In its vastness *Agoseris* almost seems to replace in this country *Hieracium* of the Old World. I think that something like seventy species have already been published; and I should not wonder the number existing on the plains and slopes and summits of the West yet undiscovered should amount to seventy more. It would be no more remarkable than that there should be two or three hundred species of *Hieracium* on an equal extent of Eurasian territory; and the number of two hundred species there in *Hieracium* is a very conservative estimate.

AGOSERIS LONGISSIMA. Plants 2 feet high and more, glaucous, mainly glabrous; leaves erect, more than a foot long, narrowly linear, entire, acute, loosely curled-hairy marginally near the base, the plant otherwise wholly glabrous: heads small for the plant, the involucre rather many-flowered, but less than an inch high, the bracts all triangular-lanceolate, acute, the outermost shorter and a little broader than the others, without trace of pubescence: achenes about 5 lines long, very slender, tapering to a striated and hollow beak, this in those of the dark-colored outer series of less than one-third the length of the body, in the whitish median ones of nearly half the length of the body: pappus white, very delicate and fragile.

Collected only by myself, on the Little Cimarron River, 29 August, 1896, the specimens all in my own herbarium. Remarkable for the great height of leaves and scapes, and the small heads, but these on decidedly stoutish and firm scapes.

AGOSERIS VICINALIS. Plants a foot high more or less, with glabrous glaucous herbage and more or less depressed or merely ascending leaves, these lance-linear, entire, acutish, of less than half the length of the somewhat slender scapes, these usually decumbent at the very base, thence ascending or else quite erect: involucre rather many-flowered and broad,

less than $\frac{3}{4}$ inch high; bracts remarkably consimilar, all being narrowly lanceolate, the outer series not much shorter than the inmost, the number of series rather definitely two: achenes about 5 lines long including the stout beak which is not much shorter than the body; pappus soft, white, of nearly the same length as the achene.

Low prairies at Brookings, South Dakota, June, 1891, T. H. Williams; type in U. S. Herb. The locality is interestingly near to that whence the original of *Troximon glaucum*, Nuttall, came, which was Fort Mandan. Nuttall's plant, however, was said to have a much imbricated involucre of pubescent scales.

AGOSERIS ISOMERIS. Stout and low, glabrous throughout, glaucescent rather than glaucous, the scapes stout, strongly striate, 4 to 6 inches high and nearly twice the length of the depressed or ascending rather ample foliage: leaves oblong or lance-oblong, entire or the margins somewhat full and crisped, at apex merely acutish, the base narrower and petiolar: involucre $\frac{3}{4}$ inch high, rather many-flowered, the bracts in rather more than two series but of almost precisely equal length, the outer oblong or lance-oblong, the inner lanceolate, these acute, but hardly so the outermost: flowers apparently yellow: fruit not known, but doubtless beakless.

Fish Lake, Uintah Mountains, Utah, 18 July, 1902, Leslie N. Goodding. This plant, so well marked in habit, and with such a peculiar involucre, must be almost or quite alpine, the altitude of Fish Lake being nearly 9000 feet.

AGOSERIS TARAXACOIDES. Subalpine, with the habit of the last, but taller, the scapes 4 to 8 inches high, the leaves less than half as long, these deep-green but glaucous, variously toothed and pinnatifid, some closely and coarsely dentate, others more truly pinnatifid, but the lobes or segments divaricate, their margins at the base arachnoid-woolly, otherwise quite glabrous: scapes somewhat woolly, under the involucre; these 1 inch high or less, the outer bracts lanceolate, their

margins arachnoid-woolly, the inner long and lance-linear, acute, marginally naked: achenes nearly cylindrical below the rather long beak, those of the outer series pubescent, the inner all glabrous; pappus copious, soft but not fragile, its length about that of achene inclusive of the beak.

At 8000 feet, near Marysvale, Utah, collected by Marcus Jones, 2 June, 1894; fine sheet of type specimens in U. S. Herb.

AGOSERIS CAUDATA. Low rather slender subalpine perennial, the leaves and scapes from a strong but herbaceous tap-root with sometimes a branched crown, this not in the least woody or caudex-like; herbage glaucous, glabrous: leaves much depressed, or else ascending, of about the length of the scapes, all from somewhat above the middle cut deeply into narrow strongly deflected segments, but the upper part of one entire narrowly linear and caudate-acuminate piece: scapes only 2 or 3 inches high, erect, each surmounted by a head rather narrow and few-flowered, but of extraordinary length, being $1\frac{1}{2}$ inches high in mature fruit, including the pappus, the involucre alone 1 inch high or more; its bracts rather few, the outer oval and acuminate, the very long inner ones lance-linear: achenes very slender, linear-fusiform, 7 lines long inclusive of the slender and not short hollow beak; pappus firm, smooth, not fragile.

Singularly well marked species, from 8000 feet in Salina Cañon, Utah, collected by Marcus Jones, 15 June, 1894; type in U. S. Herb.

AGOSERIS CONFINIS. Subalpine low stoutish perennial with branching caudex; herbage pale and glaucous, in the main glabrous also: leaves lance-linear, mostly entire, glabrous: scapes 3 to 6 inches high, ascending, or even at base quite strongly decumbent, somewhat sparsely or loosely flocculent at base, also strongly so under the involucre, this broad and many-flowered but scarcely $\frac{3}{4}$ inch high; short outer bracts triangular-ovate, the innermost lanceolate, none acute, all

purple in the middle and glabrous except marginally, there somewhat white-woolly: achenes including the short stout beak $\frac{1}{2}$ inch long, the pappus soft, dull white, nearly as long.

Marysvale, Utah, and Buckskin Mountains, Arizona, at altitudes of 9000 and 10000 feet, Marcus Jones, Aug. & Sept., 1894; specimens in U. S. Herb.

AGOSERIS LONGIROSTRIS. Crown of root simple or branching but fleshy like the root, not subligneous; scapes erect, a foot high; herbage very pale and glaucous, mainly glabrous: leaves ascending or suberect, 4 to 6 inches long, very narrowly linear, attenuate to a long almost filiform summit, mainly entire, some with a few remote short teeth, others as many short slender lobes, all perfectly glabrous: scapes slender, showing a few long soft hairs almost throughout, but more conspicuously below the middle, terminally under the head scantily white-woolly; involucre an inch high, subcylindric, the bracts very white but showing purple dots, the outer oblong, acute, scantily and even interruptedly woolly-ciliate: achenes long and slender, tapering very gradually to a slender beak (not pappus stipe) of their own length.

At 9000 feet, near Fish Lake, Utah, Marcus Jones, 4 Aug., 1894. An elegant plant by its almost filiform foliage, remarkable for the length of the beak of the achene, for the plant is of the *A. glauca* group.

AGOSERIS LONGULA. Scapes stout, 2 feet high, but foliage only one-third as long, the whole plant glaucous, also glabrous as to all the vegetative organs: leaves narrowly linear to lance-linear, acute, often entire, as often with here and there a short salient tooth: involucre many-flowered, $1\frac{1}{4}$ inches high, bracts more numerous than in the last, in three series, all triangular-lanceolate, acuminate, the outermost series of about one-third the length of the innermost, the tapering upper part of the middle series more or less distinctly bristly-ciliate: achenes 6 lines long, extremely slender, the beak though slender striated, nearly half as long as the body; pappus fragile.

Type specimens collected by myself on prairies of the Humboldt River at Deeth, Nevada, 14 July, 1896. Mr. Heller's 9130, from Deeth, in 1908, has oblong-linear rather short foliage, but scapes and heads as in *A. longula*, though the bracts of the involucre are wholly naked. The achenes in his specimens are far from mature.

AGOSERIS LAPATHIFOLIA. Large and rather coarse perennial, with stout scapes 2 feet high, and rather ample foliage of 4 to 8 inches length; herbage glabrous and greenish, not glaucous but glaucescent only: leaves lanceolate, acute, entire, narrowed very gradually below to a short winged petiolar part not amounting to a petiole; heads broad and many-flowered, but the involucre barely an inch high, their bracts lanceolate, acute, glabrous, the outer only shorter and more herbaceous than the inner: achenes with stout beak one-third as long as the body; pappus rather firm, scaberulous, much longer than the achene.

Above Houston, Idaho, L. F. Henderson, 1896; his n. 3681 as in U. S. Herb; the broad foliage remarkably green rather than pale and whitish, and quite recalling the foliage of dock.

AGOSERIS LACERA. Tall and rather slender perennial, the scapes erect from the very base and 2 feet high, the foliage suberect, more than half as high, this and the scapes below the middle clothed thinly with long sordid crisped hairs, but all the herbage very pale as with bloom: leaves linear, long-attenuate at apex, usually entire below the middle, above it cut deeply into a few subulate-linear nearly straight and ascending or suberect segments: heads very small for the plant, the involucre only $\frac{3}{4}$ inch high, its bracts all lance-linear and consimilar, the outer as usual shorter, but in proportion not much broader, all attenuate-acute and villous-ciliate: achenes short and shortly beaked, the whole hardly as long as the fine barbellulate white pappus.

Pullman, Washington, 28 July, 1899, C. V. Piper, in U. S. Herb., under the collector's n. 3027.

AGOSERIS MICRODONTA. Coarse and tall perennial of low meadows, the stout scapes 1 to 2 feet high and more supporting large many-flowered heads, the leaves not rarely a foot long and more; herbage pallid and glaucescent, glabrous in the main, the scapes and leaf-margins at least, sometimes the leaf surface, more or less crisped-hairy: leaves lanceolate, narrowed gradually to a distinct winged petiole, its margins lanate-ciliate even in leaves otherwise glabrous, most leaves saliently if even remotely denticulate, in some plants with few and larger teeth: involucre $1\frac{1}{2}$ inches high, 1 inch broad at summit, the summit of the scape under them either tomentose or scarcely so; bracts many and imbricated, none very broad, the outermost triangular-lanceolate, the rest more and more narrowly lanceolate, all villous-ciliate, sometimes also appressed-villous on the back, all the pubescence brownish: achenes 7 lines long including the hollow beak, this more than half as long as the body, the outer series dark-colored and very strongly serrulate-scabrous at summit, those next in order pale, less scabrous, the central all abortive; pappus not as long as the achene, very fine and fragile.

Coarse large species of southeastern Washington, said to be common about Pullman, in low meadows, where it has been collected and distributed by Mr. Piper and by Miss Hardwick. There are three good sheets of it in U. S. Herb., of the years 1901 to 1905.

AGOSERIS PROCERA. Very large and stout, the scapes 2 feet high, the foliage ample, upright, a foot high or more; herbage wholly glabrous, of a dull pallid green, merely glaucescent, blackening in the drying: leaves narrowly lanceolate above the long and rather wide petiolar basal part, sparingly and variously toothed, attenuately acute at apex: involucre many-flowered, an inch high only, but quite as broad, the numerous bracts all narrow, much imbricated, triangular-lanceolate, slenderly acuminate, some obscurely villous-ciliate toward the apex, otherwise glabrous; ray-flowers apparently more or less villous-arachnoid externally: achenes not known,

but by inference from the shortness of the broad heads, little elongated and shortly if at all beaked.

Largest of the genus as far as known, and from near Ellensburg, Washington, 17 June, 1897, by Kirk Whited; his n. 507 as in U. S. Herb. By the much imbricated and slender involucrel bracts the plant recalls the genus *Scorzonella*.

AGOSERIS LANULOSA. Low perennial with branching caudex above a deep-seated taproot; scapes rather slender, 2 to 4 inches high; foliage half as long or less, inclined to be depressed, the whole plant pale as with bloom and almost canescent with a thin coat of fine downy-looking tomentellous pubescence: leaves oblong and lance-oblong, acutish, mostly entire, some with a few short salient teeth, some retrose, others falcately ascending: involucre many-flowered, not small for the plant, nearly $\frac{3}{4}$ inch high, their bracts rather definitely in 3 series, the outermost ovate, the middle oval, the inner narrowly lanceolate, all except the inner finely tomentellous, most strongly so on the margin: achenes, slender-fusiform, their stout hollow beak of nearly half the length of the body; pappus uncommonly short.

Kittitas Co., Washington, J. S. Cotton, his n. 1752 as in U. S. Herb. No special part of the county is named. The plant is evidently subalpine in the mountains there.

AGOSERIS VESTITA. Stout low subalpine perennial, older plants with branching caudex, the branches covered below with a scaly coat of old leaf-bases, the stout scapes 2 to 6 inches high and of about twice the height of the foliage, the herbage merely glaucescent underneath a thin coat of tomentellous pubescence: leaves elongated-oblong, most of them entire or but obscurely denticulate, a few with several salient triangular teeth: involucre broad, $\frac{3}{4}$ inch high, the bracts broad and much imbricated, the outer ovate, acute, the very innermost series broadly lanceolate, all much obscured by a dense woolly tomentum most copious on and along the margins, thinner on the back of the bracts: achenes short,

subcylindric, hardly even narrowed at summit, the long firm pappus sessile on the body of the achene.

Rocky ground at 8000 feet on Mt. Rainier, Washington, C. V. Piper, 1895; his n. 2149 as in my herbarium.

AGOSERIS ANGUSTISSIMA. Tufted perennial, with numerous upright slender scapes about a foot high, and the narrowest of leaves about half as long, either upright or ascending, not depressed; the whole plant pale and glaucescent: leaves very narrowly linear, attenuate-acute, glabrous above, but basally crinite-ciliate, the whole leaf commonly quite entire, yet very often showing one or more pairs of narrow subfalcate lobes or segments an inch long or less: peduncles lanulose under the involucre, the woolliness extending up along the margins of the bracts, these lance-linear and elongated, not even the outer series much wider than the inner, but only shorter: flowers few in the head, apparently rose-red: achenes consimilar, slenderly fusiform, much exceeded by the slender beak, the very delicate and fragile pappus still longer.

Fir glades, bordering the eastern shore of Diamond Lake, extreme southeastern Oregon, collected by Coville and Applegate, 6 August, 1897; also by the same collectors, on 17 August in the same year, shore of lake south of the Three Sisters, in the Cascade Mountains; copious and fine specimens in U. S. Herb. The plant has been taken by some one for *A. aurantiaca*, and the specimens are so labelled, but the nearest affinity is *A. gracilens*, a name which better befits this plant than it does the real thing that is so named.

AGOSERIS VULCANICA. Stout, low, the upright scapes and ascending foliage from a branching caudex, the scapes not greatly surpassing the leaves and 6 inches high or less: leaves glabrous, oblong-linear, rather blunt at apex, though tipped with a gland-like mucro, mostly entire, some with an obscure tooth or two on either margin: flowers unknown: scapes sparingly hairy above the middle, densely so under the head, the bracts woolly-ciliate, otherwise glabrous or nearly so, the

outer oblong-lanceolate, the inner lanceolate, all dark-purple except as to the green margins: achenes fusiform, purple, stoutly short-beaked, the pappus long, not very delicate, yellowish-white.

Strongly marked low glaucous species known only as collected by Mr. F. V. Coville, 14 Sept., 1902, "on a slope of firm pumice gravel," in the Crater Lake National Park, Oregon.

AGOSERIS COVILLEI. Size of the preceding, but caudex mostly simple: leaves linear to lanceolate, acutish, not gland-tipped, glabrous, some entire, others variously somewhat crisped and irregularly toothed: scapes little surpassing the leaves, sparsely curled-hairy throughout: involucre broad, its outer bracts ovate-lanceolate and short, the others gradually narrower, all sparsely curled-hairy on the back, naked or nearly so marginally: flowers large, yellow: mature achenes unknown, but without doubt short-beaked.

Collected by Mr. Coville at the same place and date as the foregoing, this one in full flower, the other in fruit only; the two species notably dissimilar.

AGOSERIS DECUMBENS. Low perennial with depressed leaves and decumbent scapes resting on a simple taproot without definite intermediary caudex: leaves glaucous, entire, linear but above the middle tapering to a long acute apex, glabrous except as showing a few long loose marginal hairs near the base: scapes stoutish, not notably striate, the longest 4 or 5 inches long, loosely hairy at base and to above the middle: involucre $\frac{3}{4}$ inch high, glabrous, the bracts in about 3 series, all lanceolate, the inner series not narrower than the outer, those of no series acute, not yet notably obtuse: achenes whitish, narrowly fusiform, with distinct but very short white beak, this supporting a copious firm shining-white pappus that is longer than the achene as a whole.

Fir glade on east bank of Diamond Lake, Douglas Co., Oregon, 6 Aug., 1897, by Messrs. Coville and Applegate.

Species most distinct both in habit and character from *A. angustissima* which is of the same locality.

AGOSERIS PRIONOPHYLLA. Size and habit of the last, except that the foliage equals or even surpasses the scapes, the herbage similarly rather arachnoid-hairy: leaves when entire narrowly linear, most of them broader, the margin beset with rather remote broad and short two-fold teeth, or toward the apex smaller but very salient simple teeth: involucre little more than $\frac{1}{2}$ inch high, its bracts broadly lanceolate, those of the outer series and of the middle one appressed-villous on the back and strongly villous-ciliate, the pubescence all straight and fuscous: achenes with short stout beak, and short firm dull-whitish pappus.

Mount Hood, Oregon, Aug., 1893, T. J. Howell; his n. 1939 as in my herbarium.

Very distinct from the last by its involucre and achenes; also very peculiar as to the double dentation of the leaves which seem beset with broad short teeth each broadly and deeply notched, as one sees the teeth in the large crosscut saws, so called, of the lumbermen.

AGOSERIS HOWELLII. Low and probably subalpine, the crown of the root often parted but not subligneous; scapes slender, 4 to 7 inches high, not greatly surpassing the suberect foliage; herbage deep-green, barely glaucescent, sparsely somewhat cobwebby-hairy: leaves broadly linear, attenuate-acute, entire or with few and remote elongated subfalcate segments; scapes tomentose under the involucre, this $\frac{3}{4}$ inch high, few-flowered and narrow, the bracts all lance-linear, obtusish, the outer series shorter and relatively broader, glabrous on the back, marginally short-woolly, the inner altogether glabrous: achenes nearly cylindric and linear, tapering quite abruptly to a not slender beak longer than the body: pappus not long, dull-white, rather firm.

Mount Hood, Oregon, Aug., 1881, T. J. Howell, his n. 142 as in U. S. Herb.; the species remarkable for the abruptness

with which the achene tapers to its beak ; yet is the plant in no way nearly allied to *T. retrorsum*.

AGOSERIS CINEREA. Perennial, the scapes stoutish, 2 feet high, the suberect foliage one-third as long, the whole plant glaucous, and also still paler by a coat of short roughish tomentellous pubescence : leaves of somewhat oblanceolate circumscription, obtusish, but tipped with a short gland-like mucro, the margin in some entire, in others with a few deep falciform segments or lobes : involucre $1\frac{1}{4}$ inches high, many-flowered, the bracts appearing as in but two very unequal series, the outer oblong-oval, acutish, the others narrowly linear-lanceolate and twice or thrice as long as the outermost, all glabrous for the most part, but some with tomentose margins : achenes small for the plant, linear-fusiform, surmounted by a delicate almost capillary pappus-stipe $\frac{3}{4}$ inch long ; pappus rather short, its very firm bristles distinctly scaberulous and not fragile.

Santiago Mountain, Orange Co., Calif., June, 1901, Le Roy Abrams ; his n. 1816 as in my herbarium.

Some Western Roses.

ROSA HELIOPHILA is a name that may be substituted for my *R. pratincola* published in 1899 (Pitt. iv. 13), for there is a *Rosa pratincola* of Europe, by A. Braun, which was published in 1888.

In the dozen years that have passed since I named and described this half herbaceous rose of the sunny prairies of the middle West, several other forms like it in its low stature, merely suffrutescent growth, and corymbose terminal inflorescence, have come to light, and may be named and defined here.

ROSA LUNELLII. Stems erect, simple, a foot high or more, armed rather densely with short and slender nearly colorless

prickles all straight and spreading; infrastipular spines none: leaves of a livid bluish-green on both faces, but in age quite glaucous, the rachis faintly short-villous, often with here and there a small prickle, also a few small sessile glands; stipules broad and entire, yet mostly revolute, thus seeming narrow, those of vigorous growing shoots often closely beset with sessile glands, but of older and flowering shoots glandless; leaflets of young shoots 9, of older ones 7, or even 5, small, sessile, oval and oval-elliptic, finely serrate, smooth and glabrous above, scarcely pubescent beneath except along the midvein, and this only lightly so; but margins more loosely villous: flowers corymbose; peduncles and calyx-tube glabrous; sepals marginally villous, the outside beset with many sessile or sessile glands: fruit rather large, depressed-globose, orange-red.

Open borders of woodland about Devil's Lake, North Dakota, collected by Dr. J. Lunell, 18 Aug., 1910. Differs from *R. heliophila* in that (1) the whole plant is more glaucous, (2) the prickles are far more numerous, more equal in size, and far less firm, being hardly more than bristles, (3) leaflets of less than half the size, (4) of elliptic and not obovate outline, (5) sepals glandular with sessile glands. The species is well isolated, geographically, from *R. heliophila*, which, however, is on the prairies of South Dakota, and of North Dakota, and with its own characters.

ROSA RYDBERGHII. Stems erect, simple, less than a foot high, densely leafy, rather loosely armed with short stoutish straight and spreading prickles; infrastipular spines none: leaves very glaucous above, of something approaching copperas-green beneath, yet with a trace of bloom, the rachis beset rather closely with short-stipulate and sessile glands of several sizes, also with a few stout short prickles; stipules entire as to the adnate part, this with, or more commonly without villous marginal hairs, the few lobes conspicuously crenate-serrate, glabrous; leaflets 7, large for the plant, very

notably petiolulate, broadly oval or even somewhat rhomboid-oval, deeply sharply and closely serrate, the acutish apex aristate-mucronate when young, this mucro deciduous, both faces glabrous, the lower marked with feather veins but no reticulation: flowers in a closely sessile terminal corymb: ovary glabrous; sepals apt to be glandular, the glands nearly sessile.

This fine well-marked rose of the subherbaceous group is known only as collected by Mr. Rydberg (his n. 1932), in central Nebraska, in July, 1893; the special locality being hills near Plummer Ford, Dismal River, Thomas County. Of the same low mainly herbaceous character as the foregoing, this plant is (1) glabrous, the leaflets (2) very notably petiolulate, (3) reversing the usual order they are very glaucous above, and of a deeper green beneath.

ROSA RUDIUSCULA. Stems 2 feet high, woody to the summit, but simple except as to flowering twigs, densely prickly, the prickles unequal, none very long, all slightly deflected, scarcely curved: leaves green and glabrous above, glaucescent beneath and there villous along the veins, the rachis similarly villous, but scarcely prickly or gland-bearing; stipules small, entire, obscurely villous-margined; leaflets 5 or 7, small for the plant, sessile, the terminals elliptic, laterals narrowly oval, all lightly closely and evenly serrate: peduncles and the whole calyx more or less obviously beset with short stout strongly gland-tipped bristles, but otherwise glabrous: fruit small for the plant, depressed-globose, the sepals persistent and closely reflexed over it.

Shrub said to be common in rocky woods in the northwestern part of Missouri, as collected by Mr. B. F. Bush, and distributed by him for *R. Arkansana*, under numbers 160, 167, 170, 208, etc., chiefly in the year 1896. It is plainly of the group of *R. heliophila*, often flowering like that only corymbosely at the end of a tall shoot of the season; but this tall shoot becomes a strong woody stem to flower the next year from mostly one-flowered lateral twigs. By characters

of leaf and fruit it is clearly distinguishable from the more common half-herbaceous thing so widely dispersed on open prairies. There are traces of this same *R. rudiuscula* in U. S. Herb. from Kansas and Nebraska, but no satisfactory specimens like these excellent ones by Mr. Bush.

The two roses next succeeding, while apparently of low growth and small, are removed from the *R. heliophila* alliance by a truly shrubby growth, lack of the dense bristly prickliness, and the presence of conspicuous infrastipular spines. Their habitat is far beyond the prairies, in the region of the Rocky Mountains.

ROSA FIMBRIATULA. Low, much branched, the branches slender, scarcely armed except by pairs of infrastipular prickles, these stoutish, straight, spreading; leaves small, green and glabrous on both faces, neither face shining, the lower paler; rachis very slender, but beset with a few singularly stout prickles and a greater number of short ones that are strongly gland-tipped; stipules broad and foliaceous for the size of the plant, entire, edged all around with short-stalked glands forming a close series; leaflets 7 or 9, small, short-petiolulate, broadly cuneate-obovate, very obtuse, deeply and finely serrate all around except at and near the base: flowers in corymbs of 3 to 5 at the ends of the branches: fruits small, depressed-globose, smooth and glabrous; sepals persistent, erect, more or less stipitate-glandular.

The type specimens of this are from Montana, and were collected by Lester F. Ward, in what year we are not informed; but they are autumnal specimens, the date being given as Sept. 1. The locality is specified as "Right bank of the Missouri River, 15 miles below Round Butte." Some one appears to have named the plant as *R. Californica* var. *ultramontana*; but a note attached to the sheet, in the hand of Mr. F. Crépin, reads "an *Rosa Woodsii*, Lindl.?" The trouble with *Rosa Woodsii* is, that no one can find, anywhere in the West, a wild rose answering to the description that Lindley

gave of it; for he attributed to it a foliage shining above, paler beneath; and there is no western rose known to us with leaflets polished or shining above. Moreover, he who will read Lindley's account of the origin of *R. Woodsii* will see that its pedigree is quite too mythical. The seed from which the bush grew may have come from "near the Missouri," and it may have come from some part of the world very remote from the Missouri.

ROSA SANDBERGII. Stout, rigid, much branched but low, the branches glabrous, reddened, sparsely armed with short stout slightly curved prickles: leaves small, with rather crowded small leaflets; rachis slender, glabrous, glandless and with no trace of prickles; adnate part of stipules narrow, thin, glabrous, glandless, the lobes dilated, abruptly acuminate, their margins with some few sessile glands; leaflets 5 to 7, thin, obovate, obtuse, sharply serrate, rather pallid and glaucescent as well as wholly glabrous on both faces: flowers mainly solitary at ends of short twigs; calyx glabrous except as to the pubescent margins of the sepals: fruits small, globose, smooth and glabrous, crowned with the persistent small sepals.

Colgate, Dawson Co., Montana, collected in 1892 by Messrs. Sandberg, MacDougal and Heller; their n. 1009 as in U. S. Herb.

A Cruciferous Monotype.

SANDBERGIA. Perennial herbs, in habit, vegetative characters and stellately hoary indument recalling the Physarieae. Flowers small, white, at first almost corymbose, but passing to long loose racemes in fruit. Leaves simple, chiefly in a basal tuft surmounting the short caudex and its branches. Sepals subequal both at base and throughout, short, broad, obtuse. Corolla regular; petals with broad ligulate claw and broader

spreading limb. Stamens 6, short, nearly equal; filaments stoutly subulate; anthers small, ovate, acute. Ovary linear; stigma depressed and sessile. Siliques linear, straight, narrow, only moderately compressed; valves with strong midnerve; seeds in one row, not strongly flattened, oval-oblong, wingless.

S. WHITEDII. C. V. Piper under *Arabis*. This cruciferous type of the Northwest, seen in flower only would be taken for a member of the genus *Lescuriella*, several whitish-flowered or pinkish species of which are very much like this in all except their pods. But in *SANDBERGIA* the pods are really linear—even narrowly linear—siliques; but it does not at all follow from this that the plant is an *Arabis*. There are plenty of genera, *Arabis*, *Sisymbrium*, *Erysimum*, *Stenophragma* and many others into which pods like these are easily admissible; while the flowers of the present type are as far from those of any *Arabis* as can be well imagined. I am constrained by its floral characters, together with its completely vesicariaceous habit and indument to propose for it the rank of a genus, and I willingly dedicate it to him who first collected it, Dr. J. A. Sandberg, whose name is already widely known as a collector.

Four New Potentillaceae.

POTENTILLA VALLICOLA. Stout and short branched caudex surmounting a thick subligneous root: stems slightly decumbent, a foot high or more, almost naked above the base, terminating in a rather contracted cyme, both stem and lower face of all leaves silvery-tomentulose, but upper face darker, yet canescent with a very thin coat of short silky hairs: basal leaves about 4 inches long, not depressed, the petiole and leafy rachis about equal as to length; leaflets 7 to 9, closely approximate, 1 to $1\frac{1}{4}$ inches long, oblong in outline, deeply and incisely serrate, the upper pairs decurrent on the rachis: corolla not seen; mature calyx villous with long white hairs,

its segments triangular-lanceolate, very acute, the bracteoles less than half as long, lanceolate: carpels 8 or 10, small, smooth, dull-green.

Fort Valley, northern Arizona, at 7250 feet altitude, 4 Sept., 1909, H. D. Burrall.

POTENTILLA MOGOLLONICA. Perennial, of the *Leucophyllae* (Rydb.), but of low stature, thinnish texture, the plant in no part whitened with indument: basal leaves barely 4 inches long inclusive of the short petiole, the leaflets 5 to 7, pinnately arranged and approximate, 1 to 1½ inches long, oblong or obovate-oblong, coarsely and rather acutely serrate, the upper pair strongly decurrent, lower face hoary with both a thin close tomentum and some long slender appressed hairs, upper face quite green but with scattered long appressed hairs, this kind more conspicuous at the margins of all leaflets: flowering stems slender, ascending, surpassing the foliage by no more than 1 or 2 inches, the flowers few and on slender pedicels: calyx thinly appressed-villous, deeply cleft, the segments ovate-lanceolate, acute but not strongly so, bracteoles lance-oblong, short: petals of twice the length of the calyx, light-yellow, very retuse but scarcely obcordate; pistils apparently only 5 or 6.

Mogollon Mountains, New Mexico, 25 Aug., 1903, O. B. Metcalfe, distributed for *P. ambigens*, under his n. 594; but the sheet in U. S. Herb. (n. 495585) shows two specimens of the plant here described, and one of the very different thing, *P. propinqua*, Rydb.

POTENTILLA WARDII. Tufted perennial, of the white-leaved group and with white indument: basal leaves many and almost upright, 2 to 4 inches long and the length mainly petiolar, the mostly 7 leaflets crowded upon a rachis of less than ½ inch; leaflets of firm texture, ½ to 1 inch long, closely and not very deeply subfalcately serrate, lower face white-tomentose without silky hairs except on the midvein, this densely clothed with them, upper face silvery-silky but

without trace of real tomentum; peduncles subscapiform, a foot high or less; calyx silky-villous, its segments ovate, acuminate, its bracteoles ovate-lanceolate and less than half as large: petals large, yellow, obcordate: fruit unknown.

Plant collected only by Lester F. Ward, at 11000 feet on Thousand Lake Mountain, Utah, 14 July, 1875. It has passed for *P. Hippiana*, though with totally different foliage and pubescence.

HORKELIA MYRIOPHYLLA. Tufted perennial, with rigid terete stems a foot high and more, yellowish and somewhat lustrous to the unaided eye, but under a lens sparsely glandular-puberulent, the flowers in a rather strict terminal few-flowered cyme: basal leaves linear, 4 to 6 inches long, glandular-puberulent without other hairiness of any kind, very small, crowded on the rachis, the leaf as a whole terete in its early stage, each leaflet divided to the very base into 5 or more unequal divisions; calyx of a short cup-like tube and much longer triangular-lanceolate acuminate segments, the bractlets of less than $\frac{1}{4}$ the size of the segments and lance-oblong: petals white, oblong-cuneiform, surpassing the calyx-segments and somewhat spreading: stamens 15 or 18, the filaments subulate, alternately long and short: pistils many.

Borders of mountain meadows at 7000 feet in the eastern part of Inyo County, California, collected 12 Aug., 1910, by some one employed in the U. S. Forest Service whose name has not been given. Each leaflet has the appearance of being a fascicle of distinct leaflets.

Three New Labiatae.

KOELLIA FASCICULARIS. Stems stout, strict, 2 feet high, bearing congested inflorescence at summit only, the angles densely villous-hirsutulous: principal leaves lance-linear, rigid, $1\frac{1}{2}$ to 2 inches long, entire, the margins revolute, hardly pubescent except marginally and on the veins beneath,

very conspicuously punctate on both faces, the axils of all bearing short branches not equalling the leaves and densely beset with small linear revolute leaves: flower-clusters small, capitate, their inner bracts margined by a whitish-woolly tomentum, as are also scarcely more than deltoid short calyx-teeth: corolla pinkish, purple-dotted.

Species apparently local on prairies near Chicago; collected by L. F. Ward, 16 Aug., 1897, and by Agnes Chase, 24 July, 1901.

KOELLIA HURONENSIS. Plant nearly a yard high, not stout for the height, the internodes long, axillary sterile branches elongated slender, only sparsely leafy, the whole plant deep-green, to the unaided eye glabrous, a lens showing the angles of the stem pubescent with hirtellous short hairs: main leaves elliptic-lanceolate, subsessile, 2 to 2½ inches long, not revolute, remotely denticulate, thin, glabrous on both faces or with a scanty short pubescence on the midvein and margins, veiny with about 5 pairs of feather veins, rather closely small-punctate: verticillasters in short spikes of 2, 3 or 4 terminating the few uppermost branches, nearly ½ inch in diameter, barely ¼ inch high: calyx hoary with a minute pubescence, the teeth more so, triangular but longer than broad, equal: corolla not seen.

Open prairie-like ground at Cassville, Michigan, on Saginaw Bay, an arm of Lake Huron; type specimens collected by Mr. Charles K. Dodge, 9 Sept., 1910. Its deep-green and glabrous aspect distinguishes it from all other *K. mutica* allies.

KOELLIA CURVIPES. Stems stoutish and rigid, rather acutely angled, 2 feet high, all parts equably tomentellous-puberulent, not even the angles showing other indument, all the foliage pale yellow-green as to the upper face, which is tomentellous like the stem, but lower face white with a denser tomentum, without traces of hairiness even on the veins; main leaves ovate, 1½ inches long, lightly serrate-denticulate,

all turned downwards on rigid curved petioles of $\frac{1}{4}$ inch, the few small fascicled ones sessile, widely spreading: floriferous branches few, remote, ascending, each with 1, or at most 2 glomerules, the largest 1 inch broad, $\frac{1}{2}$ inch high: bracts and calyx only more densely tomentose, devoid of hairiness; calyx-teeth slightly unequal, very short, merely deltoid but acute: corolla very short and small, tomentellous externally.

Specimens in U. S. Herb. from higher slopes and summit of Stone Mountain, Georgia, collected by John K. Small, 27 July, 1893. It is remarkable that a type so distinct in aspect and in important characters should have been allowed to pass for *K. albescens*.

Two Californian Columbines.

AQUILEGIA HYPOLASIA. Robust and tall, perhaps a yard high, the stout and somewhat fistulous stems with ascending flowering branches sparsely and somewhat viscidly hirtellous, the long peduncles more densely so: basal leaves 8 to 10 inches high and with large ample leaflets, the petiole and petiolules villous rather than hirtellous; leaflets $1\frac{1}{2}$ to 2 inches long and broad, 3-cleft to the middle, the sinuses narrow, the segments again 3-lobed and the lobes obtuse, upper face of a livid green and wholly glabrous, the lower almost as wholly soft-villous with long spreading very fine hairs, but these most signally developed along the veins and veinlets: flowers scarlet, small for so large a plant, their length little more than an inch, but spread of sepals much more than an inch, these individually narrowly rhombic-ovate, very acute, their claw short and wide; petals subtruncate, very short and thick: foli-
licles pubescent, acute at tip and there moderately divergent.

Indigenous to extreme southern California, in the moun-

tains, the flowering plant collected between Campbell's and Cameron's ranches, 21 June, 1894, by Edgar A. Mearns; the fruiting ones by the same collector between Pine Valley and Laguna, 11 Aug. 1894. Among scarlet columbines of California this one, strongly marked in character, is equally singular phenologically considered; for its flowering appears to take place in the dry season of the year. The 21st of June is the time of the blooming of aestival rather than vernal flowers. *A. truncata*, to which *A. hypolasia* is somewhat related, comes into flower in the coast mountains of even northern California in April.

AQUILEGIA ADIANTOIDES. Slender and tall, 2 feet or more: petioles of lower leaves 4 or 5 inches, 3 primary petiolules $1\frac{1}{2}$ to 2 inches, all these sparsely and delicately villous-hirsute, the short petiolules of individual leaflets quite densely so, the sparse but distinct indument of both faces of leaflets as delicate, but shorter and not spreading; leaflets of thin texture, smallish and rather remote, all deeply ternate-incised and the segments rather deeply crenate-lobed: flowers remote on long suberect peduncles, these shortly and rather stiffly hirtellous, especially so near the flower: sepals and petals scarlet, the former rhomboidal, acuminate, unguiculate, deflexed, almost equalling the short spurs: anthers ellipsoidal: follicles not seen.

Species known only as collected by the late W. H. Brewer, at New Idria, California, 24 July, 1861, his n. 797 as in U. S. Herb., on sheet 320308. It is labelled in Prof. Brewer's hand *A. Canadensis*. As to habit, pubescence, lax, delicate finely cut adiantum-like foliage, as also its distinctly rhombic sepals, it is a thing wholly apart from *A. truncata*, so common in middle California, which flowers in April and May only; this southern one, strangely, in July and August, and that not as a mountain or subalpine plant, but as one belonging to a more arid and heated part of California than *A. truncata* inhabits.

Accessions to Antennaria.

In the vast arid regions of our far Southwest, where also, especially in mountain districts, antennarias abound, there is a group of them the leaves of which appear to be marked by a narrow border of clear white which is in elegant contrast to the usually rather vivid green of the leaf as a whole when viewed from above. This effect, however, is due to the fact that leaves, green above and white beneath, have a narrow margin upturned in such wise as to show a strip of the lower-face whiteness around the green upper face.

Twelve years ago (Pittonia, iii. 290) I published the first member of this group, calling it *A. marginata*; but in the interval other plants from different parts of the desert Southwest, showing white margined leaves, all of which have been labelled *A. marginata*, some of them so named with my concurrence hastily given, it now appears after further examination, must be excluded as distinct from the original of that name.

ANTENNARIA FENDLERI. Plant flaccid rather than rigid, the growing stolons 2 to 5 inches long and assurgent, their leaves increasing in size toward the ends and there ultimately forming a rosette, green above, white tomentose beneath, those of full maturity and of the season preceding more than an inch long, the laminar part broadly obovate and very obtuse, passing with little abruptness to the much larger petiolar part, the green upper face showing, or even failing to show a faint white margin of the tomentum clothing the lower face: scapiform flowering stems of the pistillate plant 4 to 8 inches high, beset with 4 to 6 oblong acuminate suberect leaves an inch long, and these not glabrous above: involucre large, subcorymbose, the head as a whole $\frac{1}{2}$ inch high and subcampanulate, the green base of the involucre slightly arachnoid, the numerous white tips of all bracts lacerate-toothed across the summit which in the outer is obtuse, in the inner acutish: staminate plant unknown.

Immature pistillate plants were collected long ago by Fendler in 1847. These as in U. S. Herb. under his 1n. 52^a were by me too inadvertently cited as forming a part of my *A. marginata*. The description is here drawn from excellent specimens collected by Mr. and Mrs. Heller near or at what must have been the original station of Fendler, near Santa Fe, New Mexico, 29 May, 1897. Heller's number, as in U. S. Herb., is 3612, but on the sheet are but two specimens of *A. Fendleri*, the third being a good example of the very different *A. Holmii*, Greene, which we know only from Colorado.

ANTENNARIA PERAMOENA. Main stems unusually rigid and suffruticose, several arising from a perpendicular and stout central root, all prostrate and apparently rooting at all points; stolon-like new branches not striking root the first year, 3 to 5 inches long, closely leafy and equally so throughout, no rosette being formed at the end: leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, somewhat abruptly spatulate-contracted above the middle, the not well defined obovate apical and laminar part obtuse or abruptly and minutely mucronate-acute, texture unusually thin, upper face vivid-green, punctulate, sometimes scabrously so, surrounded everywhere by a narrow marginal line of the dense white pannose tomentum investing the lower face: pistillate plant unknown: inflorescence of the staminate on slender scapes only 2 or 3 inches high, very compact, of about 5 heads all sessile, the involucre not strongly lanate, the few bracts with broad and short very obtuse white tips: pappus-bristles, at least the outermost, with strongly flattened and irregularly incised lanceolate acute tips.

An uncommonly beautiful species of matted habit and long closely leafy branches, known only as collected by E. O. Wootton, at Wheeler's Ranch, New Mexico, 11 July, 1906.

This concludes the series of species with white-margined foliage.

ANTENNARIA HYGROPHILA. Plants formed into extensive but not compact mats, the stolons loosely leafy throughout,

the leaves more numerous at the ends but even these upright and not forming a rosette, the longest stolons hardly 3 inches long, slender, depressed, but firm: leaves of uncommonly thin texture, oblanceolate, acute, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, greatly narrowed toward the base, equally somewhat hoary on both faces with a thin cottony rather than woolly indument everywhere permanent, flowering stems of pistillate plants 4 to 8 inches high, slender, leafy with suberect leaves less than an inch long, linear, acuminate: heads compactly sub-corymbose; involucre of middle size, white-woolly as to the short herbaceous part of the bracts, but showing a very dark spot just at base of the long obtuse white tips, these in few series and little imbricated.

Collected at Marlette Lake, Washoe Co., Nevada, 10 July, 1902, by C. F. Baker, and distributed by him under the above name, and his n. 1296. Species seeming intermediate between my *A. media* and *A. parvifolia*.

ANTENNARIA PYRAMIDATA. Stems tufted on a short stout ligneous caudex and 5 to 7 inches high, very notably leafy, the lowest cauline leaves crowded and as large as the basal, diminishing only very gradually toward the inflorescence, these and the stem densely white-tomentose with a very close coat, oblanceolate, cuspidately acute, of firm texture: inflorescence not peduncled, forming a pyramidal thyrus rather than corymb or panicle; heads small, those of the pistillate plant subturbinate, of the staminate campanulate, the bracts of both numerous, much imbricated, all obtuse, or the inner series in the pistillate abruptly acutish, none woolly at base; bristles of pappus in male plant filiform to near the summit, then abruptly dilated.

Collected somewhere in the mountains of California, at 5000 feet, 18 June, 1897, by Marcus E. Jones, and distributed for *A. argentea*; but the plant is (1) of less than half the size of that species, (2) arises tuftedly from a caudex that is woody, (3) is strongly leafy with a firm white (not silvery) foliage (4) of another outline, and (5) its inflorescence is

pyramidal (not flat-topped). The specimens are on sheet 358998, U. S. Herb. The sheet may or may not be the same cited once by Mr. E. Nelson (Bot. Gaz. xxxiv. 124) under the name of *A. argentea*, var. *aberrans*. That author, however, saw nothing but what he called a "racemosely paniculate inflorescence" to distinguish between what he had and the typical *A. argentea*. Also he reports that the sheet he saw had "only pistillate plants." The sheet from which I describe *A. pyramidata* holds six specimens, of which two are plainly staminate, their involucre and flowers differing from those of the pistillate as I have indicated.

Some new types of broad-leaved species of the Atlantic slope of the Continent are next subjoined.

ANTENNARIA ARKANSANA. Broad-leaved and with the herbage of *A. fallax* nearly, but the plant smaller: basal leaves well enduring the winter, 3 inches long, including the petiole, the blade oval-elliptic, mucronate, $1\frac{1}{4}$ inches wide, 3-veined, green and glabrous above, though when young very thinly and inconspicuously silky-hairy: stems of fertile plant 6 to 10 inches high, ending in a rather close cluster of 4 to 7 heads; involucre campanulate, scarcely woolly at base, the scales in no part obscured, oblong-linear, numerous but only slightly unequal, the scarios tips of the very outermost short and acute or hardly obtuse, of all the others narrow and acute or acuminate: stems of sterile plant low, heads few; bristles of pappus in this narrowly linear, with few and scattered serrate teeth.

In woods near Fulton, in extreme southwestern Arkansas, B. F. Bush, 4 and 5 April, 1900; the plant said to be a denizen of woodlands; distributed by Mr. Bush as *A. occidentalis*. The leaves are greener than in that species, which by both the involucre of the fertile plant, and the pappus of the sterile, this is very distinct from that.

ANTENNARIA ELLIPTICA. Plant of the large-leaved group,

the stems rather low, that of the fertile 7 or 8 inches, of the sterile 3 to 5 inches, the inflorescences of both corymbose and of only about 5 heads: leaves in age subcoriaceous, 3-nerved, the indument almost wholly deciduous from the upper face, the blade longer than the petiole, oval-elliptic, acute, 2 inches long, $1\frac{1}{8}$ broad: involucre in the fertile campanulate rather densely arachnoid at base, the white tips of the scales not at all conspicuous, short and ovate in the outer series, narrow and very acute in the others: pappus-bristles in male with short broad and obtuse tips lightly crenate.

On hill tops, forming small mats, at Mountain Glen in extreme southern Illinois, collected by Professor Carl F. Baker, 21 April, 1900; distributed by him, if at all, under the name of *A. occidentalis*; but even the female plant has not the involucre of that species, and male pappus is very characteristic.

ANTENNARIA BIFRONS. Mature leaves of firm texture, $1\frac{1}{4}$ to $2\frac{1}{4}$ inches long, obovate-cuneiform, therefore without proper petiole, deep-green and glabrate or nearly so above, beneath closely tomentose, but young foliage even when full grown quite hoary above; stolons very short, with few leaves: stems of fertile plants slender, erect, 7 to 11 inches high, its bracts oblong-linear, acute, about four only and remote: heads large, short-pedicelled and subcorymbosely glomerate; involucre well imbricated, the scales at base very distinctly arachnoid-hoary rather than woolly, the white tips of none equal to the herbaceous part, all acute: male plant not known.

This is a very singular species, the type specimens of which were collected by myself in an old pasture in sandy soil, near Port Huron, Michigan, 9 June, 1909. By the form of its foliage it should be an ally of *A. neglecta*, yet by the size and especially the width of the same leaves, and by the short stolons and long stems it looks like the other group.

ANTENNARIA PINETORUM. Of the large-leaved group, the foliage rather copious but not large, apparently not well endur-

ing the winter, those of the season apparently full grown at flowering time, about $\frac{3}{4}$ to $1\frac{3}{4}$ inches long including the narrow and well defined petiole, the blades nearly orbicular, $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter, the length scarcely greater than the width, all very obtuse, thin, beneath obviously 3-veined under the dense indument, the upper face very closely but finely arachnoid-tomentose, the coat never completely deciduous : flowering stems very slender, but rather notably bracted with oblong and oblong-linear spreading bracts, the fertile 10 inches high and subcorymbose, the heads 8 or 10 ; scales numerous but too nearly equal to appear well imbricated, not woolly at base, greenish almost throughout, the obtuse scarios tips both short and of too greenish-white a hue to be at all conspicuous ; flowering stems of male plants barely 3 inches high, their few heads sessile, their scales with also greenish white and obscure tips ; bristles of their pappus with little dilated and only indistinctly serrated acute tips.

Pine woods near Portsmouth, southern Virginia, 27 April, 1898, collected by Mr. Thos. H. Kearney; type in U. S. Herb., sheet 355635. A very well marked member of the group of species which make very little show of scarios tips to the involucreal scales.

ANTENNARIA DILATATA. Plant large but of low stature, the flowering stems 3 to 6 inches high, the sterile equalling the fertile : basal leaves of the former season copious, surviving the winter in perfect condition, very large for the plant, all long-petioled, the blades suborbicular, 1 to $1\frac{1}{4}$ inches wide, the length the same, or rarely a mere trifle greater, the lower face permanently close-tomentose, the upper after maturity sometimes almost perfectly glabrate, more commonly whitish-spotted with small knots of the not further deciduous loose tomentum : heads in the fertile plant only 3 to 5, closely glomerate and appearing sessile ; involucre smallish, broadly turbinate, the scales well imbricated, all with short but wide and rather blunt white tips : involucre in sterile plant twice as numerous, 7 to 11, also not sessile, the tips of their scales

oval, not more obtuse than those of the fertile ; pappus-bristles of the sterile flowers with acutely lanceolate and finely serrated flattened tips.

Type specimens gathered by the writer in thin woods among rocks near the summit of Maryland Heights, Maryland, overlooking Harper's Ferry, 10 May, 1908, the plant not otherwise known.

ANTENNARIA ONEIDICA. Slender and delicate for one of the broad-leaved group, the stolons very short, with foliage fully developed at flowering of the plant : leaves 1 to 2 inches long inclusive of the conspicuous narrow petiole ; the blades round-oval and round-obovate, very obtuse, thin, veinless or nearly so, white beneath, thinly and shortly silky above and rather permanently so : flowering stems of pistillate plant 7 to 9 inches high, very slender and with small spreading bracts ; heads small, in a terminal corymb of 5 to 7 ; involucre campanulate, the scales all narrow and acuminate, very numerous and much imbricated, none but the innermost showing slender white tips, the outer with hardly a trace of them : staminate plant not known.

Near Whitestown, Oneida Co., N. Y., by Dr. J. V. Haberer, 4 June, 1904, who reported it as growing on the border of a piece of sandy woodland. No other species is known to me of which the involucral scales are so narrow, and so almost wholly green ; though the large *A. mesochora* of the prairie country makes a near approach to this in that particular.

The succeeding are subalpine, and of the Pacific Coast :

ANTENNARIA PULCHELLA. Rigidly suffrutescent, depressed, forming a loose mat, the surculi short, very leafy at the ends ; leaves less than $\frac{1}{2}$ inch long, obovate-spatulate, obtuse or even retuse, more commonly acutish, of coriaceous texture and permanently white-tomentose on both faces : flowering stems very slender but hard and wiry, their few bracts small

and appressed ; heads several, glomerate at summit of stem ; involucre only scantily woolly, the tips of the scales in the fertile plant narrowly oblong, or oblong lanceolate, of a deep dark green : tips of pappus-bristles in sterile plant lanceolate, acute, short and rather broad, subentire, or with here and there a large tooth.

Collected at 11000 feet on Mt. Goddard of the Sierra Nevada of California, July, 1900, by Messrs. Hall & Chandler ; their n. 686 as in U. S. Herb. ; also what appears to be the same was obtained by J. G. Lemmon, at some uncertain station in the Sierra as early as 1875, his specimens all sterile, as are also nearly all those of Hall & Chandler. On the other hand, a sheet of seven specimens gathered in the high mountains of Placer Co., by Mr. C. F. Sonne in 1892, and which no doubt are of this species, shows only the female plant, yet these specimens seem less shrubby than the typical *A. pulchella*, and may perchance belong to the more northerly and more herbaceous plant which I meant for typical *A. media*.

ANTENNARIA SCABRA. Low and densely matted, also very leafy as to the many and short stolons, these barely surpassed by the flowering stems, the whole barely an inch high : leaves obovate-cuneiform, $\frac{1}{2}$ inch long, at first with a dense soft white-woolly coat, this promptly deciduous, exposing a dense glandular-scabrous green indument : heads several, glomerate at summit of the very short stem ; only the scarious part of involucre scales obvious, this oval, obtuse, of a dull greenish-white : sterile plant not known.

Alpine on summits of the White Mountains, Mono Co., California, at 12500 feet, collected by W. H. Shockley, July, 1886 ; type in U. S. Herb. ; the collector's n. 444. Remarkable for the strong scabrous indument underlying the more or less transient-tomentum. Perhaps to this may be referred a plant from Farwell Gap, by Coville & Funston, n. 2160, the herbage of which soon becomes green by the shedding of the wool ; but the traces of scabrous indument are faint.

ANTENNARIA Densa. Plant forming mats, the whole rising little more or less than an inch above ground; stolons reduced in the main to sessile fascicles of small leaves crowded upon the short stout branches of the subligneous caudex; leaves hardly $\frac{1}{4}$ inch long, obovate, rather loosely and softly white-woolly on both faces; those of the short flowering stems oblong, almost imbricate-crowded: heads of fertile plant 1 to 4, sessile; the short-herbaceous part of involucre scales concealed by wool, the ample tips of a dark olive-green or almost blackish, those of the outer series rather obtuse, all the others acutish: sterile plant not known.

Alpine on Mt. San Gorgonio of the San Bernardino Range, southern California, at 11000 feet, collected and distributed by Le Roy Abrams and E. H. McGregor, 12 July, 1908. It was sent out for *A. media*, but its nearest ally is perhaps *A. pulvinata* of the frigid steppes of a thousand miles north-westward.

ANTENNARIA Candida. Densely matted but not as low as *A. densa*, the numerous very leafy surculi upright and their leaves not rosulate but suberect, $\frac{1}{2}$ inch long more or less, obovate-spatulate, clothed densely with close snowy-white tomentum: flowering stems rising 1 to 2 inches above the cushion of leafy surculi, slender and with their small leaves as white-woolly as other parts: heads in fertile plant 3 to 5, closely congested; proper scales of involucre wholly concealed by the white indument, their translucent tips from oval and obtuse in the outermost to oblong, and in the innermost to lanceolate and acute or acuminate: sterile plant not known.

Detected at 9000 feet on Mt. Rainer, Washington, by Mr. O. D. Allen, 14 Aug., 1895, and distributed to U. S. Herb. under n. 141. At variance with everything else that has been called *A. media* by its peculiarly congested habit, upright firm foliage, and the shining whiteness of the indument investing all parts except the dark tips of the involucre bracts. Its next of kin is *A. pulvinata*.

Miscellaneous Specific Types.—IV.

LUPINUS HIRSUTULUS. Rather large annual, the branches stout, strongly decumbent or merely assurgent, nearly a foot long, whitish and almost polished underneath a double indument, namely, of long and sparse pilose hairs, and a short less sparse villous pubescence: stipules long, subulate-filiform; petioles much longer than the leaves, slender, strongly hirsute; leaflets 5 to 7, small, though obovate-cuneiform, very obtuse, rather strongly hirsute: racemes very short-peduncled and short, of only about four verticils these rather crowded: calyx short, densely silky-villous; corolla apparently light-purple, little more than $\frac{1}{4}$ inch long; pods linear, 1 inch long densely and softly villous, 5 to 7 seeded: seeds small, dull-whitish.

Beacon Hill, Vancouver Island, 15 June, 1908, Prof. John Macoun. A new and very distinct member of the group of small-flowered annual lupines; the plant itself large as the largest of them, but much depressed.

EUTHAMIA GALETORUM. Stems slender, erect, 2 feet high, simple, parted at summit into a narrow corymbose inflorescence of few heads; the whole plant glabrous, the punctuation obscure, all the parts flexible and with a suggestion of succulency or fleshiness: leaves of a shining green when fresh, linear, acute: involucre broadly turbinate, as broad at summit as high; outer bracts green, ovate-lanceolate, obtuse, the inner oblong, only greenish at tip, all obtusish, their margins faintly scaberulous under a lens: rays rather many, oblong-oval, deep yellow, disk-flowers numerous; achenes strigulose.

In very wet ground on the very margin of Lake Pleasant, near Springfield, Nova Scotia, collected by the writer 8 August, 1910. A bog plant was unexpected in this genus, for the greater proportion of the species are of rather dry habitat. This one was found growing among sundews and bog violets, bordering thickets of sweet gale.

RUDBECKIA UMBROSA. Stem stout, striate, glabrous, all upper part of the plant very leafy and the leaves ample as well as extremely thin; the lowest parted into 3 leaflets with hirsute petiolules, the length and breadth of the leaf as a whole about 10 inches, the terminal leaflet deeply 3-cleft, the laterals entire or bifid, the margins of all coarsely but not deeply serrate-toothed, neither face rough, but both faces thinly and minutely strigulose; upper leaves reduced, variously 3-lobed, none undivided; heads few and short-peduncled: also not large, the disk globose, the rays few and small: pappus of disk-achenes of about 4 nearly distinct teeth.

Oak Creek, Arizona, 8 Aug., 1909, by A. Pearson. Evidently a plant of dense shades; the leaves so thin and membranaceous as to be in strong contrast to those of other allies of *R. laciniata*.

DASYSTEPHANA OXYLOBA. Stems tufted and at base decumbent, stoutish and rigid, $\frac{1}{2}$ to 1 foot high, the whole plant glabrous to the unaided eye, but appearing faintly puberulent under a lens, or else not at all so: basal leaves crowded on the stem and oval, only $\frac{1}{2}$ to $\frac{3}{4}$ inch long and very obtuse, those midway of the stem more remote, oblong-lanceolate, acutish; from 3 to 6 of the upper axils floriferous, the flowers subsessile, the whole forming a longer or shorter spike: calyx $\frac{3}{4}$ inch long, the tube much shorter than the teeth or segments, these lanceolate or oblong-lanceolate and quite foliaceous: corolla purple, $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long, never expanding, always of a somewhat elliptic outline, the lobes narrow, long, very acute, of twice the length of the intervening folds, these bifid or more than once cleft.

A handsome closed gentian, sent in from the mountains of northern Arizona, as collected 9 Sept., 1909, by some one employed in the Forest Service near Flagstaff, the special locality "Wet Park" is named, said to have an altitude of 7250 feet.

VIGUIERA CHENOPODINA. Shrubby with rigid branches tomentulose-puberulent when young: leaves about an inch long, short-petioled, deltoid-ovate, very obtuse, entire, very firm, only obscurely veiny, cinereous-tomentulose on both faces: heads in a nearly naked subcorymbose panicle, or few and quite corymbose: involucre $\frac{1}{2}$ inch high, not strongly imbricated, the few outer bracts oval-oblong and more or less hoary, the inner glabrous, twice as long, linear-oblong, all obtuse: rays few, rather broad and showy: achenes immature, biaristate or uniaristate, the intervening scales large, lacerate-fimbriate at summit.

Between Santo Domingo and Matancita, Lower California, 14 Nov., 1905, collected by E. W. Nelson and E. A. Goldman, their No. 7277 as in U. S. Herb. Well marked by the small entire obtuse chenopodiaceous foliage.

POROPHYLLUM JUNCIFORME. Tall shrub with few long erect reedy and monocephalous branches, these pale and glaucous, stoutish and almost fluted rather than striate, the leaves few, linear: heads $\frac{3}{4}$ inch high, subcylindric; bracts of involucre about 5, slightly dilated upwards, at summit obtuse, superficially pale, the 3 or 4 pairs of oblong glandular spots very conspicuous: achenes densely strigose-hispidulous.

Mescal Mountains, Arizona, 24 May, 1890, M. E. Jones. Remarkably distinct from *P. gracile* by its tall naked rigid and not slender monocephalous branches.

POROPHYLLUM VASEYI. Wholly herbaceous, the low reedy stems closely tufted, very glaucous and striate, 5 to 7 inches high, parted at summit into 2 or 3 short monocephalous branches; leaves few, linear, short, scattered: heads hardly $\frac{3}{4}$ inch high; involucre short, little exceeding half the length of the flowers, very many-flowered and verging towards the turbinate or subcampanulate, the 4 or 5 bracts oblong-linear, very obtuse, pale, marked with about two pairs of long narrowly linear glandular spots: achenes stiffly hirsute.

Plant known only as collected at Mountain Springs, above the Colorado Desert, San Diego Co., Calif., by G. R. Vasey, 1880.

POROPHYLLUM CAESIUM. Suffrutescent, tall, freely branched above: leaves linear, short, spreading or recurved; heads $\frac{3}{4}$ inch high, nearly cylindrical; bracts of involucre very firm, even almost coriaceous, dark-colored underneath a dense coat of bloom, glandular spots commonly wanting, when present elliptic in 1 or 2 pairs and deeply sunken: achenes chestnut-brown, strigose-hispid, crowned with a fuscous pappus shorter than itself.

Cajon Hills, southern California, 1 May, 1891, collected by Geo. W. Dunn; type in U. S. Herb.

POROPHYLLUM LEUCOSPERMUM. Nearly or quite herbaceous, densely and fastigiately branched from the base, a foot high, leaves short, almost filiform: heads subcylindric, nearly an inch high, the corollas and pappus exerted from the involucre for nearly their whole length; bracts pinkish underneath the ordinary light coating of bloom, most of them marked by 2 pairs of elliptic gland-dots: achenes long, slightly beaked, pale straw-color or nearly white, thinly hispidulous, crowned by a long pale pappus.

Specimens from Vegas Valley, Lincoln Co., Nevada, collected by Coville and Funston on the Death Valley Exped. 9 March, 1891. Well distinguished by its long heads and pale achenes and pappus.

POROPHYLLUM CONFERTUM. Suffrutescent and tall, the flowering branches with narrowly linear spreading foliage and ending in compactly corymbose clusters of narrow and few-flowered heads: heads about $\frac{1}{2}$ inch high, 5-flowered; bracts of involucre linear, greenish and nearly without bloom, marked with 4 to 6 narrowly oblong gland-dots: achenes narrowly cylindrical, thinly scaberulous.

Ceralvo Island, Gulf of California, 12 Febr. 1906, E. W. Nelson and E. A. Goldman. Type in U. S. Herb.

SENECIO GOLDMANII. Apparently a tufted perennial, the simple and very erect stems equably leafy, 2 feet high, rather amply corymbose at summit: leaves simply pinnate into very long and not numerous filiform segments, sessile and ascending, rather fleshy, glabrous: involucre less than $\frac{1}{2}$ inch high, broad and subcampanulate, the bracts linear, abruptly and shortly acuminate but hardly acute, glabrous but apparently dotted sparsely with minute pellucid glands: rays short, oblong, yellow.

Rosarito, Lower California, 25 Sept., 1905, collected by E. W. Nelson and E. A. Goldman, their No. 7165 as in U. S. Herb.

FRANSERIA CARDUACEA. Stout and probably a tall shrub, the flowering branches clothed with ample foliage; stems, peduncles, also the midvein of the leaf whitened with a thin soft tomentum, the herbage otherwise hoary with a dense harsh whitish muricate-scabrous indument; leaves ample, subsessile, 6 inches long or more, laciniately pinnatifid into about 2 or 3 pairs of lobes, all acuminate and coarsely and unevenly toothed, texture very firm: inflorescence terminal and paniced, the pistillate involucre rather many, closely beneath the quite short and broad staminate racemes: fruit immature, but soft-pubescent throughout and with few rather soft curved or hooked spines.

Lower California, collected at Aquaje de Santana, 35 miles north of San Ignacio, 4 Oct., 1905, by E. W. Nelson and E. A. Goldman. Allied to *F. arborescens*, Brandg., but with different indument, the foliage very broad and repeatedly gashed, with the general cut of that of some coarse thistles.

SCHMALTZIA RIBIFOLIA. Shrub stout and rigid, the stems apparently erect, with short branches nearly divaricate, their bark after the first year ashy gray, glabrous, that of young

and still leafy branches red-brown, rather obscurely puberulent: leaves all simple and undivided, suborbicular but perceptibly broader toward the base, here subtruncate to subcordate, commonly with 3 obscure rounded lobes very obtuse, these lightly and coarsely crenate, diameter of leaf about 1 inch each way, texture uncommonly firm, both faces about equally green, glabrous: fruits solitary, or rarely two to the spike, very large, glandular scaberulous.

Collected at 3800 feet, at San Mattias Pass, in the San Pedro Martir Mountains, 28 June, 1905, by E. A. Goldman. A fine addition to that group of the genus which has undivided leaves, these in this species having the cut of those of some gooseberry bushes.

SPIRAEA SIMPLEX. Akin to *S. salicifolia*, but low, simple, scarcely more than a foot high, often only 6 inches, almost or quite herbaceous, densely leafy from the base up to the solitary sessile thyrsoid inflorescence with a narrow strongly ascending foliage; bark of a light red-brown, neither altogether glabrous, nor yet more than obscurely puberulent: leaves about $1\frac{1}{2}$ inches long, lance-oblong and lance-elliptic, acute, closely, evenly and not deeply serrate, the serratures under a lens strongly callous-tipped, lower face and margins not quite glabrous: inflorescence subpyramidally thyrsoform, its branches also the pedicels and calyx somewhat pubescent; flowers small, white; teeth of calyx deltoid, acutish, erect, about equalling the tube: follicles short, thick, glabrous, dull rather than polished.

Plant first known to me from the prairie regions of Canada west of the Great Lakes, where it was collected by Prof. John Macoun, first at Indian Head, Assiniboia, in 1895, then at Brandon, Manitoba, in 1896. I chanced on specimens last summer in my herbarium, duplicates of Professor Macoun's two collectings of this marked species. Thereupon I wrote to my zealous friend Dr. Lunell of Leeds, North Dakota, whose region is not far removed from the Canadian high prairies, to ask if perchance he had met with such a *Spiraea*.

I was promptly favored with two sheets of specimens of the same new species, collected by Dr. Lunell himself at different stations in northern North Dakota ; one of them from Butte, 24 July, 1910, the other sheet from low ground near Leeds, in 1904.

The Butte specimens are like those from the Canadian side of the boundary in that they are technically herbaceous. However hard, wiry and wood-like they are as to texture, the whole comes up from under the ground, flowers, fruits as an herb does, and then dies down. The specimens from Prof. Macoun are so gathered as to demonstrate this less clearly. One of the Leeds specimens has two flowering branches arising from a point three inches above the ground, proving that in that place the plant may be partly suffrutescens. The foliage, flowers and fruits of this are more like those of genuine Old World *S. salicifolia* than anything else that has been found on this continent.

ARABIS INAMOENA. Loosely tufted perennial 8 to 12 inches high, the sublignescens basal branches not stout, naked, spreading or ascending : leafy and floriferous stems upright, sparsely leafy, branched and loosely floriferous from below the middle : leaves all very thin, large for the plant, green, thinly pubescent with short dendritic hairs, the basal 1 inch long or more including the long slender petiole, the limb oval, entire or with few teeth, cauline oval to oblong, 2 inches long, obtuse or acutish, short-petiolate or else cuneately tapering to the base, not auricled : flowers small, sepals equal obtuse, dendritic-hairy, petals not greatly surpassing them, erect, of a dull greenish white : pods thin, flat, glabrous, 2 inches long or more, flat, acute, subfalcately curved or nearly straight : seeds in one row and rather remote, suborbicular, broadly winged.

Collected in Inyo Co., California, at Lake Sabrina, in July, 1911, by Dr. A. Davidson, his n. 2729. The plant is akin to *A. repanda* inhabiting mountain districts at low elevations

bordering the Mohave Desert, but is a smaller plant, and has abundant characters.

ARABIS DAVIDSONII. Low perennial inhabiting moist rocks, the short naked and scapiform flowering stems arising each from the branch of a short compactly leafy caudex: leaves oblanceolate-cuneate, 1 to 1½ inches long, very narrow below the middle, at apex acutish and there rarely with a sharp tooth or two, commonly quite entire, of a light green and wholly glabrous like every other part of the plant: flowers unknown: pods about 1½ inches long, few in the raceme and on somewhat spreading pedicels of ½ inch or more; seeds subquadrate or more rounded, wingless, forming a single row in the narrow subfalcate pod.

Bishop's Creek, Inyo Co., Calif., July, 1911, Dr. A. Davidson; his n. 2728. These two new ones represent extremely different types of so-called *Arabis*.

The Genus *Saviniona*.

The genus *Lavatera*, to which certain botanists averse to using their powers of discrimination have reduced *Saviniona*, was established on malvaceous herbs much resembling *Malva*, but differing from them as to the outer involucl subtending the proper calyx. In *Malva* this is of two or three small bracts that are deciduous. In *Lavatera* the involucl is a firm persistent disk or shallow cup, but more or less deeply three-cleft. Habitally the *lavatera* species of Continental Europe are widely at variance among themselves, so widely that the several genera that have been proposed will ultimately be accepted, no doubt; for the time seems passing during which men looked to nothing but calyx, corolla and seeds for marks by which to delimit genera. Botanists of the future will give more consideration to the plant as a whole.

But the genus SAVINIONA, the species of which are all insular, and are trees and shrubs rather than herbs, is supported well in the rank of a genus. The first species of this group to be discovered is endemic in the Canary Islands; and it is a very strange thing to record, that the eight other species known belong to islands lying not so very far off the coasts of California and Mexico.

I subjoin the original characterization of SAVINIONA, for the work on Canary Island botany in which it was published is rarely available to students of West American botany.

“Saviniona Nob.

Pedunculi axillares, solitarii, elongati, erectopatentes, sub flore articulati, incrassati, ante anthesin ad articulationem deflexi, per anthesin horizontales. *Calyx* duplex, exterior 3 rarius 4-phyllus, foliolis ad basin inter se coalitis, persistens, aut serius caducus, interior subcampanulatus, aut hypocrateriformis, 5-fidus, rarius 6-fidus. *Corolla* subringens, petalis obcordato-bilobis, basi rectis, limbo reflexo, 2 superioribus conniventibus, erectis, infimo labiiformi. *Androecium* corolla dimidium brevius, deflexum. *Cocca* rotundato-cochleata, margine acuta, maturitate indehiscentia, integra, nec ad juncturam cum columella disrupta. *Columella* conico-pyramidata. *Semina* cochleato-orbicularia.

Arbuscula lignosa, ramis elongatis, diffusis, foliis palmatolobatis, petiolis elongatis, bibracteatis, bracteclis minimis caducis.”¹

S. CLEMENTINA. Small tree with trunk a foot in diameter, and of the height of 12 feet: leaves on petioles 4 to 6 inches long, the blades about 3 inches long, 5-lobed after the manner of maple leaves, nearly truncate at base, glabrous on both faces: corollas of the usual size, of the purple of those of *Malva silvestris* nearly, but paler above the middle: involucre

¹ Webb and Berthelot, Hist. Nat. des Isles Canaries, Vol. 3, pt. 2, Sect. 1, p. 30.

parted nearly to the base into 3 subtrigonus obtuse segments, this and the calyx sparsely and minutely stellate-pubescent; mature calyx cleft to about the middle, the somewhat enlarged segments broadly triangular, reticulate-veiny and hirtellous: pedicels under the flower spreading horizontally, under the fruit firmly upright, straight at all stages, jointed $\frac{1}{2}$ inch below the fruit.

Known only from a single tree on San Clemente Island, California, whence specimens were taken in June, 1903, by Blanche Trask. This and the next, from an adjacent island, differ from all other species in that the peduncles are firm and straight. The color of the corolla in this one is peculiar among the species of *Saviniona*.

S. RETICULATA. Shrub 4 high, with stem 4 inches thick: maple-like foliage 3 inches long, $3\frac{1}{2}$ in breadth in the middle, the base with broad open sinus, the lobes with coarse obtuse teeth; petiole not longer than the blades and stout: corolla of usual size, clear white, the petals neither obcordate nor emarginate, only retuse: pedicels short and straight, only 1 inch long, jointed $\frac{1}{4}$ inch below the flower; involucre with oval obtuse segments; fruiting calyx an inch high, its segments ovate, hardly acute, strongly favose-reticulate and rough with a not very dense stellate pubescence.

Type specimens collected on Santa Catalina Island, California, in both flower and fruit in Febr., 1898, by Blanche Trask, erroneously distributed for *S. assurgentiflora*, to which it is not intimately related, being of the blue-purple-flowered group. Apparently only a solitary plant was known to Mrs. Trask.

S. DENDROIDEA. In form a perfect tree, only 10 or 12 feet high, but with distinct thick trunk and no branches below the middle: leaves very ample, the largest 9 inches long, of the same width, but on old flowering branches of less than half that size, not deeply lobed, the cleft seldom reaching to the middle of the blade, the 3 terminal lobes far exceeding

the two basal, the basal sinus broadly V-shaped : lobes of the involucre broadly ovate, very obtuse, those of the calyx also short, triangular, acute, these dotted with prominent stellate-hairy tufts rising out of the fine and short stellate tomentum : corollas deep rose-purple, abruptly reflexed from the base or near it soon after first expansion : carpels large, forming a whorl more than $\frac{1}{2}$ inch across, of a dull straw-color or brownish, each carpel wing-angled on both sides, the sides striate from point of juncture with the axis outward to near the margin.

This fine species is known only as collected by myself on the island of San Miguel, California, twenty-five years since. My observations on the plant at the time found record in the first volume of *Pittonia* (vol. i, p. 77), where I reluctantly referred it to *Lavatera assurgentiflora* Kell. In the course of the first real examination of the fruits of these things, I discover unexpected specific characters calling for a segregation of the material that has passed for *L. assurgentiflora*, and this is the first of the segregates.

S. SUSPENSА. Branches more slender, and both foliage and flowers notably smaller than in other species : largest leaves $2\frac{1}{2}$ inches long, but 3 in breadth, not very unequally 5-lobed to the middle, the lobes unequally and coarsely short-toothed, puberulent along the veins, otherwise glabrous, petioles slender, $3\frac{1}{2}$ inches long : flower $1\frac{1}{2}$ inches long, corolla of the same width at the orifice, the petals apparently never reflexed, deep pink, or perhaps rose-red, the whole flower pendulous on a pedicel nearly 2 inches long, though abruptly turned upwards from the point of the articulation : segments of involucre subtrigonous-oval, obtuse ; teeth of calyx of less than one-third the length of the tube, acutely triangular at flowering, in the fruiting state grown to thrice their former size, obtuse, erect over the fruit, or nearly so, or slightly spreading away from it ; fruit less than $\frac{1}{2}$ inch wide, the carpels smooth on the back, rather obtusely angled at the

edges, the sides marked by radiating striae which extend nearly to the margin.

Totally distinct from the *S. assurgentiflora* of the San Francisco region by the excellent characters pointed out, the plant is known to me only by an excellent sheet in U. S. Herb., collected at San Diego, Calif., in 1889, by Dr. Geo. Vasey. The small leaves have an abrupt open rather U-shaped sinus.

S. ASSURGENTIFLORA, what I take to be the species so named by Dr. Kellogg under *Lavatera*, was based on a plant of the vicinity of San Francisco. I have at hand no fruiting specimens at all from that region; but what appears to be the same is before me in good fruit from Los Angeles, collected by Dr. Hasse in 1892. Its carpels make a fruit nearly as large as that of San Miguel *S. dendroidea*, but the character of the individual carpel is very characteristically different. Its exterior is both smooth and glabrous, its sides divided into two distinct parts, an axial depression which is white and strongly radiate-striate, this being bounded by an elevated almost semicircular corky or cartilaginous smooth and yellowish part. There is also a very similar plant, with the same well marked carpel, before me from Tia Juana River, Lower California, collected by Dr. Mearns in 1894.

The origin of these different things which have been referred all to one species is a problem awaiting some future generation of Californian botanists who, instead of closing their eyes to differences, and dogmatically proclaiming that things are all one, shall have the will and the energy to betake themselves to the field and honestly investigate.

The following insular species, whose validity no botanist has questioned, are

- S. INSULARIS.* Watson, under *Lavatera*.
S. VENOSA. " " "
S. OCCIDENTALIS. " " "

Accessions to Apocynum.

APOCYNUM CORDIGERUM. Stem low for one of the *A. cannabinum* group, hardly 2 feet high, very robust, densely leafy throughout with an ample firm yellow-green glabrous foliage, the inflorescences small, dense, none rising above the height of the foliage, all terminal: middle stem leaves oval, $2\frac{1}{2}$ inches long, $1\frac{1}{2}$ in width, very obtuse, closely sessile by a deeply cordate-clasping base: flowers small, green: fruit not known.

Plant said to be common in South Dakota, near Brookings, whence specimens by Thos. A. Williams were obtained, and are in U. S. Herb.

APOCYNUM INCANUM. Leaves elongated-ovate, very acute, short-petiolate, grayish above and much whitened beneath with a fine short tomentum; flowering branches all near the summit, densely cymose, collectively forming an almost flat-topped compound corymbose inflorescence: sepals lanceolate, acuminate, tomentulose like the pedicels and bractlets: corollas small, erect, with short-cylindric tube and abruptly spreading limb, the lobes narrow, acute, the whole flesh-colored: fruit unknown.

Almost silky-hoary species, known only from southern Oregon, as collected at Bolt, Jackson Co., July, 1892, by E. W. Hammond.

The species appears to be of that group, somewhat intermediate between the *Cannabina* and the *Androsaemifolia* to which *A. medium* of the East and several others belong.

The specimens are too fragmentary, consisting of the tops only of the stems; but there is no doubt that they represent a species until now unknown.

APOCYNUM MISSOURIENSE. Plant evidently tall and large as *A. cannabinum*, in habit, inflorescence and flowers widely different; main stem not known, the flowering branches exceeding a foot in length and simple up to the many-flowered and subcorymbose inflorescence; rameal leaves many, short-petioled, ascending, in outline exactly elliptical, ending in a short-subulate mucro, the length $2\frac{1}{2}$ inches, the breadth near the middle less than 1 inch; proper cauline leaves thrice the size of the rameal and of quite another pattern, being broadly lance-oblong with cordate base, and 5 inches long by $1\frac{3}{4}$ inch width toward the base, all of the usual vivid-green above, though with light-colored veins, and beneath only paler, not definitely glaucous: flowers small and very numerous, mainly disposed in a broad terminal compound cyme, 2 or 3 short branches each with a small cyme surpassing the terminal large one in height; sepals triangular-lanceolate, acuminate, equalling the short-cylindric corolla-tube; corolla small, either white or flesh-tinted, its lobes short, ovate or oval, obtuse, little spreading.

From western Missouri, at Atherton, collected by B. F. Bush, 27 June, 1909, and by him distributed for *A. album*, to which it is far from bearing any close resemblance, being many times larger, and in habit, inflorescence, and even foliage widely different; yet Mr. Bush could not, as it seems, refer his plant to *A. cannabinum*, and it is indeed still farther removed from that than from *A. album*.

APOCYNUM ESTELLINUM. Firmly erect and strict, glabrous, the stem glaucous, the foliage light-green, glaucescent, erect or ascending on both stem and sterile branches, the lower cauline oblong, obtuse, sessile, commonly only 1 inch long, those of the branches rather larger, oblong-elliptic, acute, the veins not prominent: flowers very small, in small clusters below the foliage; sepals ovate-lanceolate, acuminate, equalling the tube of the corolla, this very small, subcylindric, white: follicles about $2\frac{1}{2}$ inches long.

A rather small, and small-leaved Texan species, only one to two feet high, therefore of the size of *A. album*, but singularly upright and strict, and therein most unlike that, which is lax and spreading. The best specimens were collected by Reverchon, at Estelline, on the North Fork of the Red River, Texas, in May and July, 1904, and distributed by B. F. Bush. A good specimen of the same was collected at Canadian, in the same general region, by Arthur H. Howell, in July, 1903.

APOCYNUM ISOPHYLLUM. Allied to *A. cannabinum* and as bushily branched, the branches even longer, the whole herbage of a peculiarly intense green, but not dark, glabrous, only the lower face of foliage glaucescent; branches suberect, long, very leafy and the leaves small, suberect, about $1\frac{1}{4}$ or $1\frac{1}{2}$ inches long, the lowest not larger than the uppermost and all of one size, oblong-oval, short-petiolate, obtuse at both ends, more so at apex and abruptly and stoutly mucronate, upper face not marked by conspicuous venation, the lower showing filiform but clearly elevated feather veins, these not in the least whitened, but green as the rest of the organ; cymes very many, small and few-flowered, everywhere sessile and surpassed by foliage; sepals lanceolate, short, not reaching the sinuses of the small short-cylindric green corolla.

Plant known only in one good specimen collected by myself in the open prairie near Notre Dame, Indiana, 24 July, 1899. I saw in it at the time a near ally of *A. cannabinum* and with green flowers like that, but it has plenty of marks by which to distinguish it. The foliage being not only copious, and of the same size on all the parts, is so small that it might have been well named from that character.

APOCYNUM PLATYPHYLLUM. Robust and tall, commonly 4 feet high, stem and branches deep-green without trace of bloom or pallor and glabrous, so also the upper face of the foliage, except as marked by a distinct though not broad whitish midvein and numerous finer and almost divaricate

feather veins; properly cauline leaves very large, conspicuously and stoutly petiolate, the blades of long-oval outline, 4 inches long, $2\frac{1}{4}$ inches wide, obtuse at both ends, at apex strongly mucronate, those of the branches less than half as large, varying from oval-elliptic to elliptic, all of very firm texture, even rigid, and pale beneath as with bloom, but also roughened along the veins and all veinlets with stiffish white hairs: cymes rather many, those of the lateral branches far surpassing the terminal; sepals broadly lanceolate, acute or acuminate, more than equalling the tube of the short and sub-cylindric green corolla the lobes of which are broad and obtuse as well as very short.

Wells County, Indiana, in low ground, bordering lakes in Jackson Township, Chas. C. Deam, 23 July, 1895.

APOCYNUM SARNIENSE. Perhaps a yard high, but with few and suberect branches, both stem and branches purplish and pubescent with short curved dark-colored hairs; cauline leaves 3 inches long, more than half as wide and of long-ovate outline, short-petioled, rounded at base, the apex rather acute, sharply mucronate, the upper face rather bright green, glabrous, the lower paler and with a thin coat of whitish tomentum: cymes few-flowered, terminal on both main stem and each branch, but the branches subequal; sepals triangular-lanceolate, acute, these and the exterior of the corolla tomentulose; corolla pinkish, very large for the *cannabinum* group and distinctly campanulate, cleft well toward the middle and the lobes acutish.

Type specimen in U. S. Herb. sheet 444,792, collected 3 Aug., 1902, at Sarnia, Lambton Co., Ontario, by Charles K. Dodge. The species, though of the *cannabinum* group, has flowers as much like those of the other section as have some of the Pacific species; but the flowers are not quite erect, another circumstance to render the plant another connecting link between two groups which one would like to regard as subgenerically distinct.

Having drawn up this diagnosis, I open a pocket attached to the sheet containing the specimen, and find within it the proof that Mr. Dodge ten years ago, when he sent the specimen to the U. S. Herb. for a name, was not content to have it called, as it had been, *A. pubescens*. His pencil note of protest against such an "identification" reads: "This was identified last year as *Apocynum pubescens* R. Br. I should like to have this reconsidered. If necessary I will furnish a whole plant, fruit and all. It did not seem to me the name was right. Collected along the road, where it is wet in spring and fall, and very dry in summer."

APOCYNUM FARWELLII. A yard high, very stout, only sparingly branched, and that only far above the middle, the main stem glabrous and glaucous up to near the middle, above that, as also the branches, hirsutulous; cauline leaves 3 to 4 inches long, broadly oblong, cordate at base and sessile, only cuspidate-mucronate at apex, not acute; the rameal not so very much smaller, but elliptic and short-petiolate, all glabrous or nearly so above, sparsely fuscous-pubescent beneath: inflorescences few, and much as in *A. Sarniense* as to size and location, but flowers of the smallest; sepals lanceolate, acuminate, almost equalling the corolla, this short-cylindric, its lobes deltoid, acute.

Collected near Detroit, Michigan, 7 July, 1893, by O. A. Farwell, and distributed for *A. pubescens*, also again 30 June, 1899, in less pubescent, indeed almost glabrous state, and sent out without specific name.

APOCYNUM BEBBIANUM. Main stem and height of plant not certainly known, the flowering branches densely leafy with a firm broadly elliptic foliage $1\frac{1}{2}$ to 2 inches long, cuspidately mucronate, conspicuously veiny and on both faces tomentose, but as to the upper more sparingly so, and more along the veins than on the surface in general: cymes small and few-flowered, not equalling their subtending leaves, the branches

of it, and pedicels as well as calyx tomentose ; sepals lance-ovate, short ; corolla very small, short-cylindric ; follicles short, extended horizontally and nearly straight.

The type specimens are in my herbarium, sheet 6987, as communicated to me many years since by H. N. Patterson, and were collected long ago in Winnebago Co., Illinois, by M. S. Bebb. Better specimens than mine may perchance exist in other herbaria. A more recent specimen of what may be specifically the same is on my sheet 6988, as distributed from somewhere in Illinois in 1879, by Mr. Eggert of St. Louis ; but this, though nearly as tomentose as the type, has a thin foliage. The specimen, however, is in a younger state.

APOCYNUM DICTYOTUM. Evidently tall, rather robust, copiously and amply leafy, the stem and branches somewhat reddened under a nearly white coating of bloom, the main stem also loosely hairy somewhat in lines ; leaves of main stem 4 inches long, $1\frac{1}{2}$ in width near the middle, oblong-oval, at base subcordate, short-petiolate, obtuse at apex and mucronate, the rameal leaves one-third to one-half as large, nearly elliptic, all of a light glaucous hue of green and slenderly whitish-veiny above, beneath very much whitened by bloom as well as by a minute white-setulose indument, this also heightened by a system of prominent finely reticulated whitish veinlets : cyme large, short-peduncled, many-flowered ; sepals ovate-lanceolate, not equalling the corolla-tube, pubescent ; corolla small, short-cylindric.

This species, very beautiful as to singularly whitened and reticulated foliage, occurs in U. S. Herb. only as collected by Mr. A. S. Heller near Suffolk in extreme southeastern Virginia, in June, 1893.

APOCYNUM PROCERUM. Very tall and robust, the stem leafy and without a branch for the first 2 feet or more, then with a few strict branches for the flowering, the whole height of the plant 3 to 5 feet, the stem purplish and glaucous, bearing leaves rather approximate and very large, commonly 5 or 6

inches long, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches wide, from oblong and lance-oblong to long-oval, subcordate and rounded at base, or even sessile and cordate-clasping, at apex obtuse but ending in a stout mucro, vivid-green and glabrous above, and with very broad, white midvein, beneath paler, but chiefly by a thin white indument of short tomentellous hairs; rameal foliage of half the size of the properly cauline, oval-elliptic: cymes few and large, borne mostly, or only, at summit of the main axis of the plant, little surpassed by the few subtending sterile leafy branches: sepals long, triangular lanceolate, surpassing the tube of the small short whitish or greenish corolla.

This perfectly distinct and very notable ally of *A. cannabinum* has been well represented in my herbarium in four fine sheets sent me by Mr. Luman Andrews of Southington, Connecticut, in the summer of 1903. They were collected by Mr. Andrews in the neighborhood of Southington, 17 July, when the plant was in fair flowering condition, and have remained in my herbarium until now, under the name now published; meanwhile nothing like this plant makes its appearance from any other quarter. The species is said to inhabit open ground, in sandy soil.

APOCYNUM YTHACENSE. Allied to *A. procerum*, but a small plant, barely 2 feet high, but very erect and strict, stem naked at base for 6 inches, above that bearing 5 or 6 pairs of properly cauline leaves, the lowest oblong, barely $2\frac{1}{2}$ inches long, others oblong-lanceolate, 3 inches long, all subsessile, only mucronately acute, glabrous throughout, bright green above and marked strongly by white midvein and distinct diverging lateral veins; branches few, their leaves elliptic-lanceolate; flowers chiefly in an ample terminal cyme, two only of the branches bearing each a small cyme not far above the main one; sepals long, lanceolate, acute; corolla small, white, the very short tube quite campanulate, the lobes still shorter, broad, obtuse.

A fine northeastern species, white-flowered, collected by Mr. F. V. Coville, 27 June, 1885, at "Six Mile Creek, below

Green Tree Falls, not far from Ithaca, New York." I refer here, with some hesitancy, a plant gathered in southern Pennsylvania, at the "mouth of the Yucquan," in 1893, by Mr. Heller. While much like the present species in most particulars, it is much more whitened with bloom; and the different shades of color in herbage are not to be disregarded in classifying plants of high organism.

APOCYNUM SUBULIGERUM. Plant probably tall, and simple up to the ample compound-cymose and altogether terminal inflorescence, all parts glabrous, glaucous; cauline leaves somewhat lance-oval, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, sessile by a subcordate base, acutish at apex and almost subulate-mucronate, upper face of a deep copperas-green, the lower paler; rameal leaves of half-size and tapering to both base and apex, are elliptical: inflorescence of 1 or 3 large corymbose panicles at summit of stem and borne on long peduncles quite above the foliage, the branches of it conspicuously beset at the joints by long slenderly subulate or almost aristiform bracts; sepals similarly subulate-attenuate above the lanceolate base and equalling the corollas, these small, not cylindric as in most *cannabinum* allies, but distinctly campanulate, erect, their lobes deltoid-ovate, slightly acutish.

Type specimens in my own herbarium, sheet 7022, communicated to me many years since by Dr. J. Bernard Brinton, but as having been collected somewhere in the State of Maine as long ago as 1878, by F. L. Scribner. I have seen no eastern specimens making any approach to this in mode of growth and inflorescence. This, in the larger of the two specimens, is a whole almost flat-topped, measuring seven inches across. In this particular it recalls my far-away Californian *A. floribundum* and some others of the West. I name it in allusion to the great length and slenderness of the bractlets and sepals.

APOCYNUM LITTORALE. Akin to *A. album*, taller and more robust, less widely branching, herbage of a darker green;

sepals deltoid-ovate, short, abruptly acute; follicles comparatively short, stout, straight, slightly divergent from base to apex.

The species as to character, and hydrophile nature, is analogous to my *A. album*, which is of the Potomac shores and southward, while this which I name *A. littorale* is as restricted to brook and river margins at a northerly latitude. The specimens which I take for typical were sent me in 1902 from "gravelly shores of the Farmington River," in Connecticut, as collected 12 Aug., 1902, by Mr. Luman Andrews of Southington. The plants were in good fruit, but past flowering. I did not know, and do not yet know, the flowers of this plant; but after comparison of its fruiting specimens with those of *A. album* in fruit, I saw that here was a species yet undescribed, of the same group, and of the same habitat as to its love of being near running water, though of another geographic and climatic region. I labelled my specimens as new, but imperfectly known. In 1910, in eastern New York—I think it was at Pine Plains—I saw in passing by rail, stream margins almost hedged in by the copiousness of a smallish dogbane which I at the time believed to be what I am now calling *A. littorale*. The dense masses of it were one mark by which, as growing, it would be suspected as being other than *A. album*, for this always grows sparingly, in small colonies, and only here and there; but the characters by which to know each species in fruit, and when dry, are those of the follicles. These in *A. littorale* are stout, 3 to $3\frac{1}{2}$ inches long, both of equal length and of like angles of divergence. In *A. album* they are not only more slender, but measure $3\frac{1}{2}$ to $4\frac{1}{2}$ inches long, one of them straight, the other so curved that the two meet and are in contact at the tip; or, when not in actual contact, are so very near it that as a general characteristic the plain curvature of the one it is impossible to overlook when once it has been pointed out.

Another Connecticut station for *A. littorale* would seem to be Stratford, whence a good fruiting specimen is in U. S. Herb. as collected on "a dry beach," by Dr. Edwin H. Eames.

30 Aug., 1895, who also notes it "infrequent." The fact that Dr. Eames writes no specific name to the sheet indicates his inability to refer this plant to *A. cannabinum*; and this label quite antedates the point of time when, by the publication of my *A. medium* and *A. album*, in 1897, the botanists of New York and New England became awakened to the fact that we have here more apocynum species than the two that had been known to Linnæus. Dr. Eames' Stratford plant is certainly *A. littorale* rather than *A. album* despite the consideration that, like *A. album*, it may adapt itself to maritime situations. One would like to know whether from the stream borders of northern Connecticut this thing continues all the way down to the sand beaches of Long Island Sound. One would like to advise those botanical friends in Connecticut to a little more boldness in investigating their flora, and that in a frame of mind to admit the possibility that the newest edition of Gray's Manual may fall short of an absolute finality as to matters of Connecticut botany.

Another sheet before me which I can not label as other than *A. littorale* will extend the range of the species to the shores of the Susquehanna River and its tributaries in southern Pennsylvania. This was collected by Mr. Small "Two miles north of Wrightsville, York County," 7 July, 1890. It is not quite typical, being somewhat too pale with bloom, and its pods are thicker, longer, and much less divergent. To *A. album* it is farther still from being conformable; and the truth will very likely turn out to be that there is a considerable group of these small, white-flowered littoral species. Mr. Fernald's n. 84 of the Maine Flora seems white-flowered, is smaller than *A. album*, probably to be proven distinct, certainly far removed from *A. cannabinum*.

APOCYNUM ARENARIUM. Akin to *A. album*, like it white-flowered, but much taller, more sparingly branching, less leafy, leaves much more distinctly and slenderly petiolate, of thinner texture, their pattern more inclining to lanceolate; all the parts glabrous, not even the lower face of foliage very

notably glaucous; cyme apparently terminal only, but long-stalked and rather loose; sepals triangular-lanceolate, not very acute; corolla white, the tube slightly campanulate, the lobes erect, but broad, short and obtuse.

From a sand bar at Plum Point, on the shore of Chesapeake Bay, southern Maryland, collected 5 Aug., 1902, by Geo. H. Shull, and deposited in U. S. Herb., under the collector's determination as "*A. album*, Greene"; but the plant, while clearly white-flowered, has corollas of a peculiar pattern for those of any eastern ally of *A. cannabinum* in that they are not cylindric, but distinctly campanulate. They have also more obtuse lobes than are to be found in any other known member of either group. The habitat of *A. arenarium* is maritime.

APOCYNUM CERVINUM. Plant 3 or 4 feet high, simple to above the middle, there only twice or thrice dichotomous, of a very pale glaucous hue throughout, the lower face of foliage hardly more so than the upper, the venation not particularly conspicuous though almost white; leaves of main stem 4 inches long, $1\frac{3}{4}$ in width, oblong-oval, rounded and subcordate at base, at apex abruptly acute as well as mucronate; cymes of thrice the size of those of *A. cannabinum*, long-peduncled, many-flowered, the flowers large for the group, also whitish; sepals lanceolate, mostly not acute, not equalling the corolla-tube; corolla whitish but with a lurid tinge of something between green and purple, the tube short-cylindric, the lobes broad, ovate, obtuse, somewhat spreading.

This is C. F. Baker's n. 80 from the Gunnison River region in southern Colorado, collected at Deer Run, where said to be common in moist ground. It was a hasty judgment that allowed this to pass for *A. cannabinum*.

APOCYNUM CONVALLARIUM. Herbage glabrous, and of the brighter and more vivid green of *A. cannabinum*; but here more than ordinarily bright, all the foliage marked very conspicuously with whitish midvein and feather veins, and this even to the pale glaucescent lower face; proper cauline leaves

lance-oval, the largest seen 3 inches long, $1\frac{1}{4}$ in width, rounded and subsessile at base, the apex very acute; rameal leaves one-third smaller, elliptic-oval: cymes terminal, sessile, but quite many-flowered and rather loose; flowers small, lurid flesh-color and not erect, neither exactly nodding, but extended almost horizontally; sepals lanceolate, long for the short campanulate corolla.

Two specimens in U. S. Herb. are before me, both from northwestern Montana, the localities some 130 miles apart. One is from near Meeksville, in the Clark's Fork Valley, by J. B. Leiberg, 22 Aug., 1895. This, a large specimen, but of the top only of a plant, indicates a size comparable to that of the great *A. cannabinum* of the Potomac Valley. It does not show any other than the rameal foliage, and is almost past flowering. The other specimen is from Midvale, by L. M. Umbach, 14 July, 1903. This is in flower, and shows the uppermost cauline leaves. I name the species solely in allusion to the valley habitat, not as indicating any likeness to *Convallaria*. If the flowers of this, in form, attitude and color are not those of *A. cannabinum*, still as to all the vegetative characters, and general appearance, it is of that group.

APOCYNUM BOLANDRI. Plant low, barely a foot high, branched divergently from near the base, the spread of the branches equalling the height of the plant; all the leaves oblong-lanceolate, very short-petioled, acute at apex, from 3 inches long in the properly cauline to less than 2 inches in those of the branches, colored much the same on both faces, but more glaucous beneath: flowers in a single cyme at summit of the main stem, small; sepals lanceolate and long; corolla short-cylindric, its color uncertain.

Plant known only as collected by Bolander, fifty years since, and reported by him as growing "among rocks in the Merced River, at Clarks, alt. 4000 ft." It is plainly of the group of *A. cannabinum*, and with some special resemblance to my *A. album* of the shores of the Potomac, and *A. littorale* of New York and New England. These two eastern kinds are white-

flowered, and the equally hydrophile *A. Bolandri* may be found like them in this particular, if rediscovered.

APOCYNUM DENSIFLORUM. Plant several feet high, but sparingly branched and only at summit; herbage glabrous and everywhere glaucous, the upper face of the foliage only less so than the lower; cauline leaves ovate-oblong, 4 inches long, $1\frac{1}{2}$ broad, rounded at the base and sessile, at apex hardly acute, but strongly subulate-mucronate, those of the branches two-thirds as large, tapering to both ends, therefore elliptical: inflorescences 3 only, one large and terminal, the others borne on either side far above it, all short-peduncled and surpassed by their subtending pair of leaves, exceedingly many-flowered but very compact; sepals lanceolate, acuminate, of the length of the tube of the short-cylindric green corolla.

Known only as collected by myself in the mountains of Kern Co., California, near Tehachapi, June, 1889. Although green-flowered, this is at every other essential point widely at variance with the eastern and genuine *A. cannabinum*.

APOCYNUM BREWERI. Of the *cannabinum* division, and very robust, tall and sparingly branched at the very summit only: cauline leaves 3 or 4 inches long, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches wide near the base, of elongated oval general outline, but sessile and cordate clasping, at apex obtuse, yet with a prominent though small cusp; lower face of all leaves glaucous, the upper not so, yet somewhat glaucescent: cymes few, apparently only 1 to 3, far surpassed by very leafy sterile branches, short-petioled, many-flowered and dense, the flowers very small; sepals very long and lanceolate, surpassing the tube of the corolla; color of flower apparently deep purplish, but the specimens are fifty years old, the shade therefore beyond exact discovery.

Yosemite Valley, California, W. H. Brewer, n. 1673 as in U. S. Herb., collected 19 June, 1863.

APOCYNUM THERMALE. Both foliage and branches suberect, and all of a dull bluish-green hue almost the same on both

faces of the foliage, the plant wholly glabrous, both stem and branches stout and very straight: leaves $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, subsessile, oblong-oval, obtuse at base, at apex only abruptly and cuspidately or mucronately acute, the venation green and inconspicuous: cymes short-peduncled, not equaling the leaves subtending them: flowers of the very smallest, erect on extremely short pedicels; sepals short, deltoid-ovate; tube of corolla short-cylindric, the segments short, ovate, slightly spreading, the color apparently dull pale flesh-color.

Tessajara Hot Springs, Monterey Co., California, June, 1901, collected by A. D. E. Elmer. Strictly of the *cannabinum* alliance; a comparatively small plant, with peculiarly strict habit, as well as its own characters of leaf and flower.

APOCYNUM LONGIFOLIUM. Of the alliance of *A. cannabinum*, perhaps as tall, but comparatively very slender, also very sparingly branching and few-flowered, the stem and branches purple and but little glaucous, the herbage light green and glabrous, the foliage almost equally glaucous on both faces; uppermost leaves of the main stem 5 inches long, barely 1 inch wide, those of the branches 3 inches long or more, all elliptic-oblong, tapering below to a short petiole, at apex ending sharply by a long almost subulate cusp or mucro: cymes few, all greatly surpassed by the subtending leaves, the flowers not many, of the smallest, even fairly minute; sepals ovate lanceolate; corolla with cylindric tube and ovate lobes, the color dull pale greenish purple.

A Californian species, collected on Sespe Creek, near Ten Sycamore Flat, Ventura Co., 9 June, 1908, by Abrams & McGregor. Remarkable for the great length of its leaves as well as the peculiar pointing of them.

The foregoing species, to the number of more than twenty, are of that group headed by *A. cannabinum*. I now proceed with the results of a like inspection of the materials in our herbaria representing the allies of *A. androsaemifolium*. The

paper as a whole will only demonstrate the truth, not very creditable to our botanical forefathers of several generations past, that they never looked at these plants with the eyes of botanists.

The *cannabinum* group finds a fuller development on the Atlantic slope of the continent, the *androsaemifolium* alliance on the Pacific; at least from the Rocky Mountains westward, and in the far away northwest, on the vast volcanic or half-arid plains and mountain districts, this section blossoms out in a multiplicity of dwarf species which in flower are often very specious and beautiful.

APOCYNUM INSIGNE. Plant a yard high or more and robust, the stem glabrous and green without bloom; cauline leaves elliptic-lanceolate, 5 inches long, $1\frac{1}{2}$ inches wide in the middle, acute at both ends, short-petioled, widely spreading but not deflexed, green above and with a scantily pubescent midvein, underneath whitish, this partly by reason of a dense bloom, and partly as being thinly hirtellous with white hairs: cymes as in other members of its group terminal and axillary, but strongly developed and very many-flowered; flowers apparently colored as in *A. androsaemifolium*, but not more than half as large; sepals short, deltoid-ovate; corolla campanulate, deeply lobed.

Mountains of Virginia, the specimens collected by Gerrit S. Miller on Stony Man Mountain, near a large spring, 3 July, 1903. The species is allied to *A. medium* of the Potomac Valley, District of Columbia, but is twice or thrice as large, with extremely different foliage and large clusters of small flowers. The follicles in this very large species are the smallest known in the genus.

APOCYNUM LEUCONEURON. Akin to *A. androsaemifolium*, evidently larger, probably a yard high, the foliage more elongated: leaves lance-ovate, those of the main stem $3\frac{1}{2}$ to 4 inches long, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches wide a little below the middle, of firm texture, dark green and glabrous above, paler beneath

and there sparsely pubescent on the general superficies, but densely so along the conspicuously white and broad veins: flowers smaller than in the allied species, produced in sessile but exclusively terminal cymes; sepals lance-ovate, short; corolla with short subcylindric tube and deeply cleft limb, the color apparently pinkish.

Type in U. S. Herb. from Cockrell, Missouri, 3 July, 1898, B. F. Bush. The leaves of the stem in this are deflexed as in the type to which I liken it; the flowers also are not so extremely different as they are in, for example, *A. medium*; but both the foliage, with its strong peculiar veininess, and the strictly terminal inflorescence, seem to claim for the plant the rank of a species.

APOCYNUM SILVATICUM. Akin to *A. androsaemifolium*, rather stout, 2 feet high, the stem naked to the middle, there parted into 2 or 3 once or twice dichotomous leafy and flowering branches: leaves large for the plant, $2\frac{1}{2}$ to 3 inches long, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches wide, and widest at the middle, the outline being mostly rhombic-ovate, with here and there one of oval outline, all tapering to the base and short petioled, acute at apex, ascending or somewhat spreading, never drooping, the upper face deep green and glabrous, the lower pale with bloom, also along the veins hirsutulous with white hairs, a few distributed to the general face: cymes more terminal than subterminal, all with long peduncles and numerous pinkish flowers: sepals short, deltoid-ovate; corolla quite open-campanulate and with broad short lobes.

Joplin, Missouri, B. F. Bush, n. 2271 as in U. S. Herb., collected 7 June, 1909; distributed as *A. urceoliferum* to which it is not by any means correctly referable. Rocky Woods are given as its habitat.

APOCYNUM ELLIPTICUM. Plant with purple and glabrous stem and branches devoid of bloom; leaves remarkably firm of texture, fairly subcoriaceous, dark-green above, very pale and glaucous beneath, in outline exactly elliptical, short-

petioled, widely spreading; cymes both terminal and axillary, elongated and many-flowered, in full development forming an ample inflorescence, yet not at all corymbose; sepals ovate, or lance-ovate; corolla pinkish or purplish, not large, the tube cylindrical but very short, the segments as long or longer.

An ally of *A. androsaemifolium* from the Guadalupe Mountains of Texas, collected by Vernon Bailey, 19 Aug., 1901. The foliage is well characterized both as to form and texture. The corollas are smaller than in the more familiar ally, far more numerous, and of different form, being in no wise campanulate.

APOCYNUM VACILLANS. Plant of the largest, probably very tall, glabrous throughout, the herbage vivid green as to upper faces, the lower singularly ash-colored by something like a grayish bloom, but this hardly effaceable: cauline leaves lance-ovate, 4 or 5 inches long, 2 inches broad below the middle, subsessile, rounded at base, at apex scarcely mucronate but acute; those of the branches not half as large, almost precisely elliptical, acute at base, at apex very acute: cymes few-flowered, most terminal but some lateral, and all sessile: flowers rather small, not erect; sepals lanceolate, nearly equalling the short tube of the campanulate corolla, of which also the segments are long, equalling the tube, the whole corolla colored much as in *A. androsaemifolium*.

The only specimen before me of this fine plant was collected somewhere in the State of Washington as long ago as 1889, by Geo. R. Vasey, and preserved in U. S. Herb. Some one has labelled it *A. cannabinum*. Looking at nothing but the upper face of the leaves, this would be any one's hasty judgment of it as to its nearest affinity, for not only is that face of the shade of green characteristic of that group, but the leaves are rather ascending than otherwise; at least, they have not the spread, much less the decided droop of those of *A. androsaemifolium*; but when one attends to the inflorescence and the flowers one finds them entirely those of the group headed by the species last named. It is the best case I have met with

of ambiguity between the two groups, and I have named it in reference to that characteristic.

APOCYNUM ELMERI. Distinctly and in all respects of the group of *A. androsaemifolium*, the foliage oblong-elliptic, deep green above, very glaucous beneath, the cauline leaves 3 inches long, $1\frac{1}{4}$ wide in the middle, tapering to a narrowed but at last subtruncate base, at apex mucronate-acute: the branching of the plant for the flowering quite fastigiate, the inflorescence as a whole distinctly corymbose, both the terminal and lateral cymes well pedunculate and many-flowered; sepals triangular-lanceolate, not equalling the tube of the corolla, the segments of the corolla not as long as the tube; the whole flower pinkish or purplish, all of them standing out horizontally on slender pedicels of quite unusual length.

This is another Washington species, collected in Whitman County, in 1896, by A. D. E. Elmer. Although the collector himself labelled it *A. cannabinum*, it lacks every mark of that species. Its leaves are dark-green, they droop; the individual flower is as clearly as far from that of *A. cannabinum* as is the inflorescence. Such a plant, so clearly a western relative of *A. androsaemifolium*, places it beyond doubt that my *A. pumilum* is no mere subspecies.

APOCYNUM GRISEUM. Plant evidently tall, only the flowering branches taken, these a foot long, flowering only terminally and from the two uppermost axils as in *A. androsaemifolium*, below the inflorescence leafy, the leaves in 3 or 4 pairs, distinctly petiolate, neither deflexed nor ascending, but spreading horizontally, the blades broadly ovate, subcordate, the apex only acutish, $1\frac{1}{2}$ to 2 inches long, 1 to $1\frac{1}{4}$ inches wide near the base, the branches, peduncles, pedicels, calyx, and the leaves beneath gray with a fine short tomentum; upper face of leaves of the usual dull-green and minutely as well as sparingly pubescent: flowers not numerous, of a flesh-purple hue, the sepals lanceolate, shorter than the corolla-tube, this and the whole of the corolla campanulate, but the lobes narrow, and with unusually wide sinuses between them.

Near the boundary between the United States and Canada, for northwestward, between the Columbia and Kettle Rivers, within Canadian territory, collected by J. M. Macoun, 6 June, 1902, Geol. Surv. No. 66,555 as in my herbarium ; distributed for *A. androsaemifolium*.

APOCYNUM OVALIFOLIUM. Plant a foot high or more, stoutish and with few and opposite brachiate branches : leaves firm, even subcoriaceous, short-petioled, of exactly oval outline, obtuse, inconspicuously mucronate, of a very dull dark-green above and very minutely and somewhat granulately puberulent, the lower face glaucescent, glabrous : cymes pedunculate, terminal and subterminal, few-flowered ; sepals lanceolate, acuminate, very long, equalling the tube of the corolla ; corolla rather small, flesh-purple, its segments elongated-oval, almost as long as the tube.

Collected along Rogue River, Jackson Co., Oregon, 21 Aug., 1897, by Mrs. R. M. Austin. Manifestly of the group of *A. androsaemifolium* despite the fact that its corolla-tube, though short, is not campanulate but short-cylindric ; also the flowers are nearly erect, which is also out of character for the group. The indument of the surface of the leaf is very minute ; perhaps a granular coating merely, but it imparts a dulness of color that is peculiar.

APOCYNUM RUBICUNDUM. Plant large and stout, glabrous in every part, the foliage spreading or deflexed, of a firm almost coriaceous texture, all the leaves oval, the largest 3 inches long, 2 inches wide, distinctly petiolate, the base very obtuse, the apex also rounded, but conspicuously mucronate, dark-green above, pale beneath : flowers many in clusters terminal and subterminal and borne beyond the leaves ; sepals ovate-lanceolate ; corolla small, rather narrowly campanulate, but deeply cleft, of a pale rose color.

Collected by Kirk Whited, at Stines, Chelan Co., Washington, 11 Aug., 1901, and distributed with no show of reason for *A. pumilum*. The plant is larger and stouter than the

largest *A. androsaemifolium*, but with smaller and quite reddish flowers. It has an almost coriaceously thick foliage, and is of the arid interior of the county.

APOCYNUM STENOLOBUM. Plants branched from almost the very base, only 6 to 10 inches high, glabrous throughout: lowest leaves small, oval obtuse, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, the others exactly ovate, $1\frac{1}{2}$ inches long, obtuse at base, scarcely acute at apex though there very prominently subulate-mucronate, of thinnish texture, very dark-green above, whitish with bloom beneath, the upper ascending on rather long and slender petioles, the lower widely spreading or even deflexed: flowers few and large, mostly terminal; sepals triangular-lanceolate, with long and slender acumination; corolla with long narrow cylindric tube and very long oblong-linear sub-erect segments, the whole little less than $\frac{1}{2}$ inch long, pinkish or flesh-color.

This is another of the fine discoveries of Mrs. R. M. Austin in extreme northwestern California, where she obtained it, on Davis Creek, Modoc Co., in 1895. It can have formed no part of the Grayian var. *pumilum*, for that author never saw this plant. The type sheet is in my own herbarium, n. 7052.

APOCYNUM PANICULATUM. Plant a foot high more or less, with short naked main stem erect, but the branching above this wide and somewhat fastigiate, the branches copiously leafy, all of them at summit very definitely cymose-paniculate: leaves about $1\frac{1}{2}$ inches long, 1 inch wide, mostly of precisely ovate outline, but many oval, very short-petioled, at base subcordate, at apex obtuse or only acutish, of rather firm texture, dark-green above, glaucous beneath, spreading apart, but not drooping; numerous flowers borne above all foliage in about 5 to 7 simple or compound cymes of which the terminal one is not larger than the laterals which join it to form an apparently paniced inflorescence: sepals triangular-lanceolate, acute, the tips straight; corolla with long tube

slightly widening upwards, the segments of more than half its length, ovate-oblong, acutish, recurved.

The habitat of this exceedingly beautiful dwarf dogbane is along Warner Creek, in the extreme northeastern corner of California, which forms a part of the great volcanic and half desert region that is extensive in adjacent Oregon and Nevada. The very fine specimens before me belong to my own herbarium and were collected by Mrs. R. M. Austin, in August, 1882. The paniced inflorescence, of numerous and large flowers, is not peculiar to this one species. It marks my *A. tomentellum* of western Nevada, and several more.

APOCYNUM EXIMIUM. Plant dwarf and large-flowered, but somewhat larger than the last, the stems 8 to 12 inches high, solitary, leafless and naked below to the height of 3 or 4 inches, thence simple or with only 2 or 3 branches, glabrous throughout; lower leaves round-oval, $\frac{3}{4}$ inch long, the others mostly ovate to round-ovate, $1\frac{1}{4}$ to $1\frac{3}{4}$ inches long and near the base almost as broad, all very obtuse, or the very uppermost retuse, yet none lacking a short abrupt mucro; texture firm, the upper face dark-green, the lower glaucous: flowers few, very large, in terminal and subterminal cymes; sepals short, deltoid-ovate; corolla quite $\frac{1}{2}$ inch long, flesh colored, the long tube slightly widening, the lance-oblong obtuse lobes nearly as long as the tube, and merely ascending.

Collected by W. N. Suksdorf, in Falcon Valley, Washington, in 1886, distributed by him for the Grayian var. *pumilum*, of which wondrous aggregate it may or may not have formed a part.

APOCYNUM POLYCARDIUM. Low, widely branched from the base or near it, 9 or 10 inches high, the breadth of the plant as a whole a foot or more; stem and branches tomentulose-puberulent, densely clothed with a spreading and exactly heart-shaped small foliage; leaves 1 to $1\frac{1}{4}$ inches long, very obtuse, or even retuse, at apex and mucronulate, dark-green and puberulent above, glaucous and sparsely pubescent be-

neath; flowers few, pinkish, large for the plant, in subsessile terminal and subterminal cymes; sepals very short, deltoid-ovate, barely acute, of hardly one-fourth the length of the broad subcampanulate tube of the corolla; corolla-limb of deep narrowly oval and obtuse spreading lobes.

The fine specimen in U. S. Herb., representing a very marked species, is from Jackson Co., southwestern Oregon, and was collected 14 July, 1892, by E. W. Hammond. The foliage in this is so copious, and so perfectly heart-shaped as to invite, better than any other species, such a name as *cordatum* or *cordigerum*.

APOCYNUM PLUMBIFLORUM. Dwarf 5 to 7 inches high, parted into 3 or 4 branches widely spreading from near the base, each with a compound-cymose terminal inflorescence, the whole herbage glabrous and of a leaden gray with density of bloom; lowest leaves orbicular, only $\frac{1}{2}$ inch across, the others twice or more than twice as large, ovate, obtuse, mucronate, spreading or even drooping on their short but slender petioles: flowers very small, reddish or purplish, the calyx with distinctly turbinate and undivided basal part, and broadly lanceolate segments not equalling the middle of the corolla, this tubular and slightly ventriose to near the summit, there cleft into oblong recurved lobes.

Western Nevada, in the Walker River region, collected fifty years since by W. H. Brewer, "near West Branch of Walker River." Remarkable for the dull lead-color of the stem and both faces of the foliage, and hardly less so for the small tubular corollas that imitate those some ericaceous plants.

APOCYNUM XYLOSTACEUM. Plants 6 inches high, the stem naked below for about 2 inches, then parted into several sub-erect branches closely leafy and flowering terminally and in some upper axils; leaves all small, ovate varying to oval, mostly $\frac{3}{4}$ inch long, obtuse at both ends, nearly all abruptly deflexed, of a very dull dark green above, glaucous beneath, glabrous everywhere; flowering copious in terminal and a few

subterminal subsessile cymes; sepals lanceolate and long, yet far from half equalling the long tubiform corolla, the oval obtuse segments of which are of less than one-third the length the tube and erect.

A diminutive species known to me in but a single sheet in U. S. Herb., of three excellent specimens collected in the Klamath Valley in southern Oregon almost fifty years since by Dr. H. M. Cronkhite, U. S. A. With its small tubular corollas like those of some dwarf caprifoliaceous shrubs, this would pass at first glance with the uninitiated for a xylosteum or a symphoricarpus.

APOCYNUM PULCHELLUM. Dwarf and depressed, the stems only 6 to 10 inches long, decumbent, or even for their whole length almost reclining, much branched, puberulent; leaves mostly spreading horizontally on distinct but short petioles, seldom deflexed, oval, obtuse at both ends, the largest only $\frac{3}{4}$ inch long, $\frac{1}{2}$ inch wide, firm, dark green and glabrous above, pale and sparsely pubescent beneath: cymes numerous, and from several of the upper axils, occasionally, and to the number of 5 or more, paniced above the upper pair of leaves; pedicels hairy under the calyx, the hairiness extending upwards along the middle of the sepals, these broadly lanceolate, acuminate: corolla very large, purplish, the tube long and cylindrical, the lobes nearly as long as the tube, oblong, obtuse, not widely spreading.

Mountain meadows of Lassen Co., California, collected long ago by Mrs. R. M. Austin. This remarkably beautiful dogbane is so small, and with such diminutive and rounded foliage, as to give it the appearance of some small caprifoliaceous plant, a dwarf snowberry, for example.

APOCYNUM ROTUNDFOLIUM. Of the size of *A. pulchellum*, but upright, branching only fastigiately, and from above the base, glabrous throughout; lowest leaves almost exactly

orbicular, 1 inch across, the next slightly verging to ovate, $1\frac{1}{4}$ inches long, all nearly sessile, widely spreading, none deflexed, of subcoriaceous texture, dark green above, very glaucous beneath, cymes both terminal and axillary small and on short peduncles; sepals broadly and deltoidly lanceolate, their slender tips recurved; corolla purplish, large, the tube subcylindric, slightly ventricose, being a trifle constricted under the comparatively very short lobes, these of barely one-third the length of the tube, obtuse and recurved.

Known chiefly as collected in the Sierra Nevada of California, somewhere in Placer Co., in Sept., 1892, by A. M. Carpenter.

APOCYNUM ARCUATUM. Dwarf barely 7 inches in height, but the plant by virtue of its long and recurved branches measuring more than a foot across; all the herbage puberulent, both faces of the leaves hirtellously so, the lower quite pale with bloom, the upper dull dark green: all the lowest leaves small and subreniform, those next them orbicular, the others round-oval, the largest about an inch wide: flowers very large, but not very numerous, in short and subsessile terminal and lateral cymes; sepals short, lance-ovate, these and the pedicels villous-pubescent: corolla with subcylindric tube only very slightly wider above than below, the segments in length approaching that of the tube, elongated-oval, little spreading.

The plant is known to me only as collected in 1892 by Mr. Jepson, the locality being the South Fork of Eel River, California, a station that might lie in Lake County or Mendocino, probably Lake. It forms part of my *A. pumilum* published in the Bay-Region Manual, and is my sole warrant for attributing to the species there so named the character of subreniform lower leaves. By this mark, fortified as it is by the arcuate and elongated branches, and flowers of their own peculiar pattern, the plant must claim specific rank; and since nothing of this, nor of anything much like it, was ever seen by Asa Gray, it

could not have been a part of his "variety *pumilum*," a thing which can have no status any way, even as a variety, because it was never described.

APOCYNUM CERCIDIUM. Plants 5 to 8 inches high, widely branched from the base, the width of the plant equalling its height, densely leafy with a very large foliage, the short cymes partly surpassed by it, every part of the plant glabrous; lowest leaves orbicular and smallish, the next also suborbicular yet perceptibly longer than broad, $1\frac{1}{2}$ inches long, the width less by $\frac{1}{8}$ inch, subcordate at base, retuse at apex, the usual mucro obsolete, other foliage broadly oval, obtuse at both ends, mucronulate, all the leaves spreading or slightly ascending, none deflexed; flowers few, terminal and axillary; sepals triangular-lanceolate, acuminate, of less than half the length of the tube of the corolla; corolla not large, quite campanulate, the lobes long-oval, obtuse.

Fort Bidwell, Modoc Co., California, June, 1903, collected by Mary A. Manning; type in U. S. Herb., sheet 667,872. Flowers more nearly like those of *A. androsaemifolium* than in any other species, but the plant a dwarf, with large foliage recalling that of the genus *Cercis*.

APOCYNUM AUSTINAE. Plant 18 inches high, simple and leafless for the first 6 inches, then parted into a very few ascending branches sparsely leafy, at summit, loosely but freely flowering, in all parts glabrous; leaves small for the plant and all deflexed, short-petiolate, ovate, obtuse, mucronate, averaging 1 inch long, dark-green above, pale beneath; sepals short, ovate, acute, somewhat spreading; corolla of middle size for this group, narrow, cylindric nearly, and that from base to orifice, the oblong, obtuse segments of half the length of the tube, but erect; follicles 4 inches long, straight, closely contiguous and erect.

Lassen Creek, Modoc Co., California, Aug., 1894, Mrs. R. M. Austin, the type in my own herbarium, n. 7106.

APOCYNUM LURIDUM. Low, widely branched from an inch above the base, but only 8 inches high, the branches copiously leafy, but the leaves ascending, or only spreading, large for the plant, those at summit as large as those near the base, and fully equalling when not surpassing the sessile inflorescences; lowest leaves small, orbicular, the next large, suborbicular, retuse, the rest oval, obtuse, mucronulate, average length of leaves more than 1 inch, all glabrous, deep but hardly dark green above, glaucous beneath; sepals ovate, acuminate, short for the corolla, this nearly cylindrical as to the rather broad tube, the oval obtuse lobes of more than one-third the length of the tube and spreading, the whole of a deep lurid purple like that of some solanaceous flowers.

Lassen Creek, Modoc Co., California, Aug., 1894, Mrs. Austin, the only specimen being in my own herbarium, n. 7107.

APOCYNUM DIVERSIFOLIUM. Plant 10 inches high, simple, rather closely leafy from base to summit, sparsely pubescent as to stem and both faces of the leaves, of which the lower pairs are orbicular, $\frac{3}{4}$ inch across, those in the middle portion of the stem ovate, $1\frac{1}{4}$ inches long, the uppermost pairs oval and smaller, all obtuse, faintly mucronate, dark green above, paler beneath; terminal inflorescences borne well above all foliage, the lateral cymes when present surpassing the leaves subtending them; sepals short, ovate, scarcely acute; corolla purplish, of a broad cylindrical tube and rather large oval obtuse reflexed segments.

Collected at Fredalba in the San Bernardino Mts., southern California, 22 July, 1902, by Le Roy Abrams, distributed for *A. pumilum* as many another excellent undescribed species has been. This one, like several other of the dwarf kinds of California and Oregon, departs somewhat from the general characteristics of *androsaemifolium* allies in that the corollas are nearly erect, never quite nodding.

New Species of *Trautvetteria*.

TRAUTVETTERIA NERVATA. Basal leaves not of the largest, pedately rather than palmately parted almost to the base, the primary segments narrow, their lobes almost divaricate, forming oblong sinuses by overlapping each other above: flowers not known: achenes numerous, much compressed, obliquely somewhat lunate, narrow at base, a distinct nerve or prominent secondary vein traversing each interval between two primary ribs, the whole head round-ovate rather than spherical.

In rich damp woods near Dublin, Georgia, 21 June, 1902, collected by Roland Harper. It is the first strongly marked species that has been added to genus since its establishment; both the one belonging to the Pacific coast of America, and the Japanese species, differing from the Atlantic American type by no very striking peculiarities. But this Georgian species at the very first glance at even the foliage declares itself as something well marked and distinct; and the ovate heads of achenes are another peculiarity that is obvious enough; but the secondary nerves, running the whole length of the carpel, constitute a character which calls for an amendment of the diagnosis of the genus. So also does the nature of the achene as being much compressed laterally after the manner of *Thalictrum*.

TRAUTVETTERIA FIMBRIATA. Foliage not large, of firmer texture than in *T. grandis*, of a lighter green, almost glaucescent beneath, the radical leaf of suborbicular contour and 6 inches across, deeply cut into 5 or 7 subrhomboid segments entire as to their cuneate-tapering base, the rest of the segment fimbriate-lacerate: both the cyme and the individual flower very large for the plant, and stamens excessively numerous: achenes small, slightly compressed, broadest at about the middle, tapering abruptly to each end, the space between the ventral rib or angle and the lateral showing a very prominent nerve which, as a branch of the ventral, runs

diagonally to about the middle of the achene and there ends abruptly; style prominent, but not long as in *T. grandis*.

A beautiful and well marked species, evidently rare, known only as collected by W. C. Cusick, in "subalpine bogs and stream banks" of eastern Oregon, in June and July of 1886. The leaves in this show narrowly V-shaped sinuses between all the main segments; another distinctive mark. Apparently of this species is a specimen from the Blue Mountains, southeastern Washington, by Robert M. Horner, collected in July, 1897.

TRAUTVETTERIA APPLANTA. Plant not large, 1½ feet high, the radical leaf 6 inches broad or less, subtruncate at base, the sinuses between the lobes oblong, nearly closed, the lobes rather evenly and very acutely serrate-toothed, the whole leaf very firm and strongly veined and nerved: achenes many, much more compressed than in other species, the sides obliquely elongated oval, not narrowed sensibly at either end, the summit appearing obtuse, the short style so lateral as to appear below the geometric summit of the achene, the sides commonly showing a longer or shorter nerve between the ventral angle and the lateral.

The habitat of this is the middle West southward, beyond the Mississippi. The specimens before me are from southern Missouri, and were gathered at Monteer, by B. F. Bush 27 July, 1899. It is said to be common on river bluffs, presumably wooded.

TRAUTVETTERIA ROTUNDATA. Plant of the largest, with ample foliage thin and not obviously veiny; radical leaf 9 inches wide, parted nearly to the base, the sinuses narrowly oblong, mostly closed, the segments coarsely and unevenly somewhat incise-toothed, but the teeth obtusish: heads of carpels small, globose, the achene as broad as long and suborbicular, not much inflated, the style rather long.

Borders of Mill Creek, Plumas Co., California, collected by Mrs. R. M. Austin, in 1877, the only specimen seen in

my herbarium ; but the plant was evidently communicated to Dr. Gray at the time, for there is a mention made of it by Mr. Watson in the Californian Geological Survey Botany, vol. ii, p. 425 ; but this Californian plant is not there described. It had not been botanically looked at by either Gray or Watson. The description which I thus refer to is that of the Oregonian *T. grandis*, which Watson proposed to restore, after Gray (Proc. Am. Acad. viii, p. 372) had reduced it. This Californian plant does not at all answer to *T. grandis*, even as to foliage, much less as to its achenes. In *T. grandis* these are not at all suborbicular, but broad and rounded as to the upper part only, thence tapering to the base.

TRAUTVETTERIA SANICULIFOLIA. Plant barely 2 feet high, the stem bearing 3 or 4 ample long-stalked leaves, no truly basal one obvious ; leaves of orbicular circumscription, but deeply 5-parted and without basal sinus, the lower lobes overlapping, the segments narrowly cuneate-obovate, coarsely serrate-toothed above the middle, all of very thin texture, without prominent veins, but the upper face conspicuously fine-reticulate throughout, both faces glabrous, the lower of a deeper and a glossy green : fruit unknown.

Species known only as collected by Mr. Heller, about Lake Waha, Nez Perces Co., Idaho, in June, 1896. The leaves have exactly the cut of those of typical *Sanicula*. Their copious development up and down the stem is another character, and the beautifully reticulate surface is another.

TRAUTVETTERIA MEDIA. Plant of the largest, the radical leaf a foot in diameter, often less, cleft almost to the base, the segments showing long narrow mostly closed sinuses, themselves 3-cleft and very coarsely and irregularly serrate-toothed : achenes small, tipped with a rather long style that is closely circinate, the space next the ventral suture with one or two short nerves.

A New Mexican species of the upper Gila River in Socorro Co., growing at 9000 feet in the mountains ; the specimens

gathered by O. B. Metcalfe, 15 Aug., 1903, and distributed under the name of *T. grandis* on my authority. That determination was made quite too inconsiderately. While geographically the New Mexican plant is quite as far removed from the habitat of the western species as from the eastern one, the great dimensions of it seemed to connect it with *T. grandis*; also the achenes were seen to have something like the more elongated beak of those of *T. grandis*; but, on careful comparison it becomes clear that in the species last named the long beak is in the main straight, being merely hooked at the end, while here in the geographically intermediate plant the whole style is coiled into something like a ring; also the body of the achene has markings between the main angles which ally it with the two eastern species above described as new.

Specimens from a very different part of New Mexico, namely of the Pecos River country, are in U. S. Herb., collected in 1908, by Mr. Paul Standley. They are all immature and incomplete. I dare not assume that they are referable to *T. media*; for the foliage seems different, and smaller. Neither do they furnish clear warrant for any opinion that they represent another species.

Some Erigeron Segregates.

Nearly all the new propositions here following under the above title are aptly to be denominated segregates because of their having been listed in books under old names. Superficial glances, and rough guesses as to identity, such as authors often content themselves with, give example to herbarium aids, and to those who collect and sell specimens; thus is engendered wild confusion of many species under one name in the thick bundles of the larger public herbaria; and perhaps none are now worse off in that regard than those of so-called *Erigeron*, this notwithstanding that in recent years not a few new segregates have been indicated by the few of us who

study western botany. Still, there is much more waiting to be done; and those species now proposed are but a continuation, not a conclusion of the task. I take up first in order things that have been passing for *E. glabellus*, *macranthus* and *salsuginosus*.

ERIGERON PATENS. Perennial, stout, rigid, upright, 2 feet high, equably leafy to near the summit, there parted into many long leafy monocephalous branches to form an ample paniculate-corymbose inflorescence: all the foliage remarkably hard and rigid, glabrous except marginally and along the veins: basal leaves not seen, those of the main stem $2\frac{1}{2}$ inches long, widely spreading or even notably deflexed, closely sessile by a broad base, very acute at apex, the general outline elliptic-lanceolate, strongly scabrous-ciliolate, with some similar short stiff hairs along the veins beneath; leaves of the branches half as large, somewhat ovate, acuminate, bristly-ciliate and, like the branches, densely glandular-puberulent: involucre $\frac{1}{2}$ inch high, $\frac{3}{4}$ inch broad, their bracts not notably unequal, wholly herbaceous, caudately acuminate, purplish and granular-viscid: rays very many, long and shiny, of a rather light purple: achenes strigulous; inner pappus of quite firm bristles, the outer of fewer short and stout ones not clearly squamiform.

Type in U. S. Herb., collected by D. T. McDougal in sloping pine woods of Strawberry Valley, near Pine, central Arizona, 29 Aug., 1891. A poorer specimen of what is essentially the same, though not as much roughened, is at hand from near Flagstaff, Ariz., by M. E. Jones, 6 Aug., 1884.

ERIGERON FOLIOSISSIMUS. Allied, like the preceding, to *E. macranthus*, equally, and even more densely leafy to summit, but little more than a foot high, the tuft of basal leaves all fresh and conspicuous at time of flowering, oblong-oval, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, including the short and very distinct petiole, obtuse, entire, rather pale-green, faintly nerved, every-

where glabrous except as to a minute marginal series of stiff incurved hairs; the cauline more than an inch long, quite crowded on the upper two-thirds of the stem, oblong-lanceolate, sessile, very acute, not ciliolate, every part showing under a lens a minute roughness of glandular points, this extending equally to the stem and peduncles as well as bracts of the involucre: heads large, only 2 or 3 and short-peduncled at the very apex of the stem; bracts of involucre devoid of pubescence, showing an herbaceous midvein between the two definite scarious margins, only a few of the outer somewhat shorter and wholly herbaceous: rays very narrow, blue-purple: squamellae of the pappus minute, nearly subulate.

Near Fort Huachuca in extreme southern Arizona, Sept., 1891, Dr. T. E. Wilcox; type in U. S. Herb.

ERIGERON GULIELMI. Related to *E. glabellus*, but smaller, the decumbent and almost leafy stems a foot high from a subligneous and branched caudex: basal leaves 1 to 1½ inches long including the rather short petiole, in outline cuneate-oblong, very obtuse, of firm texture, but glabrous on both faces, yet both blades and petioles strongly short-ciliate with curved hairs: stem monocephalous, naked above the middle, below it with here and there a reduced and sessile oblong-linear leaf: bracts of involucre linear, acuminate, herbaceous, glandular-viscid: rays very numerous but not narrow, yet not of the broadest: no heads mature, therefore achenes and pappus not seen.

Well marked, and known only as collected on Bill William Mountain, northern Arizona, by the late Dr. Edward Palmer in 1869; type in U. S. Herb.

ERIGERON SUBASPER. Of the general aspect of *E. glabellus*, much smaller, stout, rigid, all the herbage firmer, and of a pallid, rather than vivid green: basal leaves 1½ to 3 inches long, erect, somewhat obovate-spatulate, tapering to a flat and not very narrow petiole, the limb very obtuse, mucronate;

cauline leaves oval, sessile, obtuse, or in some specimens oblanceolate and acute, both faces of all sparsely scabrous and the margins scabrous-ciliolate, very closely so: heads large, in the more robust 5 or 6 and corymbose, in others 1 or 2, their peduncles with a bract or two: bracts of involucre rather short, all densely strigose; rays numerous, light purple, not very narrow; outer pappus obscure, made up of very short bristles.

Plant common on the San Francisco Mountain, northern Arizona; distributed perhaps first by J. G. Lemmon in 1884, later by C. A. Purpus in 1900, the specimens by the latter distributed for *E. glabellus*, of the former for *E. macranthus*.

The low robust growth, firm pale rough foliage, besides the floral characters abundantly distinguish this from its northern ally, which is *E. glabellus*. I collected a good series of specimens of the plant, near the base of the mountain, in 1889, and they have until now remained in my herbarium without a name.

ERIGERON ELDENSIS. Of the group of *E. glabellus*, but less resembling it habitally, the stems tall, to the height of more than a foot, slender and very erect from the base, probably not clustered but growing singly: basal leaves 3 inches high or less, including the long slender petiole, the blades oval and obtuse to elliptical and acutish, those of the stem an inch long more or less, broadly to narrowly lanceolate, sessile, very acute, all the foliage of very thin texture and glabrous except as to the not very strongly scabrous-serrulate margins: heads 1 to 3, when 2 or 3 the lateral far surpassing the terminal: bracts of involucre rather few, equal, slender and acuminate, only very obscurely scabrous-puberulent; rays purple, narrow, not excessively numerous; outer pappus of extremely small and narrow squamellae or bristles.

Cañons and slopes of Elden Mesa, northern Arizona, at 6600 feet, collected by J. B. Leiberger, 11 Aug., 1901; distributed to U. S. Herb. without specific name, under the collector's number 5387.

ERIGERON HUACHUCANUS. With the habit and the aspect of *E. subasper*, but the herbage pale almost to hoariness with a rather close investiture of harsh hairs inflexed from a pustulate base: lowest leaves short-petioled and with oval-elliptic blades, those of the stem rather large, many, partly overlapping each other, spatulate-oblong and oblong-obtuse, sessile, narrower ones extending even to the summit near the large head: bracts of the involucre neither very narrow nor at all acuminate, rather obtushish, strigose-hairy on the back; rays many, either white or very pale, of medium width between those of *Erigeron* and *Aster*: achenes strigose-hairy, outer pappus of minute subulate squamellae.

Near Fort Huachuca, southern Arizona, T. E. Wilcox, Sept., 1894.

There is a very beautiful large broad-rayed asteraceous plant very common in the mountains of Colorado, Wyoming, Montana and even far to the northwestward, one which might as well be called an aster as an erigeron, which figures in our herbaria, where there are hundreds of sheets of it, as *Erigeron salsuginosus*; meanwhile there is not in all the United States any plant at all which answers or even comes near answering to that plant of the high North, the "salt plains of the Athabasca" described by Richardson in 1823 as *Aster salsuginosus*. I now name and define our Rocky Mountain plant, according to it the rank it long has called for.

ERIGERON CALLIANTHEMUS. The stoutish stems commonly 1½ feet high, often somewhat less, upright above an ascending base, sparsely leafy, often monocephalous, more commonly with one terminal head and a lateral one borne much above the terminal: herbage thin and delicate, to all appearance glabrous: basal leaves of narrowly elliptical blade 3 or 4 inches long and a petiole much shorter than that, or now and then almost as long; cauline leaves ovate and ovate-oblong or

lanceolate, $1\frac{1}{2}$ to 2 inches long, sessile by a half-clasping base, acute, all the foliage without notable veininess and glabrous except as to a minute and obscure marginal series of appressed hairs: peduncles under the heads pale with an appressed and short fine pubescence: involucre of the terminal head fully an inch broad, its bracts wholly herbaceous, apparently in two or more series, their acuminate tips recurved, their margins below minutely glandular-ciliate and the whole involucre viscidulous: ray-flowers 50-60, broad as in asters but long, the expanded head 2 inches across, color of rays mostly of a rich deep violet, though sometimes paler: achenes silky-strigulose; pappus simple, of rather firm and numerous bristles.

The center of distribution for this fine plant seems to be the southern part of Wyoming and adjacent northern Colorado. It is from that part of the West that the most copious display of specimens is made by the larger herbaria. Excellent examples have been distributed from various parts of Wyoming by Prof. Nelson, from northern Colorado by C. C. Parry, H. N. Patterson, C. S. Sheldon, Geo. E. Osterhout and others, while from southern Colorado it was abundantly sent out by C. F. Baker, and Mr. Standley gathered it in New Mexico. These mentioned are all in flower only. Mature heads with ripe achenes are in my own herbarium in abundance, the specimens all taken by myself on Little Ouray Mountain below Marshall Pass, Colo., in 1896. From Oregon, Washington, Idaho and the mountains of British Columbia come plants named *E. salsuginosus* which seem to belong to this *E. callianthemus*; though from so wide a range, and from such diversity of climatic and other conditions, the plants show a considerable degree of variation, but chiefly as to size of the plants, along with deviations from the typical leaf outline. But there are other western and far northwestern allies that demand rank as specifically separate from this most beautiful of Rocky Mountain asteraceous plants.

E. MEMBRANACEUS Greene, Pitt. v. 294 (1898), was a segregate of the confused *E. salsuginosus* of Gray's Synoptical Flora, and is an ally of *E. callianthemus*, which does not reach the Rocky Mountain region. In my description of the species as based on Mr. Cusick's n. 1771, while depending on the very ample and thin almost filmy leaves, I do not point out that those of the stem are so broad at the point of insertion, as to become amplexicaul, nor that the heads are smaller than in *E. callianthemus* and the peduncles much less pubescent. Mr. Cusick, in his attempt to collect and distribute new material of the species, after I had published it, was not very fortunate. He took his specimens from another locality. They are of hardly one-third the size, and lack the characters of the species. I never should have separated his n. 2112 from *E. callianthemus*, and that is what I call it. But in the Blue Mountains of Oregon *E. membranaceus* is the common species, and was collected there, also in Mr. Cusick's year 1897, by Robert M. Horner, n. 262, and by J. B. Leiberger, n. 2931; and even a year earlier, by Mr. Piper in 1896, while in this year also Mr. Henderson gathered it in Idaho, n. 3662. A specimen collected in the Selkirk Mountains, B. C., by Mr. Shaw I confidently refer here, and less so another from Clayton Peak, Wasatch Mountains, Utah, for this has foliage too acute, also with here and there a tooth.

While the plant which I have named *E. callianthemus*, forming a great part of the *E. salsuginosus* of Gray, and perhaps all of that of Rydberg, occurs all the way between the northern borders of New Mexico and southern British Columbia, with *E. membranaceus* centered in the isolated Blue Mountains and radiating thence into other sections of that mountainous interior of the Northwest that lies to the eastward of the coast ranges and is separate from them, there is a large plant of the higher coast mountains of Washington and Oregon also called *E. salsuginosus* by Gray and by Howell, which has marks by which it stands aloof from my *E. callianthemus*, such as we reasonably look for, when we

know what a completely distinct climatic region those coast mountains have been constituted by nature.

ERIGERON HESPEROCALLIS. Large as *E. callianthemus*, with equally showy heads, with broad purple rays, the pubescence both of stem and leaf-margins more pronounced, the leaves not only thinner and of a less pallid green, but more narrowly lanceolate and instead of being obtuse, or barely acutish, are attenuate-acute; the bracts of the involucre are more distinctly scaberulous and less viscid, the achenes are shorter and broader, the pappus of more delicate bristles; last and not least of the differences being that herbage readily ferments and darkens in the drying, while the firmer and glaucescent *E. callianthemus* undergoes no such change.

The best specimens of *E. hesperocallis* before me are of my own collecting on Mount Rainier, 20 Aug., 1889. The plant grew copiously in a woodland opening with a marsh in the midst and a stream flowing through from the lake which is near the limit of trees on the west side. Both Mr. Howell and Mr. Suksdorf have often distributed the same plant, in less luxuriant form, from Mt. Hood in Oregon, and Mt. Adams in Washington. Mr. Gorman collected it in a smaller form at Crater Lake, on Mt. Pitt, in southern Oregon; this plant, however, departs from the type in having its basal leaves obtuse, also with a more or less hairy midvein. Again, and far away in northwestern Washington, in the Olympic Mountains, Mr. A. D. E. Elmer (n. 2623) obtained a form, or ally, of the present species with leaves basal and cauline equally narrow and acute, and glabrous except as to a rather conspicuous white-villous ciliation. Yet again, in the Wenatchee Mountains, away in the northern interior of the same State, the same Mr. Elmer has (n. 447) another ally with the normally very acute, and in drying blackened foliage, but the whole herbage cinereous with a fine soft pubescence. Future exploration of the vast Northwest, on both sides of the British boundary, will be likely to form my *E. hesperocallis* as here circumscribed an aggregate.

I must not advance beyond this point in the discussion of the *E. salsuginosus* medley of the books without adverting to, and critically examining the fine plate, purporting to represent Richardson's *Aster salsuginosus* published in the Botanical Magazine for the year 1829, t. 2942. Viewed superficially, and without study of the text, and the circumstances under which the plant represented was grown in Scotland, the beautiful plate has been a stumbling block. Looked at discriminatingly, no plant that I know of, whether of the United States or of British North America, comes anywhere near answering to that fine figure. The whole plant is represented, therefore with the full complement of leaves basal and middle and upper cauline, in all 13 leaves, of which all except the upper 4 are very distinctly, though rather remotely serrate. I have under inspection some 90 herbarium sheets, mostly very good specimens as to foliage, of plants of the West and Northwest which on Gray's authority were labelled *E. salsuginosus*, and not one of the 90 shows a hint of that serrature shown in the Bot. Mag. figure, not so much as one tooth of it. He who examines the plate sees that the whole plant—so very tall—had to be drawn in two sections. The section is made midway of the stem, and between leaves 9 and 10, counting from the base. It is in the least degree disconcerting that all the 9 leaves of the lower part of the plant are well serrated, the 4 belonging to the upper section are all at once perfectly entire. It suggests a query as to whether the two sections in the figure may not have been founded on parts of two different plants. The suggestion comes to myself with all the more forcefulness because of the fact that the 9 leaves of the lower section, not only by their serratures but by their whole outline—if that were all—are those of the plant familiar to me as my own *E. Drummondii*, which was derived from the selfsame part of British America whence the seeds from which this Bot. Mag. *salsuginosus* was grown. I am far from saying or thinking that said plate is thus fictitious. I do not believe that it is. However much like those of *E. Drummondii* in outline and indentation, they are shown to be glabrous. Those of *Drum-*

mondii are hoarily hirsute. Also the figure could not have been made, as a whole, from the last named species, for the rays in *Drummondii* are perhaps twenty times as numerous and almost as narrow as threads. I have a settled opinion that this plate labelled *Aster salsuginosus* presents a species not yet named and published, and which awaits rediscovery somewhere among the mountains of those great broad provinces of British Columbia or Alberta; as also the real original *salsuginosus* of the "salt plains of the Athabasca" awaits rediscovery.

We owe gratitude to Sir William Hooker's memory for his having published that fine daisy that flourished in the Glasgow Garden more than 80 years ago, and shall excuse him for having guessed that the mountaineer beauty of southwestern Canada would be the same as Richardson's of the far northern alkaline plains. Our later synantherologists have all been quite as inconsiderate; to not one of whom does it seem to have occurred that if the *salsuginosus* of high northern interior salt plains had ever made its way to Colorado, Wyoming and Utah, men would have found it on the alkaline or salt plains that are remote from the subalpine sweet-watered meadows and brooksides where alone *E. callianthemus* is ever seen. In respect to the Pacific coast species, *membranaceus*, *hesperocallis* and their kindred, the like is true. Not one of them is of the concourse of those plants which inhabit saline or alkaline lowlands. Every one is of elevated and pure-watered marshes or brooksides, or other moist alluvial grounds.

Restricted to the Pacific slope, and ranging from British Columbia to southern California, each in its own physiographic region, are several other species of this broad-rayed group which I proceed to name and characterize.

ERIGERON LORATUS. Allied to *E. callianthemus*, but main foliage from basal part of plant extremely narrow, erect, and greatly elongated, 2 to 9 inches long, the lance-linear blades less than $\frac{1}{2}$ inch wide, tapering to an almost equally long petiolar part, cauline leaves 2 inches long or less, lanceolate,

acute, sessile, all foliage deep-green, entire, pubescent marginally and more or less so along the veins, but stems quite strigulose; heads not of the largest, but solitary; bracts of involucre very many, linear, acuminate, their slender tips recurved, all green as to color, not darkened, neither granular nor viscid but rather strongly scaberulous; rays purplish, decidedly broad, but less so than in *E. callianthemus*.

Known only as collected near the international boundary, in the Chilliwack Valley, in July, 1901, by J. M. Macoun, the type specimens in my own herbarium, bearing the Canad. Surv. numbers 24,468 and 26,467.

ERIGERON CILIOLATUS. Low tufted perennial, the branched caudex stout, copiously leafy, the leaves ascending or upright, the few flowering stems—one only to each branch of the caudex—only 2 to 4 inches high, stoutish, decumbent, beset with reduced and bract-like foliage, strictly monocephalous, all foliage glabrous except marginally, of the blue-green of *E. callianthemus*, not altered by the process of drying; basal leaves 1 to 1¾ inches long, spatulate oblong and very obtuse, to lance-oblong and acutish, peculiarly ciliate for this alliance, with a considerable length and density of hirsutulous hairs: bracts of the involucre devoid of pubescence and glandular, dark-colored, almost uniserial and equal, the tips little spreading; rays broad, about 35, nearly or quite white.

From 7,500 feet on Mt. Rainier, collected 14 Aug., 1895, by O. D. Allen (n. 142), and distributed for *E. salsuginosus*.

ERIGERON SUKSDORFII. Rhizomatous subterranean parts strongly developed and very stout; stem and tuft of basal leaves solitary at each branch of the caudex and the scapiform stem monocephalous; herbage firm, glaucous, not in the least discolored in drying: basal leaves upright, ¾ to 2½ inches long, the earliest spatulate-oblong, very obtuse, others lanceolate, acute, all entire, shortly and stiffly ciliate, the hairs incurved; pubescence of stem strigulose, the hairs appressed: heads as large as in smallish states of *E. callianthemus*, the

involucral bracts much less numerous, glandular-scaberulous, not darkened but of the same green as the foliage, of firm texture and scarcely reflexed at tip: rays white.

At 5000 feet on Mt. Adams, Washington, 5 Aug., 1885, W. N. Suksdorf, his n. 2412 as in my herbarium; sent out by Mr. Suksdorf for *A. salsuginous*, but by him remarked on as different from the other *salsuginous* of lower altitudes on the same mountain, that is, *E. hesperocallis*. He notes that this smaller plant of greater elevations has white rays. He does not note that the herbage is different both as to color and texture, nor that this plant when dry remains colored as when fresh. I should have been glad if I could have left this to represent, on these higher elevations of coastward peaks, the Rocky Mountain *E. callianthemus* in a small form. That is what the specimens suggest, until you view the parts under a lens. It has characters precluding its referability to that or any other species.

Within the almost or quite 600 miles stretch of the Sierra Nevada of California nowhere exist the physiographic conditions that have been given the *E. hesperocallis* of Oregon and Washington, much less the environment of *E. callianthemus* of the far inland and more arid as well as colder Rocky Mountain chain. Yet plants of their type are more or less frequent throughout some 500 miles, at least, of the Sierra Nevada. It is a region—that of the higher elevations, where alone these plants are found—which has been little explored, but among the scanty material gathered, one notes here also a number of things long ago labelled *E. salsuginosus* which need not be looked for outside of this mountain range, and which are mostly without name or description. The earliest known California member which obtained a name as a variety is a plant of subalpine heights in the northern Sierra to which Asa Gray as long ago as 1876, while he still held these things to be asters, named *Aster salsuginosus* var. *angustifolius*. It is a well defined species and has been named in specific rank by

some one in more recent times ; but southward in the middle and southerly extensions of these mountains there are evidences of species not yet named.

ERIGERON REGALIS. In size, form, even leaf-outline, mostly precisely imitative of *E. callianthemus*, yet as to texture and color of foliage widely different ; leaves as thin as in *E. membranaceus*, yet not dark but light-green, at the same time with nothing of the glaucous or blue-green of *E. callianthemus*, the basal ones with blades elliptic and acute, tapering to long winged petioles, marginal pubescence scanty and unequal, that of the stem as scanty, fine, spreading or ascending : heads 2 or 3, very large ; bracts of involucre more equal, broader, shorter, not much disposed to curve at tip, densely beset with minute gland-tipped strigose hairs ; rays ample, apparently pale purplish or pinkish : achenes villous-strigulose.

This fine species was first collected by Bolander in 1866, in the Yosemite Valley, his n. 5029, according to the sheet now before me, and in Asa Gray's hand labelled *Aster salsuginosus*. More perfect specimens are those of Coville & Funston from Mineral King, n. 1409 of the Death Valley Exp., and the same with narrower foliage, also from Mineral King, is their n. 1472.

ERIGERON PETIOLARIS. Tufted perennial, with solitary monocephalous stem from each branch of the caudex, the whole 6 to 10 inches high ; basal leaves quite erect, $1\frac{1}{2}$ to 3 inches long, the broad winged petiolar part of from twice to four times as long as the somewhat obovate to oblanceolate laminar part, both faces as well as the stem hirsutulous with fuscous rather than whitish hairs, and the leaves somewhat viscid-glandular under the pubescence, cauline leaves very narrow, but both frequent and long, very erect, almost appressed to the stem : head short-peduncled, rather large, $1\frac{1}{4}$ inches wide from tip to tip of the broad blue rays ; bracts of invol-

ucre subequal but in several series, their tips tapering, but not attenuate nor much recurved, dark-colored and glandular above the middle, but toward the base rather densely viscous-hirsute.

Such a peculiar member of the group is before me, from some not definitely indicated station in the mountains of middle California, at 10,000 feet, by George B. Grant, collected in July, 1902; type sheet of four specimens in U. S. Herb.

ERIGERON CONTROVERSUS. Evidently an alpine and sub-caulescent perennial, each tuft of ample upright leaves and monocephalous scapiform stem arising from the branch of a stout multicapitose crown, the height only $1\frac{1}{2}$ to $3\frac{1}{2}$ inches; leaves 1 to $1\frac{3}{4}$ inches high, spatulate oblong, very obtuse, entire, glabrous except as to an obscurely ciliolate margin, the texture not firm; stem with 1 to 3 linear bracts and a solitary head large for the plant; involucre between turbinate and hemispherical, of not very numerous bracts and these notably unequal, rather firm, linear, acute, the tips neither erect nor yet definitely spreading, the whole dark-colored, glandular-puberulent, with also some strigose hairs: rays broad, well elongated, purple, about 25 in number.

An ambiguous species, known to me in a half-dozen specimens mounted on U. S. Herb. sheet 221514, collected by Mr. Marcus Jones in Aug., 1879, at Alta, Utah. Mr. Jones distributed this for an *Erigeron*, without any specific name. It is not easy to see why in 1879, before Asa Gray had transferred such things from *Aster* to *Erigeron*, he should not have received and distributed this plant for an aster. Perhaps the only slight inequality of the involucral bracts, and their glandular character, may have indicated erigeron, or, it may be that the labelling and distribution of the specimens was made after 1881, when Gray began to call such things erigerons and therefore in the light of that author's teaching. This dwarf is an erigeron only because *E. salsuginosus* and *callianthemus* are to be erigerons. If they are aster, so is this, and

the more because of the few and unequal bracts in *E. controversus*. This can not be the *Aster glacialis* of Nuttall, any more than can certain larger, yet smallish states of *E. callianthemus* can be that unrecognized plant.

There is another group of large and handsome western erigerons, even more showy in some of its developments than the *salsuginosi*, readily distinguished from the last named by the excessively numerous and extremely narrow rays; a group more numerous in species than the *salsuginosi*, and as much in need of critical investigation. The plants are particularly abundant at middle elevations in the Colorado mountains, sometimes descending to the foothills along stream banks, in moist alluvial soil. A multitude of diverse types in this group went altogether, in the days of Hall and Harbour's, Parris and Patterson's and my own early gatherings in Colorado, as *E. glabellus* according to the dictum of Asa Gray, the *E. asper*, published by Nuttall together with his *E. glabellus*, being suppressed; not allowed even varietal rank. The validity as a species of this Grayian group that took in one set of plants from the high and dry plains of Dakota and Manitoba to moist and rich mountain valleys of British Columbia and southward all the way to New Mexico and Arizona remained long unquestioned. So long as I knew these beautiful things only as we have them in Colorado and Wyoming, I did not question the authority of Gray in the matter, or doubt that he was correct; and not until many years later, and after the period of my studies in Colorado had ended, did I discover the evident fallacy of the *E. glabellus* of the Synoptical Flora.

In the summer of 1890, on the unbroken prairie, sparsely grassy and somewhat sandy, at Carberry, Manitoba, I came upon several colonies of erigerons of species wholly new to me. I had not forgotten that it had been from somewhere in just this physiographic region, and not so very far to the south, that Nuttall had derived the originals of his *E. asper* and *glabellus*. I made a representation of the plants for my herbarium. On my return from that season's travels I could

have taken up my Colorado and Wyoming materials, and might easily have made the segregations—some of them at least—which this personal rediscovery of Nuttall's plants convinced me were called for.

Two years later than the date of my collecting these things in the southern part of Manitoba Mr. Rydberg, then unacquainted with the farther Rocky Mountain erigerons of such signal beauty, gathered the comparatively homely *E. glabellus*, though not in typical form, in the Black Hills of South Dakota. With something very like the real *glabellus*—specifically the same thing—before him, he was able afterwards, when the great richly colored Colorado mountain "*E. glabellus*" came to his knowledge, to segregate it, agreeably to its deserts, as a species. This he did, publishing the fine plant, however, under the poor plebeian name of *E. Smithii*.

I should be glad to be able to take up, at this juncture, the whole subject of Nuttall's *E. asper* along with *glabellus*; but the many scores of sheets of specimens at hand which have been so referred, as I think infelicitously, can not now be studied critically by me for want of time; but there exist in Colorado and other western mountains here and there some less common types of this alliance hitherto unpublished.

ERIGERON RUBICUNDUS. Habit of *E. Smithii* but a stout plant, and low, barely 6 inches high; basal leaves 1 inch long, spatulate-obovate, entire, very obtuse, the cauline oblong, acutish, broadest at base and sessile, quite numerous, overreaching one another in their suberect attitude, all superficially glabrous except as showing some long hairs on the midvein beneath, the margins rather strongly hairy; stem stiffly short-hirsute throughout: involucrel bracts in two equal series, hirsute below the middle, above somewhat strigulose, but with also a denser investiture that is glandular-scaberulous: rays 100 or more, deep-pink, or almost rose-color, not of the narrowest, the spread of them in the expanded head $1\frac{1}{4}$ inches.

Known to me only as collected in the extreme southwestern Colorado, near Silverton, July, 1889, by Alice Eastwood.

ERIGERON IODANTHUS. Mode of growth quite that of *E. Smithii* but rather small, the stems less than a foot high, tufted and at base decumbent, stoutish, loosely hirsutulous to above the middle, above that and to the peduncles more densely so, but the hairs finer and shorter, accompanied by a trace of sessile glands very minute: basal leaves long-petioled, the blades broadly oblanceolate, obtuse, the whole 2 or 3 inches long and with sparse hairiness as to both faces, the cauline oblong to lanceolate, sessile, acute, rather strongly ciliate, but superficially glabrous or nearly so: heads large, 2 or 3, the terminal one not surpassed or even equalled by the laterals; bracts of involucre linear, acuminate, equal, glandular-puberulent: rays many, not extremely narrow, in color of an intense blue-violet.

Collected at 10,500 feet on some mountain in southern Colorado, 9 Sept., 1903, by F. H. Knowlton.

ERIGERON HIRTUOSUS. Habit of *E. Smithii*, but only 5 or 6 inches high, the stem strongly hirsutulous from base to summit, all except the very earliest leaves hardly less so; lowest basal leaves spatulate-obovate, obtuse or even retuse, glabrous except marginally, and there showing only scattered short straight spreading hairs; stem leaves few, large for the plant, spatulate to oblong, acutish, broad at base and sessile: heads 2 or 3, large, their short peduncles very hirsute, the involucre glabrous except for a few hairs at the base, above it green and naked, though with the mere suggestion of a glandular coating: rays long and very narrow, deep-purple.

Collected in southern Wyoming, at 10,000 to 11,000 feet on the Continental Divide, 15 July, 1901, by Frank Tweedy.

ERIGERON MOGOLLONICUS. Stoutish and rigid, the several stems 12 to 16 inches high, erect above an ascending basal part,

these and tufts of larger leaves from a short branched crown or caudex, the leaves to all appearance glabrous, but not so the stem and long peduncles of the several large heads, these sparsely but rather coarsely setose-hispid and striate; basal leaves on short broad petioles, these and narrowly oval or spatulate-oblong blades 3 to 6 inches long, obtuse, entire; cauline leaves small, oblong, sessile, from 1 inch long in the lower to $\frac{3}{4}$ inch long in the upper, all glabrous except as to the rather strongly and stiffly ciliate margins; heads corymbose, the hemispherical involucre little more than $\frac{1}{4}$ inch high, twice as broad, the bracts equal, linear, strigose-hispidulous and most so near the margin, not at all granular; rays narrow, not excessively numerous, nearly $\frac{1}{2}$ inch long, apparently purplish.

Known to me only as collected in the Mogollon Mountains, New Mexico, by H. H. Rusby in 1881.

A natural group of rather tall and leafy, mostly white-rayed erigenus, of which *E. Coulteri* is an old and a good representative, has yet not a few unrecognized species; among them the following, from Oregon.

ERIGERON NEMOPHILUS. Large perennial, with stems stoutish, simple and monocephalous, $1\frac{1}{2}$ feet high, with a copious investiture of large stem leaves; basal foliage of an elliptic-lanceolate blade and narrow petiole of nearly equal length, the whole 3 inches long or more, entire, very acute, the cauline almost as large, but sessile, broadly lanceolate, with 1 to 3 salient serrate teeth on each margin, the texture of all very thin, unaltered as to the deep-green color in drying, both faces sparsely hairy, the margins closely beset with very different short incurved hairs; stems sparsely hirsute below, more thinly soft-strigose above the middle; head very large, the narrow and equal involucre bracts soft-hirsute at and near the base, otherwise green and glabrous, with hardly a perceptible trace of the glandular: rays numerous, not so extremely narrow, apparently light rose-red.

A fine and strongly marked species apparently collected only by Mr. E. I. Applegate somewhere in southern Oregon, 29 July, 1898. For the particulars of the locality, I may well quote the words of Mr. Applegate: "Moist ground at edge of woods west of Abbott's Butte, on boundary line between Jackson and Douglas counties, about 6000 feet."

ERIGERON LEUCANTHEMOIDES. Tall as the last; more strictly erect, monocephalous, the stem as leafy; basal leaves not present, the cauline mostly 3 or 4 inches long, with a spatulate tapering from an oval and obtusish proper laminal part, this lightly and even somewhat obscurely serrate-toothed, the texture of all very thin, darkened or discolored in drying, both faces with some scattered hairs, but the margin without any; stem nearly glabrous throughout, the few hairs soft and spreading: heads large, the spread of the not very narrow white rays nearly 2 inches; bracts of involucre in 2 series but equal, shortly soft-hirsute almost throughout, but the hairs shorter and more sparse above the middle.

Collected in the Powder River Mountains, Oregon, in August, 1896, by C. V. Piper, by him labelled *E. Coulteri*, to which it is not very closely allied. The breadth of the long white rays is almost that of those of the ox-eye daisy.

ERIGERON LUCIDUS. Stems more than a foot high, rather slender, strictly erect and monocephalous from slender nearly horizontal rootstocks; basal leaves small, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long including the elliptic to oblanceolate blade and broad petiole, the lower basal twice or thrice as large, mostly spatulate and spatulate-oblanceolate, sessile, acute, the upper half of the stem with only few and reduced acute narrow leaves, the pedunculiform uppermost part naked for 3 or 4 inches under the solitary large head; stem straw-colored, very smooth, glabrous to the naked eye, a good lens disclosing here and there a white-bristly short ascending hair; leaves of a bright light green, of thinnest texture, glabrous except margin-

ally, even there only obscurely pubescent: involucre before pressure perhaps low-hemispherical, nearly $\frac{1}{2}$ inch high, at the very base marked by a tuft of hirsute deflexed white hairs, the bracts all equal and hardly biserial, linear, acuminate, from below the middle up the apex rough with scattered blackish hairs but neither glandular nor viscid; expanded head $1\frac{1}{4}$ inches across, the rays white, neither narrow as in typical erigeron, nor anywhere nearly as wide as in *E. callianthemus*.

Type specimens in U. S. Herb., collected in Idaho, between Custer and Challis, by L. F. Henderson in 1896.

ERIGERON SCABERULUS. Akin to *E. glabellus*, the simple monocephalous stems strictly erect from the very base, a foot high or more, minutely hispid-hirsute throughout, this indument deflexed on the lower part of the stem, elsewhere only horizontally spreading; leaves numerous, but small for the plant, the basal not 2 inches long, oblanceolate, acutish, entire, of firm texture and upright, the cauline less than an inch long, lance-oblong, acute, erect, sessile, both faces of all foliage setulose-scabrous, the margins closely and stiffly ciliolate: involucre hemispherical, more than $\frac{1}{2}$ inch broad, the bracts equal, linear, merely acute at tip, the whole series glandular-scaberulous and closely so, without hairiness; rays very many and narrow, but short for the involucre, the spread of them hardly $1\frac{1}{4}$ inches.

White Mountains of Arizona, David Griffiths, August, 1903; type sheet in U. S. Herb., sheet 496640.

Several new allies of *E. divergens*, chiefly far southeastern, are next presented.

ERIGERON GRACILLIMUS. Root annual, stem strictly erect, simple to near the summit, 10 to 15 inches high: earliest foliage unknown, leaves nearest the base cuneate-obovate, narrowly so, the others spatulate-linear, all entire, acutish, $\frac{1}{2}$ to

$\frac{3}{4}$ inch long, greenish, thinly somewhat strigulose-hairy, the few pedunculiform and monocephalous branches minutely and more deusely hispidulous under a lens: involucre about 4 lines broad, not as high, its bracts biserial but equal, the inner linear-lanceolate, aristate-acuminate, the outer linear, loosely hispid-hirsute: spread of the numerous violet or paler rays about $\frac{3}{4}$ inch: bristles of the pappus very delicate and fragile, the squamellae present, as in the whole group.

Common on stony slopes, in forests of yellow pine, in the Coconino Forest Reservation, northern Arizona, the specimens collected 24 Aug., 1911, by Jardine & Hill, who give 6800 feet as the altitude of the woodlands where it grows. On U. S. Herb., sheet 326788 are four good specimens of the same, distributed from the same general region, collected by M. E. Jones, 17 Sept., 1894. The special locality given for these is Nagle's Ranch.

ERIGERON FURCATUS. Annual or biennial, rigidly erect, 6 to 10 inches high, simple to the middle, there producing a solitary short-peduncled head, and beyond that widely and several times forked, the whole cinereous with a short strigose-hirsute indument: absolutely basal foliage unknown, the lowest cauline $1\frac{1}{2}$ inches long and suberect, consisting of oblanceolate blade and narrow petiole of equal length; those of upper part of stem 1 inch long, linear, obtuse, numerous, the pedunculiform flowering branches similarly bracted to within a half-inch of the head; bracts of involucre only sparsely hirsute, the inner series shorter than the outer, all acute; rays many, narrow, long, white: outer pappus conspicuous, of rather many broadly subulate squamellae.

The type is from the region of the San Francisco Mountains in northern Arizona, as collected by F. H. Knowlton, 20 Aug., 1889, the special locality Hendrick's Park. No other member of the group has a stem simple up to the height of three or four inches, then once or twice or thrice forked.

ERIGERON LAVANDULACEUS. Low perennial, the not numerous branches basal, at first decumbent, then ascending, the whole 5 to 7 inches high and cinereous with a dense and rather soft strigose indument: leaves rather firm, the basal seldom an inch long, of rounded entire blade and well defined petiole of equal length, those next above cuneate-obovate, the proper cauline and rameal oblong-oblancheolate, abruptly acutish; pedunculiform monocephalous branches naked for 2 inches or more: heads of the usual size for the group; involucre rather broad and low, sparsely hirsute, the bracts very many, equal, merely acute; rays excessively numerous and narrow, not long, of a fine lavender-blue: pappus bristles very delicate, the squamellae minute or obsolete.

Gardenville, Nevada, 15 June, 1902, C. F. Baker, his n. 1085, distributed as *E. divergens*. With its deep lavender rays and graceful habit, this is one of the few members of its group that may be called beautiful.

ERIGERON DICLADUS. Perennial but with perfectly simple caudex producing annually 2 or sometimes 3 wand like stems a foot high or less, these very slender and monocephalous, the branchlets all leafy, sterile, curving outwards; whole plant pale with a dense pubescence which under a lens is wholly hispidulous: basal leaves gone at flowering time, only their dilated, hispidulous and ciliate petiolar part remaining; cauline oblanceolate, but narrowly so, and an inch long, those of the branchlets much reduced and linear, the long pedunculiform ends of the branches naked; heads of the size usual in the group; involucre bracts equal and biserial, except as to several much shorter which subtend the rest, the pubescence not dense, hispid-hirsute: rays white: receptacle almost flat: outer pappus of the achenes not scanty but minute, apparently slender-subulate.

Collected at 6600 feet in the mountains near Kingston, New Mexico, 9 June, 1904, by O. B. Metcalfe, wrongly referred by me to *E. cinereus*. Though the few branches are

rigid and ascending, there is still a suggestion of *E. flagellaris* in its aspect.

The present study must be concluded by diagnoses of species belonging to various groups of the membership of the genus.

ERIGERON VILLOSULUS. Stems tufted, 3 to 6 inches high, very leafy to the summit with a foliage large for the plant, mostly monocephalous, the heads short-peduncled, hardly surpassing the foliage; leaves of lower part of stem oblanceolate, more or less definitely broad-petiolate, the others lance-oblong and sessile, all entire, acute or at least acutish, from $2\frac{1}{2}$ inches long in the lowest to $1\frac{1}{2}$ in the uppermost, all parts of leaf and stem, especially the stem, almost hoarily villous-hirsute; involucre $\frac{1}{2}$ inch broad, its bracts equal, biserial, the outer series strigose, the inner glabrous; rays very narrow, not excessively numerous, deep violet-purple, the head with these expanded an inch across.

Grassy summit of Mt. Angeles, western Washington, at 6000 feet, J. B. Flett, 12 Aug. 1911. A member of the leafy stemmed group to which *E. macranthus* and *speciosus* belong, but a dwarf subalpine, almost woolly-looking plant.

ERIGERON ANICULARUM. Low perennial with one or more subscapiform assurgent or ascending stems 6 inches long, arising out of a tuft of upright lanceolate basal leaves 1 to $2\frac{1}{2}$ inches long, entire, or some with a few serrate teeth, these and the few lance-linear stem leaves of a pale green, also subcinereous with a fine short strigose pubescence; heads 1 or 2, of middle size, the involucre hemispherical, $\frac{1}{2}$ inch wide when pressed; bracts rather broadly linear, not only acute, naked and very thin at tip but mainly strigulose-hairy, with traces of minute glandular dots where the pubescence is thinnest: rays rather short, numerous, narrow, white.

Collected on Old Wives' Creek, Assiniboia, 23 May, 1895, by Prof. John Macoun, n. 10850 of Canad. Geol. Survey.

Var. *LATIUSCULUS*. Pubescence and heads as in the type, but monocephalous stems stout, rigidly erect, only 3 inches high; the tuft of basal leaves large in proportion, broader, often very obtuse.

This is from Twelve Mile Lake, Wood Mountain, in the same province, and by the same collector. Its number is 10,894 of the Canad. Geol. Surv.

ERIGERON PACHYRHIZUS. Low multicapitose subalpine perennial, with something of the aspect of *E. leiomerus* as to the parts above ground, but these tufted on the branches of a thick woody-looking caudex, such branches ascending, or nearly horizontal, dark with imbricated leaf-bases of many seasons: $1\frac{1}{2}$ to 3 inches long, oblanceolate to spatulate-elong, very obtuse, entire, of thin texture and bright green, sparsely beset both superficially and marginally with setiform hairs, or some of the lowest glabrous; stems several, subscapiform, 3 to 5 inches high, decumbent, bristly-hairy, usually monocephalous, and with a few sessile small leaves; involucre rather narrow and subturbinate, its bracts almost uniserial, rather few and broadly linear, acute, sparingly setulose; rays short and broad, perhaps white.

Calapooia Mountains, Oregon, "on a bare peak, about a mile west of the Cascade divide," Coville & Applegate, 9 Aug., 1897. Interesting plant, with some affinity for *E. leiomerus*, yet doubtless also with points of contact with alpine diminutives of *E. callianthemus*. The color of the herbage is unaltered by drying.

ERIGERON EUCEPHALOIDES. Stems several, a foot high or more, from a subligneous caudex crowning a thick hard root or rootstock, loosely and rather equably leafy to the summit, the bark whitish, smooth, glabrous, only the peduncles of the 1 to 3 heads scabrous-hispid; leaves all everywhere glabrous except as to the distinctly scabrous-ciliate margins, the basal upright on long slender petioles, these and the narrowly

oblanceolate acute blades 3 or 4 inches long, the cauline all sessile, but the lower spatulate-lanceolate, the others oblong to ovate-lanceolate, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long and sessile by a broad half-clasping base: heads much smaller than in others of the *macranthi*, 1 to 3 on naked rigid peduncles, the receptacles under the bracts strongly muricate-scabrous, the bracts rigid, subulate-linear, their slender tips recurved, strongly scaberulous; rays not elongated nor so very numerous, but rather broad, of a deep violet-color: achenes strigulose, pappus fine and fragile.

South shore of Pettit Lake, Idaho, collected 14 Aug., 1895, by Dr. B. W. Evermann of the U. S. Fish Commission, who describes the habitat as a morainic ridge, at an altitude of 7200 feet or more. The species is strongly marked, and has something of the aspect of *Eucephalus glaucus*.

ERIGERON APICULATUS. Plant 2 feet high or less, in habit between the *macranthi* and the *glabelli*, having a strongly developed tuft of basal petiolate leaves, the stem being copiously and equably leafy with broad sessile ones, all the foliage thin-nish, wholly glabrous except marginally, and even there faintly if at all ciliate; basal leaves upright, 3 to 6 inches long including the broadly lanceolate and lightly serrate blade and the broad petiole, the cauline about $1\frac{1}{2}$ inches long, ovate-lanceolate or narrower, entire, but all leaves both basal and upper tipped abruptly with a long almost aristiform mucro: heads about 4, corymbose, long-peduncled, among the largest; involucre nearly hemispherical, in the pressed specimens 1 inch across, the bracts linear, equal, in about 3 series and, like the peduncles below them, finely and closely glandular-scaberulous, the outside of the receptacle beneath the bracts hirsutulous with short deflexed hairs; rays many, long, the spread of them about $1\frac{3}{4}$ inches, broader than those of other *macranthi*.

Known only as collected in 1874, at 9000 feet, on Mt. Graham, Arizona, by J. T. Rothrock.

ERIGERON LEIOPHYLLUS. Akin to *E. macranthus*, stout and rigid, 2 feet high, the stem perfectly glabrous, whitish and somewhat polished, closely leafy to the monocephalous or subcorymbose summit; basal leaves if any unseen, the lower cauline 2 or 3 inches long, broadly oblanceolate to spatulate, these succeeded by oval ones of $1\frac{1}{2}$ inches or more, those nearer the summit gradually shorter and, the uppermost ovate and $\frac{1}{2}$ to $\frac{3}{4}$ inch long, the lower and larger obtuse, the small uppermost acute, all very smooth and glabrous on both faces, only the margins scaberulous with short upturned bristly hairs: heads 1 to 5, small for the plant; bracts of the involucre linear, acute, glabrous, under a lens showing faint traces of minute granular indument.

Collected at Fort Douglas, Utah, 17 July, 1886, by Marcus E. Jones, the very good type sheet of four stems being n. 221417, U. S. Herb.

ERIGERON CONGESTUS. Low perennial, with taproot crowned by a closely compacted system of short and stout branches bearing tufted upright leaves and many scapiform monocephalous branches. The whole plant only 3 or 4 inches high, every part almost hoarily strigose-hirsute: leaves oblanceolate, obtuse, entire, an inch high or little more; scape-like branches with few and inconspicuous narrow bract-like leaves and simply hirsute with long white hairs: involucre hemispherical, the bracts linear, acute, very hirsute with stiffish, even somewhat strigose hairs like those of the leaves; head less than $\frac{1}{2}$ inch high, more than $\frac{1}{2}$ inch broad, rayless, the flowers deep-yellow: achenes flattened, minutely strigulose; pappus double, the inner very slender and fragile.

Gold Hill, in Bear Valley of the San Bernardino Mountains, southern California, at 7000 feet, S. B. Parish, 2 June, 1901; both habitally, and as to pubescence completely distinct from *E. aphanactis*, which also does not reach this region.

Certain Cruciferous Types.

POLYCTENIUM is here proposed as a generic name for a type which only by most superficial inspection, joined to a total disregard of vegetative characters, has found place in books and herbaria under the name of *Smelowskia Fremontii*. To the eye of experience there is not a suggestion here of the genus *Smelowskia*, which are not only soft-wooly herbs, but their herbage is soft as to texture, that is, it is yielding or pliable, whereas in *Polyctenium* it is in every part rigid, wiry as to the stems, and as to the leaves stiffly acerose, almost prickly; also the basal and subterranean parts are as different as imaginable. Of the branched caudex, its members deeply invested with the soft-chaffy leaf-bases, which one notes universally in *Smelowskia*, there is no trace in *Polyctenium*. So strong is the contrast between the two that when the latter first came to my knowledge, and I thought it a plant undescribed, I referred it to *Braya* and published it as *B. pectinata*. If any one had pretended to assure me that the plant was a *Smelowskia* I should have been heedless of the proposition. I have never been able to appreciate that now time-honored artificialism in botany that ignores vegetative and habital characteristics. But the pods even in this plant have not always been looked into with due discrimination. They have been described as linear and tetragonal; but while their angularity is obscure, their more distinctive mark is that they are definitely, though in the type species but slightly, obcompressed. Measured transversely to the partition they are wider than the partition itself, a character which comes out strongly in a species never until now published. The original of the genus is frequent in southern Oregon, particularly in the Klamath Lake country, and southward into northern California. I call it

POLYCTENIUM FREMONTII.

POLYCTENIUM GLABELLUM. Larger than *P. Fremontii*, quite devoid of distinctively basal pectinate foliage, and the plant almost glabrous, only few and scattered short and mostly

simple stiff hairs visible under a lens: leaves neither very rigid nor pungent, sessile along the branches and appearing almost digitate by their 4 or 5 long and linear segments: racemes larger but flowers smaller than in the type species, and white: pods unknown.

Known only as collected by Mr. J. B. Leiberg on Dry Creek, Malheur Co., Oregon, 27 May, 1896. The locality is in extreme eastern Oregon, remote from the range of *P. Fremontii*.

POLYCTENIUM BISULCATUM. In habit quite like *P. Fremontii*, with a similarly dense tuft of acerosely dissected basal leaves, but the plant smaller, also quite cinereous with a copious but very minute and short dendritic pubescence, this extending to the pedicels: siliques short, only 3 or 4 lines long, linear-oblong, strongly obcompressed, each valve sunken into a shallow furrow on either side of the midvein.

Collected so far only by Thomas Howell, in Silvies' Valley, of the Blue Mountains, Oregon, 24 May, 1885. Readily distinguished by its dense pubescence and short, much flattened and bisulcate pods. The plant is also small, the most perfect specimens less than 3 inches high.

PLANODES is a generic name well suited to a cruciferous type which for more than two centuries past, under the leadership of a number of systematists, has wandered from one genus to another, at home nowhere, until one admit it as *sui generis*. The most unnatural place ever assigned it by any one, is that which it is forced into in recent manuals, where it is called *Arabis virginica*. There is not a group or subgenus of arabis species into which it falls. To put it next the cresses, where Plukenet had it more than two centuries ago, is not at all as bad taxonomy as to call it an arabis. Linnaeus, who knew the type only from Plukenet's figure of a very young plant, could see in it nothing else but a *Cardamine*, and, altering that author's *Virginianum*, named it *Cardamine Virginica*. No one, having an eye to habitual resemblances, and

ignorant of the ripe pods and seeds of the plant, could possibly make a better disposal of it. But the one character essential to the very existence of *Cardamine* as a recognized genus is extreme elasticity of the valves of the pod when mature. That which lacks the essential character of a genus, must not be forced into such genus; and I call this type

PLANODES VIRGINICUM.

New Species of Chaenactis.

CHAENACTIS LEUCOPSIS. Subalpine or alpine low perennial, the many stems, buried for half their length in sand or scorial, arising from a more deeply seated root, their aerial part consisting of a tuft of leaves and a scapiform monocephalous stem, itself barely 2 inches high and little surpassing the leaves, the whole herbage even to the tips of the involucrel bracts whitened with a fine close altogether wooly indument: leaves of stout petiole and pinnate blade of about equal length, the pinnae approximate and themselves pinnate-lobed all except the lowest, and the minute lobes short and rounded: heads $\frac{3}{4}$ inch high, about as broad, the bracts subequal, the outer, lance-linear, the others linear, none quite acute: rays none: achenes hirsute; pappus of about 8 subequal paleae, all obtuse, purple in the middle.

Type specimens in U. S. Herb. from an altitude of 11,500 feet in the Needle Mountains in southwestern Colorado, 14 July, 1901, Whitman Cross, collector. Completely separate from other alpine species by its purely wooly indument, without trace of separate hairs or any glands; its habit also rather characteristic.

CHAENACTIS PUMILA. Alpine or subalpine dwarf perennial with its several branches wholly above ground, clustered on the crown of a long deep root, the whole plant above ground only 2 to $3\frac{1}{2}$ inches high, but the breadth of the mass of heads sometimes 4 inches; blades of the leaves ovate, often

broadly so, from less than $\frac{1}{2}$ to more than $\frac{3}{4}$ inch long, on broad flat petioles of more than equal length, the petioles and rachis densely white wooly at first, this partly deciduous, the pinnae approximate, sometimes more than once pinnate: scapiform peduncles barely surpassing the leaves, sometimes corymbosely branched and with 3 heads, other plants moncephalous, these and the involucre strongly glandular-scarious and viscid, never in the least either wooly or hirsute: achenes fairly hispid rather than hirsute; pappus short.

Species of the Sierra Nevada of California exclusively, the type Brewer's 1901 from Sonora Pass, at about 11,500 feet. The heads of flowers in this stout dwarf are as large as those of the largest species.

CHAENACTIS IMBRICATA. Suffrutescent and tall, the many upright branches stout, somewhat tortuous, sparsely leafy up to the corymbous summit; all parts except the floral hoary with a thinnish flocculent tomentum; blades of the leaves of ovate or lance-ovate outline, bipinnate, the primary pinnae remote, their segments crowded, very small and rounded: heads 1 to 5 terminating the branches, $\frac{3}{4}$ inch high; bracts of the involucre very notably unequal, forming about 3 series, all viscid-hirsutulous, not tomentose: achenes strongly strigose-pubescent; pappus paleae elongated but unequally so, very thin and delicate.

Known only from Wenatché Flat, Washington, where it was collected in 1899, June 4, by Kirk Whited. Quite as nearly shrubby as the Californian *C. suffrutescens*, but most unlike that in all other characters.

CHAENACTIS RUBELLA. Dwarf perennial, the whole aerial part of the plant only 1 to $1\frac{1}{2}$ inches high, the proper stems much longer, but leafless and as if buried under sand or scoriae, thus apparently springing severally from a single taproot: leaves many, $\frac{1}{2}$ inch long or little more, ovate, obtuse, closely pinnate and the pinnae pinnatifid, the segments mi-

nute and round, the whole leaf floccose-tomentose when young, later more or less glabrate: scapes only $\frac{1}{2}$ inch long, the heads as high; involucre bracts broad and obtuse, thinly wooly, with barely, or hardly, a trace of glandulosity; corollas deep purple, as are also stems, leaves, and even the pappus; achenes quite hirsute, scales of pappus unequal, on the whole rather short, very obtuse.

A fine subalpine species known only as collected by Dr. J. N. Rose somewhere in northwestern Wyoming, probably on what is now Yellowstone Park territory, 31 Aug., 1893.

CHAENACTIS MINUSCULA. Dwarf, and also slender, the tufts of small leaves only an inch high, the scapiform peduncles and solitary heads together barely 2 inches, even less, all these, in the specimens, crowning stoutish caudex-branches dark-colored and covered with the persistent bases of the leaves of other seasons, the root bearing these not known: leaves from broadly lanceolate to narrowly oblong outline, the pinnae approximate and mostly entire, the whole floccose-tomentose only when young, the older glabrate: involucre $\frac{1}{2}$ inch high, their bracts green or purplish, glandular-scarious or some glandular-hirtellous, yet not very viscid: achenes rather strongly bristly-hairy; pappus purple, its scales obtuse, not very unequal.

Summit of Mount Parks, Idaho, at an altitude of 9400 to 10,400 feet, collected by Dr. B. W. Evermann, 15 Aug., 1895.

CHAENACTIS ANGUSTIFOLIA. Low perennial, with caudex simple or sparingly branched, the leafy and corymbose stems only 2 to 7 inches high, all the parts except the involucre and flowers white with a close permanent tomentum, both basal and cauline leaves long and narrow, in outline narrowly lanceolate to broadly linear, the pinnae closely approximate and very short, either with 3 rounded short lobes or else quite entire, the petiole manifest, but much shorter than the blade:

involucres subturbinate, more than $\frac{1}{2}$ inch high, bracts narrow below, broader and obtuse above, light-green, notably hirsutulous with jointed and viscid hairs: achenes with a conspicuous indument of stiff short strongly ascending hairs; paleae of the pappus very unequal, some of the outer very short, the innermost greatly elongated.

Point of Rocks, Wyoming, in dry soil, collected by E. D. Merrill and E. N. Wilcox, 19 June, 1901. Specimens in U. S. Herb.

CHAENACTIS EVERMANNII. A low much branched and decumbent undershrub, the branches rather slender, wiry, hard-woody and tortuous, those of former seasons naked, dark-brown, those of the season an inch or two long, closely leafy, monocephalous, the small head on a short and slender peduncle: leaves only $\frac{1}{2}$ to $\frac{3}{4}$ inch long, some tridentate and tapering cuneately to a short petiole, others between pedately and pinnately 5-cleft or lobed, the lobes oblong, obtuse, entire, the leaf as a whole white-tomentose on both faces when young, glabrate in age: involucre small, turbinate, far shorter than the flowers, of few and unequal bracts, all wholly herbaceous and very obtuse, thinly tomentose: achenes densely, even somewhat silkily, appressed-pubescent; pappus of about 8 unequal thin obtuse scales.

Collected on a mountain in Idaho, in 1895, by Dr. B. W. Evermann.

CHAENACTIS BRACHIATA. Perennial with stout lignescent basal branching and the dimensions of the northern and genuine *C. achilleifolia*, but basal leaves as well as cauline many times smaller, more fleshy and very compact as well as permanently white-tomentose, the closely pinnate blades ovate to oval, only $\frac{3}{4}$ to 1 inch long on stout petioles of equal or greater length: stems a foot high or more, whitened with wool when young, the wool only partly persistent later, the 3 or 4 monocephalous branches brachiate, *i. e.* abruptly divergent from the main stem at first, then holding the heads erect

by a curve, the whole summit corymbose : heads $\frac{3}{4}$ inch high, turbinate ; bracts linear-oblong, very obtuse, pale-green, rougheued with short papillose gland-tipped and viscid hairs : some of the outer achenes glabrous, others like the inner sparsely short-bristly ; paleae of the pappus very unequal.

Springdale, Utah, M. E. Jones, 17 May, 1894. Species strongly marked in many ways, the foliage comparable to that of *Tanacetum crispum* in cut, but many times smaller, and white with wool.

CHAENACTIS CHEILANTHOIDES. Suffrutescent, producing densely leafy sterile branches 6 inches high, and flowering ones of a foot or more, these also amply leafy below the corymbose inflorescence ; leaves tripinnate, 3 or 4 inches long, 1 inch wide, the ultimate segments all minute and rounded, the whole leaf open and fern-like after the manner of common species of *Cheilanthes*, quite white with a dense wooly indument when young and growing, later glabrate and greenish : corymb of 8 to 12 turbinate heads nearly $\frac{3}{4}$ inch high, on slender pedicels, these and the involucre thinly villous-tomentulose and minutely pellucid-glandular, the bracts subequal, lance-linear, obtuse ; flowers of twice the length of the involucre, flesh-purple, glabrous ; achenes villous-hirsute and pellucid-glandular.

Fayette River, Idaho, at 4100 feet on dry sandy slopes, collected 15 Sept., 1911, by D. Parkinson. The foliage of the plant is of signal beauty, fine, lace-like, ample, snow-white when young, pale in maturity.

Miscellaneous Specific Types.—V.

CLEMATIS ALTHEIFOLIA. Habit and inflorescence of *C. ligusticifolia*, but the plant more slender and graceful, all the parts notably smaller : leaves of sterile shoots 5 or 6 inches long, of 7 to 9 remote small leaflets, these 1 to $1\frac{1}{2}$ inches long, of somewhat rhombic-ovate outline, with a notable

acumination, commonly with a few coarse teeth, often with a prominent lobe on one side at the base, texture very firm, both faces minutely and thinly appressed-pubescent; leaves of fertile branches quite similar, but with only 3 to 5 leaflets and surpassed by the cymes of smallish white flowers: sepals of pistillate flowers 5 or 6, spatulate-obovate to oblanceolate, reflexed and rather persistent, softly silky: stamens of such pistillate flowers 5 to 10, with flattened filaments either linear or slightly lanceolate-dilated, anthers manifest, but perhaps effete; staminate plant unknown: achenes silky-plumose to above the middle, nearly naked for some distance below the apex.

Species known only as collected by myself in the half desert hills near Golconda, in northwestern Nevada, 27 July, 1896.

POLYCODIUM OLIGANTHUM. Shrub apparently low, the branches short, slender, widely spreading, or some recurved, thinly hirsutulous with whitish hairs, some spreading, others turned upward: leaves subcoriaceous, small, the largest only 1 inch long, oval, acutish, glaucous beneath, scarcely glaucescent above, also with scattered hairs near the margin and on the very short petioles: flowers scattered singly in the axils of the ordinary foliage: corolla rather ample and deeply lobed: stamens short: fruit small, globose, conspicuously crowned by the triangularly lobed calyx.

Known only as collected at Lemon Bay, Florida, 23 May, 1906, by S. M. Tracy; his n. 7264. A fine new member of that Floridan group that has no distinct and separate inflorescence.

POLYCODIUM LANGLOISII. Branches slender, minutely and sparsely pubescent with short curved hairs, the pubescence permanent, at least during several seasons: leaves ample, thin, deep-green and almost alike as to color on both faces, pubescent along the veins on both faces, of oval-elliptic outline, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches wide, subses-

sile, narrower below the middle, yet ending abruptly and usually subcordate at base, the apex very acute: bracts of the short racemes small, oval, obtuse, rather strongly ciliate under a lens: corolla extremely short yet apparently mature: fruit unknown.

Species very distinct by the foliage; known only as collected by the late Rev. A. B. Langlois, at Covington, Louisiana, 16 April, 1894.

MACHAERANTHERA SCOPARIA. Annual or biennial, less than a foot high, much branched from the base, and fastigiate, the slender but rigid branches forming a rather dense broomy-bushy tuft: basal and early leaves unseen, those of the branches linear, entire, acute, ascending, hardly an inch long, subcinereous with a minute and rather dense strigulose pubescence, the branches greener, their scanty pubescence more tomentulose: heads many, at summit of the plant only, some of the main branches 3-parted, with as many heads, others simple and monocephalous: involucre $\frac{1}{2}$ inch high, subcampanulate, their bracts not excessively numerous, the tips appressed and straight, not pungently acute, whitish at the back with a minute villous-tomentose pubescence; rays 20 or more, rather short, violet.

Plant of open grassy woodlands, northwest of Turkey Tanks, on the Coconino Forest Reservation in northern Arizona; the specimens collected by Jardine and Hill, 26 Aug., 1911. The species may be compared with my *M. linearis* of southern New Mexico, from which it differs as well by its much less imbricated involucre, and by its pubescence, as by its low bushy habit.

SENECIO MESADENIA. Perennial, the solitary stem stoutish, erect, 2 feet high, subumbellate-corymbose at the almost naked summit, below the middle very sparsely villous-lanate: leaves almost all basal, the longest a foot long including the very long petiole, the blade only 4 or 5 inches, the petioles like the stem below villous-lanate, the blades oval-elliptic, very

saliently and rather closely dentate and minutely and obscurely villous-ciliolate, otherwise glabrous except as to the midvein beneath and next the petiole: corymb of about 12 heads $\frac{1}{2}$ inch high, the terminal one largest and sessile, subturbinate, at least under pressure; bracts of involucre linear-oblong but abruptly apiculate, the very tip of the apiculation purple, the whole otherwise light-green, glabrous; rays rather short but broad, oblong, light yellow.

Collected somewhere on the Mono Forest Reservation, California, at 6600 feet, 1 July, 1911, by Charles W. Fulton. I name the species in reference to the likeness the plant bears to certain species of the genus *Mesadenia*.

SENECIO FODINARUM. Robust perennial $1\frac{1}{2}$ feet high, rather amply leafy to the middle, the basal leaves not the largest, 2 or 3 inches long, ovate, with short and broad petiole, those next above on the stem twice as long, spatulately tapering from an oval upper part, those midway of the stem as long but spatulate-oblong, all entire, obtuse, almost veinless, arachnoid-wooly marginally, otherwise nearly glabrous; heads 12 to 16 in a broad compact corymb, each head nearly $\frac{3}{4}$ inch high; bracts of involucre oblong, abruptly acutish, more or less villous-arachnoid along the prominent midnerve; rays short and broad, yellow.

Near Mineral King in the Sierra Nevada of California, Aug., 1891, Coville and Funston, Death Valley Exp. n. 1491.

Certain Asclepiads.

Time was, and not very long since, when in all our books the commonest milkweed, or silkweed of our northern States and Canada bore the Latin designation, *Asclepias Cornuti*. It passes by that name in works as recent as Gray's Synoptical Flora (1878) and even in the sixth edition of his Manual (1890). Only in the course of the very last years of the nineteenth century, and under the influence of new ideas as to the inviolability of the principle of absolute Linnæan priority, was the old but very erroneous and misleading name *A. Syriaca* restored; the name given it by Linnæus, who himself never had the remotest suspicion that his plant was at all American, not to say exclusively such, and never seen in Syria at all.

As early as 1844, and while as yet the best botanists held that falsehood must not be propagated in the name of science by even so much as a falsifying adjective plant name. The principle is rational and sound. There are amateur botanists, collectors of specimens, and makers of herbaria, both in this country and in Europe, where now our plant has long since become naturalized, who have never supposed for a moment that the species is not a native of Asia, introduced here. The name itself tells that lie to all such people; and every one of these may justly charge us with disseminating untruth, and what we know to be an untruth, by using that as the legitimate name of this common milkweed.

But now, what is of quite special interest in this connection is, that even Decaisne's name for the species, the name *T. Cornuti*, is false as well as the other, though in a different way; for any one possessing a botanist's trained eye, accustomed to, and at all familiar with our milkweeds, opening at page 90 of Cornut's volume, discovers even at first glance that what is there figured, so far from being the *A. Syriaca* of Linnæus, is really the *A. obtusifolia* of Michaux. The solitary, strictly terminal, pedunculate umbel with its few-flowered laxity, as also the small foliage, dispute its identity with the more com-

mon large-leaved plant whose umbels are always several, always lateral and almost sessile. Moreover, in that old author's full page of description, in which he covers everything from root to pods, there is not a syllable that points to the woolly-leaved and spinous-podded *A. Syriaca*. The man could not have written that description with any specimen of the species last named before him.

Several generations of botanists, including our many Americans of the profession, since Decaisne's time, yes, even from Linnæus down, have trustingly followed Linnæus and Decaisne in citing Cornut's figure as a sort of prototype—by all of them an unquestioned prototype—of *A. Syriaca*. One is obliged to doubt whether even one of them, after Linnæus, ever took a look at that old seventeenth-century page and figure to see for himself what it might represent.

Concerning the two names, *A. Syriaca* and *A. Cornuti*, it may not seem to every mind impertinent to ask which one is likely to become the settled one for the species, and perpetual for all coming botanical time? It is possible that neither one may forever escape universal reduction to the status of synonymy; for, *tempora mutantur*. The first of the two prevailed from 1752 to 1844, though rejected by some who would have no geographic botanical names at all. From 1844 until almost 1900 *T. Cornuti* held sway; for only as late as 1908 did that old standard, Gray's Manual, return to *A. Syriaca*; so that only within the last five years has that appellation met with what may be called universal adoption among us. Times change, and so do minds. How long the opinion may prevail that names stand by priority, even when false or ridiculous, no one can tell; but it might easily be that forty years hence, or twice or thrice forty, a distant generation may think as some of the best and boldest individuals between Linnæus and us have thought, that all false names and foolish ones must be expunged, and better ones substituted for them. In that day both *A. Syriaca* and *A. Cornuti* will both go by the board.

The following new members of the genus are from regions distant and western :

ASCLEPIAS LONCHOPHYLLA. Stems 1 or 2 from the root, stout, suberect, low, only 7 to 9 inches high, densely leafy from near the base to the summit, there producing 1 or 2 ample subsessile umbels ; leaves rather broadly lanceolate, 2 inches long or somewhat more, abruptly mucronate-acute, on stout short petioles of less than $\frac{1}{4}$ inch, firm, equally lightish green and sparingly pubescent on both faces : flowers about $\frac{1}{3}$ inch long, dull purplish green ; hoods subquadrate-oval, obtuse, the horn stout, incurved, not very acute.

Plant of the San Francisco Mountain floral district in northern Arizona, where it is doubtless a rarity, having been collected by only one among the many botanists who have visited the region, namely, by C. A. Purpus, in 1902. In his distribution of specimens it was called *A. Hallii*. It is indeed related to that quite rare species of Colorado and Utah, though it is as nearly allied to *A. pratensis* of Mexico, with which it agrees as to its reduced dimensions. It is upright, however, while the Mexican ally is decumbent ; this also has few and opposite leaves, while *A. lonchophylla* has them fairly crowded on the stem, also mostly alternate. It is also notably pubescent, whereas *A. pratensis* is glabrous, or with but a few traces of pubescence.

ASCLEPIAS DEMISSA. Allied to *A. erosa*, but low, only 8 or 10 inches high, firmly erect, densely leafy with small foliage, the herbage glaucous and slightly hoary : leaves ovate-lanceolate, little exceeding an inch in length and a half-inch in width, truncate at base, or nearly so, and sessile, strongly ascending in pairs, the apex subfalcate-cuspidate : flowers in several subterminal short-peduncled umbels, the individual flower large for the plant ; hoods short, far from equalling the anthers, subtruncate, the inner process broadly crescent shaped, far exerted, short-pointed.

An interesting plant, purporting to have been collected

somewhere in Arizona in 1875, by Dr. Loew. The two specimens are on U. S. Herb. sheet 18,727. It was at first labelled "*A. erosa*." That was afterwards (?) erased and "*A. vestita*" substituted, this appellation also subsequently erased, all by parties unknown. The small size of the plants, and peculiarly small and dense foliage, preclude our referring it to either of those species, not to speak of the flowers, the hoods of which, while too short by half for those of *A. erosa*, have the pattern of those of that species in all but their great brevity. In this one particular only do they at first glance suggest *A. vestita*; in structure, and as to the horn, they are far from it.

ASCLEPIAS ROTHROCKII. Allied to *A. erosa*, half as large, more slender, canescently tomentulose: leaves oblong-oval, $2\frac{1}{2}$ to 4 inches long, subsessile, cordate at base, at apex abruptly and cuspidately acute: umbels subsessile, their peduncles barely $\frac{1}{2}$ inch long: hoods of the flower white, shorter than the anthers, as broad as high, truncate and subcampanulate, the broadly lunate process much exerted, not very acute, not horizontal over the anthers, but ascending.

Collected by J. T. Rothrock, on Wheeler's Expedition of 1875, apparently at Fort Tejon, southern California. The foliage has neither the size nor the form of that of *T. erosa* from the same region. It is of thinner texture, also. That of *T. erosa*, even from southern California, is almost coriaceous, the leaf ovate in outline, modified by a long acuminate apex, and the breadth of the leaf is greater than the greatest length of that of *T. Rothrockii*.

ASCLEPIAS OBTUSATA. Of the size of *A. erosa*, but with soft-hoary and thin flaccid foliage; leaf outline elongate-oval, short-petioled and not cordate at base, the apex in all but the floral leaves very obtuse, even subtruncate, but always with a small mucronation, length of leaf $3\frac{1}{2}$ inches, the breadth 2 inches, the texture quite thin: hoods exactly truncate, about equalling the anthers, their process with a long point horizontally extended.

This, like the preceding, was collected by Rothrock, his label says at Fort Tejon; but most probably that collector's localities for plants are untrustworthy. As far as Dr. Gray's description of his *A. erosa* var. *obtusa* goes, this plant agrees with it; but he testifies that Rothrock obtained the plant at Bartlett's Cañon near Santa Barbara, and that is not only far removed from Fort Tejon, but is in an extremely different climatic region. This plant, then, is from near the ocean, and within the fog belt. The thinness of the texture was not noted by Dr. Gray. The closet botanist is apt to fail in this. The distinction of the hood, as truncate squarely, not obliquely, Gray took note of.

Some New Lupines.

LUPINUS OVINUS. Low caespitose perennial, the branches of the caudex thick, short, slightly woody, the scapiform peduncle with flowers only 3 or 4 inches high, the raceme of about 3 or 4 verticils borne little above the foliage: leaflets about 7, $\frac{3}{4}$ inch long or less, oblanceolate, acute, both faces glossy with a dense appressed silky-villous indument, this extending to the pedicels and calyx; corolla $\frac{1}{3}$ inch long, deep blue-purple, wings perceptibly larger than the banner, keel slightly exerted beyond the wings, uncommonly stout and straight, sparsely ciliate at about the middle; pods $\frac{3}{4}$ inch long, densely silky-tomentose, several-seeded.

Sheep Mountain, Waterton Lake, Alberta, collected in July, 1895, by Mr. John Macoun, the specimens with Geol. Surv. n. 10,413.

LUPINUS YUKONENSIS. Tall and slender perennial, with ample long-stalked foliage and no branches, and a solitary rather short raceme of large flowers: petioles 7 or 8 inches long, erect, the leaflets 5 or 6, nearly elliptical, $2\frac{1}{2}$ inches long, $\frac{3}{4}$ inch wide, thinnish, slightly glaucescent above and

glabrous beneath, showing few and scattered pilose hairs on the veins and a more copious yet not at all dense coat of somewhat appressed shorter hairs, the stem also pilose, and with also a short closely appressed pubescence; rachis of the raceme, and more especially the pedicels, hirtellous-hairy; flowers in 6 or 8 not indistinct verticils; calyx thin, scarcely gibbous at base, upper lip notched, the whole villous hirsute on and near the margin: corolla blue-purple, about $\frac{1}{2}$ inch long, the breadth a little more, banner and wings about equal, keel becoming longer, strongly falcate, naked; ovary densely villous-hirsute.

Klondike River, Yukon, John Macoun, 9 July, 1902.

LUPINUS PAULINUS. Herbaceous low perennial, with long slender taproot and a multicapitous short-branched crown, the numerous scapiform peduncles 4 to 7 inches high including the raceme, this compact, 2 to 3 inches long and quite surpassing all the foliage: leaves notably small for the plant, and of few leaflets, the usual number 6, none of more, not a few of 5 and even 4, cuneate-oblong, $\frac{1}{2}$ inch long more or less, barely acute, deep-green, densely appressed-pilose beneath, the upper face less densely so and with shorter hairs, all subfuscous; rachis of the raceme only thinly setulose-hairy; flowers mostly in distinct and approximate verticils; calyx more pilose, its short and subtruncate upper lip partly hyaline; corolla dark purple, less than $\frac{1}{3}$ inch long, the banner uncommonly short and wings large, keel enclosed within the wings, short and little curved, scantily wooly-hairy above the middle: pods not seen.

Collected at Paulina Lake in the interior of Oregon east of the Cascades, 28 July, 1894, by J. B. Leiberger; his n. 550 as in U. S. Herb.

LUPINUS FRAXINETORUM. Perennial, with the habit of *L. formosus* and *Bridgesii*, the several stems weak at base and decumbent, devoid of distinctively basal or radical leaves, but though leafless at the very base, freely and equably leafy above

it and up to the single and terminal raceme, rather conspicuously villous-hirsute with long hairs either horizontally spreading or somewhat deflexed, the short slender petioles similarly hairy, these at base subtended by a pair of large oblong or narrowly oval herbaceous stipules entirely free from the petioles and from each other, $\frac{1}{2}$ inch long or more and acute; leaflets about 7, oblong-oblancoate, 1 inch long or less, acute, canescent on both faces with a dense appressed short-silkenness; raceme subsessile, 5 to 7 inches long, the rachis, pedicels and calyx short-silky-villous; flowers rather definitely verticillate, the whorls not at all crowded; corolla about $\frac{1}{2}$ inch long, dull bluish and white, the banner shorter than the wings, the long keel falcate, naked.

Specimens from an altitude of 6800 feet in the Californian Sierra, on the Sequoia Forest Reservation in Fresno County. Collected by Mr. Ralph Hopping, 29 June, 1911. The species is a remarkable one among Californian perennial lupines on account of its large herbaceous free stipules. The specific name is but an adaptation of the geographic name Fresno, which Latinized is *Fraxinus*.

LUPINUS HABROCOMUS. Perennial with very leafy stems 2 feet high or more, strongly striate-angled and notably brittle rather than flexible, clothed with a rather copious but very fine and soft-spreading pubescence, bearing at summit a single short-peduncled and rather lax raceme of large flowers: basal leaves not seen, those of the stem midway and upwards large, on ascending petioles of 2 inches or more, and with subulate-lanceolate hyaline very villous stipules; leaflets about 8, almost lanceolate, tapering almost equally from near the middle to each end, 2 inches long or more, very thin, quite green despite a not very sparse indument of very fine appressed hairs which only along the margins, and the midvein beneath, becomes dense, forming a silvery-villous line: rachis of raceme, as also the pedicels, villous-hirsutulous; calyx almost hyaline, purplish like the petals, yet appressed-villous; length of the very broadly oval wing petals $\frac{1}{2}$ inch, the banner notably

shorter; keel rather narrowly falcate, sparsely curled-hairy from above the middle: pods unknown.

Cochetopa Forest Reservation, middle southern Colorado, growing in aspen groves at 8500 feet in the mountains, gathered by E. F. Clark, 6 July, 1911. The plant when dry is so fragile that the specimens have reached me only in fragments, but they show the marks of a rather peculiar species in several ways, as already indicated.

LUPINUS HILLII. Perennial, the rather slender but rigid stems several, 1 to 1½ feet high, bearing 1 to 3 racemes at summit, otherwise simple, purplish underneath a certain hoariness of short dense villous pubescence interspersed with a few long white hirsute hairs; absolutely basal foliage apparently wanting, those of the main stem on slender but firm petioles of 2 to 3 inches, purplish and pubescent; leaflets 5 to 8, cuneate-oblong, very obtuse, 1 inch long, the largest ⅓ inch wide near the summit, not very densely silky-strigose on both faces, less so above: racemes short-peduncled, 3 inches long, rather lax, the blue-purple flowers very small, more or less definitely verticillate; corolla only, or scarcely, 4 lines long, the banner shorter than the wings, the keel shorter than either, not falcate, strongly ciliate from base almost to apex: pods short, rather lightly silky-villous, mostly 3-seeded, but not a few 2-seeded only.

This exceedingly well-marked lupine was collected on the Coconino Forest Reservation in northern Arizona, 29 June, 1911, by Mr. R. R. Hill, who reports it common in open thinly grassy groves of yellow pine. The flowers are the smallest known among those of perennial lupines.

New Species of *Cicuta*.

CICUTA FRONDOSA. *C. occidentalis* f. *frondosa*, Greene, Pitt. ii. 7. In the long interval that has passed since I discovered this plant, and made public mention of some of its character-

istics, the specimens have lain in my herbarium without further notice. That I was at first willing to locate it under the Rocky Mountain *C. occidentalis* was partly because, not knowing its fruit, I preferred not to accord it specific rank on vegetative characters alone. Nevertheless the best, and often the only characters for hundreds of species in a multitude of genera, are the vegetative; and the marks attributed to this Californian water hemlock at the first, are properly specific. The difference between a glaucous plant and one without bloom is a specific difference. The stems are not only taller but stouter than in the very largest *C. occidentalis*. Finally the consideration of its habitat, as of the Pacific slope, and completely sundered from the environment of the plant of Colorado and Wyoming—this argues for it specific rank; and the more conclusively since the discovery of *C. grandifolia* of northern Arizona, a species which occupies, geographically, a middle place between the habitat of *C. occidentalis* and the Californian species.

CICUTA SUBFALCATA. Roots 8 to 12, thickish and fleshy, 3 or 4 inches long, terete or slenderly fusiform, whorled around the basal part of the strictly erect and closely partitioned subterranean section of the stem, this hardly an inch high; stem proper only 2 or 3 feet high and slender, upright, not much branched, bearing at summit about 3 smallish umbels: leaves ternate, or some only bipinnate, the leaflets large for the plant, 3 or 4 inches long, narrowly lanceolate, subfalcate, closely and saliently serrate-toothed, of a vivid green on both faces, without trace of bloom and glabrous; flowers small, white; fruit unknown.

From the Gallatin National Forest in southern Montana, where it is reported as growing in wet places, at an altitude of 5000 feet. The specimens were gathered by some one in the forestry service there, 29 August, 1911.

CICUTA DAKOTICA. Basal and underground parts not seen, but plant evidently tall and robust, freely and widely branched

above : leaflets large, 3 to 4 inches long, $\frac{3}{4}$ inch wide, acuminate at apex, at base acute, somewhat remotely and not deeply serrate, the serratures almost spinescently acute, neither face of leaflet notably veiny : umbels many : fruits rather large, oval-elliptic, marked superficially by more than usually narrow ribs and broad intervals in cross section showing thin curved-linear dorsal and large triangular lateral ribs ; oil-tubes large and deep, impressed into the seed, rendering the periphery of the seed sinuous.

Collected on grounds of the college farm, at Brookings, South Dakota, in 1893, by J. J. Thornber. Type in U. S. Herb. Evidently a more robust and widely branched plant than *C. maculata*, the leaflets several times larger, and the fruit of marked character.

CICUTA ARGUTA. Subterranean and closely partitioned part of stem so shortened as to be almost obsolete, the fascicle of roots therefore proceeding from just below the surface of the ground, these 6 or more, large and fleshy, nearly terete, 4 inches long or more, $\frac{1}{3}$ inch thick : leaves small for the plant and very compact, only 8 inches long beyond the petiole, of some 80 leaflets and biternate ; leaflets 2 inches long or less, narrowly lanceolate, closely, deeply and acutely serrate from base to apex, the short veins running to the tips of the serratures very prominent beneath : fruit short, rounded, nearly as broad as long ; ribs thick and broad, the intervals narrow, as seen in cross section the dorsals oblong-oval, the laterals of more than twice their size and gibbous-oval ; oil-tubes not impressed.

Type sheet in U. S. Herb. from Forest City, South Dakota, 3 Sept., 1892, by Griffiths and Schlosser.

CICUTA VALIDA. Stature of the plant and its underground parts not known : lowest leaf 2 feet long including the very stout and apparently turgid or inflated petiole, this more than $\frac{1}{2}$ inch thick, the lamina a foot long, 10 inches across below

the middle, of rhombic-ovate outline, the leaflets large, few and rather remote, 31 in number, in five primary pinnae, the first and second being compound, each of 10 leaflets, the third compound and of 6 leaflets, the fourth and fifth simple, each being of a pair of large sessile leaflets; terminal leaflets exactly ovate, acute, obtuse at base, about $2\frac{1}{2}$ inches long exclusive of the petiolule, strongly but not at all deeply serrate, the teeth short and broad, but mucronately acute, lateral leaflets somewhat smaller, quite tapering to the short stout petiolule, but the tapering inequilateral: upper part of stem remarkably stout and somewhat fistulous, bearing 3 large umbels, the pedicels likewise very stout and rigid: fruits suborbicular but distinctly broader than high; corky ribs prominent, in cross section narrowly oval, the laterals of about four times the dimensions of the dorsal.

Eastern slope of the Sierra Nevada of California, in Mono County, collected very long ago by Bolander, and, if distributed by him at all, probably under the name of *C. maculata*; indeed this is "*C. maculata*" of the Botany of the State Survey, at least as to the plant from Mono Pass; the southern plant so referred being very likely my *C. frondosa*. The fruits of *C. valida* are small for so large a plant, and are not very satisfactorily designated as suborbicular. They might almost as well be described as transversely short-oval. The species is particularly well marked in character. I do not know how it came to escape the notice of Messrs. Coulter and Rose.

CICUTA SONNEI. Plant 3 to 5 feet high and not stout, with subterranean parts much as in *C. occidentalis*, *i. e.* of large fusiform roots, but stems purplish and glaucous, remotely leafy and the foliage small; basal leaves smallest of all, only 4 to 6 inches long, the middle cauline twice as large, all consisting of about 29 leaflets each, 1 to $1\frac{1}{2}$ inches long, lance-elliptic, very acute at both ends and remotely and slightly serrate-toothed except at the cuneately tapering base, those of the small basal leaves broader, shorter and at base obtuse: umbels few: fruits small, the corky wings low, very broad,

almost meeting over the oil-tubes, all oblong as seen in cross section, the laterals more than twice the size of the others.

The habitat of this, as to the type specimens, is the eastern base of the middle Californian Sierra in California and adjacent western Nevada. The specimens are those collected by Mr. Sonne, at Truckee in 1892, and by myself at the same place in 1895. Mr. Heller has also distributed the same (n. 7174) from Truckee, but neglecting the underground parts, and calling his specimens *C. vagans*, wrongly, through following the guess of Coulter and Rose. Neither the underground parts nor the carpels in *C. Sonnei* are at all as in *C. vagans*.

CICUTA FIMBRIATA. Radical leaf large, bipinnate, of somewhat triangular circumscription, being a foot long, exclusive of the long petiole, and 9 inches wide near the base, the leaflets large and few, about 39 to 41, ovate-lanceolate, acute at both ends, about $2\frac{1}{2}$ inches long by 1 to $1\frac{1}{4}$ inches wide below the middle, everywhere, except at the entire and tapering base, closely, deeply and thereby fimbriately serrate, the serratures slender, acute, but somewhat unequal; both faces of the leaflet of a vivid green, the lower very conspicuously veiny with elevated and sharp feather veins.

Saline or brackish marshes of Washington near the sea, where it was collected in 1854 or 1855 by Dr. J. G. Cooper, in whose catalogue (Pac. R. R. Rep., vol. xii, Book ii, p. 63) it is thus mentioned: *Conium maculatum*, Linn. "Large form of the northwest coast." (T.) Abundant everywhere in wet grounds, the large variety mostly near the sea, 8 feet high.

The words in quotation marks are those of Dr. Torrey. The determination of the specimen was made by him for Dr. Cooper, as the latter affirms. The name *Conium maculatum* was surely a slip of Dr. Torrey's pen for *Cicuta maculata*; for we can not possibly suppose him to have failed to distinguish between the leaves of *Conium* and *Cicuta*. The fact that in either case the specific name was *maculata* would have its tendency to induce such a lapse in writing.

CICUTA AMPLA. Subterranean parts not seen, neither even the basal or lower cauline leaves; leaflets of the uppermost, and not far below the umbels ovate-lanceolate, 3 to $3\frac{1}{2}$ inches long, nearly $1\frac{1}{2}$ inches wide toward the base, coarsely but very evenly crenate-serrate, the serratures very broad and short, but very abruptly acute, both faces deep green, the lower marked with elevated feather veins corresponding to the serratures: branches and peduncles rather slender, glaucescent: fruits large, elongated, of oval-elliptic outline, narrowed at summit to a distinct short neck, the 3 dorsal ribs elevated and narrow, hardly broader than the intervals, in cross section oblong, but the 2 laterals five times larger and equilaterally triangular, almost acutely so.

This remarkably distinct new cicuta is known to me only in the fruiting summit of a single plant, with good fruits and upper leaves, which was taken from somewhere near the Michigan Agricultural College at Lansing, 8 Oct., 1891, by the late Prof. C. F. Wheeler. Of such pronounced characters both of foliage, as far as we know it, and especially of the fruit, one naturally longs to know what its radical leaves and its subterranean parts are like.

Earlier History of our Dogbanes.—I.

In that old folio of the year 1565 entitled *Hortus Regius Parisiensis*, at page 22, occurs this expression of the name and characteristics of a dogbane: *Apocynum Indicum foliis Androsaemi majoris flore Lili convallium suaverubentis*. This, if so turned into English as to be rightly understood will read: "An American *Apocynum* with leaves like those of *Hypericum androsaemum*, and flowers like those of the reddish variety of the lily of the valley."

This, in the folio of Jonquet, is the earliest account I have met with of any American dogbane. By the terms of Jonc-

quet's phrase the plant is not so certainly of American derivation. *Indicum* might indicate either the West or the East Indies; but, within ten years from the time of the publication of Joncquet's book, it appears to have been ascertained that the plant, whatever it was, had come from America; and what is more important, it had been seen in the Paris garden, and studied and very well written up by an Italian botanist of high distinction, by name Paulo Boccone, to whom, by the way, seems to belong the credit of having first figured plants from dried specimens affixed to herbarium sheets. Boccone, in his book, *Icones et Descriptiones Rariorum Plantarum* (1674), published nine years later than Joncquet's folio, reports having seen the plant growing copiously in the Paris Royal Garden, and gives a rather full and enlightening account of it, besides the figure of a twig of it, which twig it is likely he took for that purpose while in Paris. The name which he assigns it is quite altered from that by Joncquet. It is now *Apocynum Canadense foliis Androsaemi majoris*. It appears to have been ascertained that Joncquet's term *Indicum* was false, and *Canadense* takes its place in the name. The description by which Boccone follows up his amended and corrected name for the type is too long to be given here both in the Latin original and in translation, and I shall present his little chapter only in what would be the equivalent English wording of it: "This plant, as remarkable for rarity as elegance, stands up like a little tree. The stem to the height of a foot or more is without joint or leaf, and reddish, above this being divided into a multitude of branches. Leaves in pairs, rounded and closely resembling those of the greater androsaemum, attached by petioles, adorn the whole head. From the very extremities of these stems there proceed in a branched arrangement little flowers, pinkish tinged with purple, cup-shaped like those of the lily of the valley, or the strawberry-tree; to which there succeed pods narrower than those of asclepias, having within a white wool, and flat seeds of a reddish-brown color. The roots, spreading far and wide under the ground, are extremely tenacious of life and often send up their shoots

in the midst of the beaten paths of the garden. It is full of a milky juice which exudes from any part of the plant that is wounded. It is destructive of flies, if they alight on the flowers. At Paris, in the Royal Garden, it may be seen in abundance."

With such fulness as this were the best botanists of the generation preceding that of Tournefort accustomed to describe new plants; but for the botanists of the time there was much more in this description of the new dogbane than most of us of to-day will be able to get out of it without some very careful looking into it. Indeed there are hordes of botanists in several countries to whom Boccone's account of the foliage of his new plant will be meaningless, and therefore, to them, no description at all. Yet his phrase "leaves of the larger androsaemum" has in it all of the following: leaves ovate, entire, two or three inches long, firm, deep or dark green and glabrous, spreading away from the stem on little or no petiole. Now the plant *Androsaemum officinale*—called *Hypericum androsaemum* by Linnaeus—was very familiar to botanists of southern Europe, and that phrase told distinctly to all that the new apocynum suggested by its foliage and general bearing the familiar androsaemum. And we of the present age, if we know the hypericaceous plant androsaemum, can assure ourselves that Boccone's dogbane, whatever it may have been, was not *A. cannabinum*, because that has not an ovate foliage. Its leaves do not spread away from the stem, but are ascending, and are of a color that is in strong contrast to that of androsaemum. Of course when it is said of the flowers that they are like those of the pinkish or reddish lily of the valley, it becomes if possible still more certain that he had some member of that group of which Linnaeus *A. androsaemifolium* is the type. Is this plant of the old Paris Garden—the plant of Joncquet and of Boccone—the *A. androsaemifolium* of Linnaeus and of later North American botany? That can not be answered by any simple Yes or No. In reality the question is twofold. Let us simplify by asking: Is it the *A. androsaemifolium* of Linnaeus? This may be answered unhesitatingly in

the affirmative. His very name for the species he took from the descriptive phrases of Jonquet, Boccone and Morison. Thus did he most positively and unmistakably identify his plant with theirs. It were perhaps better not to say "his plant," for really Linnaeus had no plant of it either alive or dead and dry. He knew it only by the accounts given of it by those earlier authors; so it may be more accurate to say that he took out of their texts their own descriptive phrase *foliis androsaemi*, and made it a specific name for their species.

Now comes the other question. Is that plant—the plant of Linnaeus, as we may say—the same which we American botanists of the nineteenth century were taught by all our masters, to call by that name *A. androsaemifolium*? The facts give to this a negative answer. Our masters, the whole succession of them for a hundred years, were wrong in what they instructed us to receive for that species. That I was the first to call attention to this matter, and to propose names for things wrongly called *A. androsaemifolium* in our books is a condition under which I may without presumption tell what the plant was like which I, mistaught, and during a half-century of botanical observation, received as the *A. androsaemifolium* of Linnaeus. Its distinctive marks were, and are, a rather small number of pinkish or purplish nodding bell-shaped flowers inserted by short stalklets in the axils of the two, or even three, uppermost pairs of leaves of the plant, with also a somewhat more numerous short bunch of them at the summit of the branch. They were not at all numerous, and the aggregate of the flowers in the axillary clusters was greater than the aggregate of those in the one terminal cluster. In brief, the little inflorescences were axillary and terminal, the flowers beautiful but few. Apocynums answering that description as to their manner of flowering I was familiar with very long ago in New England, and later on the woodland borders of far-western prairies; and every man who pretended to know plants, and every book of botany that was available said this was *A. androsaemifolium* Linn. Almost every book assigned that species the mark of "flowers lateral and terminal" or

else "terminal and lateral." I cite briefly rather a long line of the masters who give the species that character: Michaux (1803), Pursh (1814), Bigelow (1814, 1817, 1824), Elliott (1821), Torrey (1824), Darlington (1826, 1837, 1853), Rafinesque (1828), Eaton & Wright (1840), Darby (1855), A. Wood, in all his editions, Chapman (1860).

The long while I was in error as to the identity of the aforesaid dogbane, I was so by reason of my unwavering faith in the authorities; and they were all wrong. If we now turn to Linnaeus, who, as they all say, gave that name to that plant, we learn that his plant had only terminal flowers; and it is not alone his brief diagnosis which so affirms. The figures, both of Boccone and of Morison which he cites, present a plant with decidedly numerous flowers, all in a terminal cymose panicle. To their plant both of them applied the descriptive phrase *foliis androsaemi*, and Linnaeus did no more than adopt that as a name for the selfsame type. I have no evidence that Linnaeus ever saw so much as a dried specimen or fragment of the plant; and all that he says about it he may have taken out of Boccone and Morison, whom he cites as the authorities on it.

At the time of this writing there are several species of dogbane known which have pink or purplish flowers all in strictly terminal cymes. The best of them belong to the far off western side of the Continent, and were therefore unknown until late in the nineteenth century. There are, however, indications of the existence here at the East of two or three which will more or less nearly answer to the real *androsaemifolium* of Joncquet, Boccone, Morison and Linnaeus; but before proceeding to such, let us take note of one of those graver misrepresentations of that species which at one time and another have appeared in books.

I should much like to see such a plant as that which Jacob Bigelow more than ninety years ago, in his admirable Medical Botany, figured for *A. androsaemifolium*. It departs widely from the anciently published and true thing in two important particulars if not in three. Its flowers, however well at agree-

ment with those of the real species of that name as to size, form and color of the corolla, are distributed in the main to axillary cymes. The whole number of flowers which the plate shows is 25, of which 7 are in the terminal cyme, the 18 belonging to 3 lateral ones; so that the whole number of the flowers is distributed about as equally as possible among four cymes mostly axillary. Considering that in plant species generally characteristics of inflorescence are more stable than those of the flower itself, and seeing that the whole accepted system of the Apocynaceae—quite as in the case of each of a hundred other families—would fall back into chaos should inflorescences cease, as we may say, to be sworn by, we are forced to deny to this plant of Bigelow a place among possible mere variations of *A. androsaemifolium*. But in the second place I remark that the foliage of his plant is about as far as can be from answering to that of the species aforesaid. So far from being ovate, the leaves are nearly lanceolate and quite slenderly acuminate. There is in them no suggestion whatever of the foliage of androsaemum; so that to no plant at all like this could the specific phrase *foliis androsaemi* have been applied. By characters of foliage alone, the plant figured by Bigelow is something apart, not only from real *A. androsaemifolium*, but from every other member of the genus known to me. Moreover, by the dimensions attributed to it by Bigelow it is again a stranger to us, for he reports that it “grows often to the height of five or six feet, though its common elevation is three or four.” Plants that are commonly received by the botanists of to-day for *A. androsaemifolium*, having truly ovate and mostly obtuse leaves, if ever found two feet high, are accounted very tall specimens, and many little exceed one and a half feet; and all these have more axillary than terminal cymes, and are rather few-flowered. Unless the plant of Bigelow was in his day limited to the environs of the lesser Boston of a hundred years ago, and is now extinct, it should fall to the lot of some Massachusetts botanist to discover it anew, and give it a name, and a place in the list of northeastern dogbanes.

Not so far removed from what must be the typical *A. androsaemifolium* is a plant which, a dozen or fifteen years earlier than the work of Bigelow, had been figured and described under that same name in Curtis' Botanical Magazine, t. 280, and with an instructive account of the origin of the subject from which the drawing was made. Some such plant, though not Curtis' type, had been known in English gardens for sixty or seventy years anterior to the publication of the plate in the Botanical Magazine. Philip Miller had given an account of it in the first edition of the Gardener's Dictionary (1731), and Morison had described and figured it thirty years earlier, though whether from the plant as grown in England or on the Continent I am unable to say; but presumably that early accession of it to English gardens had been derived either directly or mediately from the original stock in the Paris Garden. This plant of the early Botanical Magazine is of quite another origin, for, though Curtis takes it to be specifically the same thing, the specimens he had were grown in England from seed sent from the neighborhood of Halifax, N. S., at a date then—that is, in 1794—quite recent. This figure, perhaps the most life-like and beautiful that has hitherto been produced as representing an apocynum, is in all essentials like that of Boccone (1674) and of Morison (1699). It shows a plant of ovate and truly androsaemious foliage—true to that even as to the dark-green color—and what may well be called a terminal cymose panicle of flowers. True indeed, one of the four cymes is axillary to one of the leaves, yet that one is raised on a long peduncle and so made fairly a part of the panicle. All are borne away beyond the leaves. Within a period of 130 years between 1664 (Paris Gard.) and 1794, that which is the very type of *A. androsaemifolium* was in the gardens of Europe, often described, and three times figured. Then in the first half of the nineteenth century the same was excellently represented in the *Herbier de l' Amateur* (1829) and in the *Belgique Horticole* (1850).

As regards this particular American dogbane, by name the oldest of them all, the sum of the matter is this: that the

plants so well figured in European journals between 1794 and 1850, quite like that of Boccone of 1674, represent the real *A. androsaemifolium*. It is certain that the original of the 1794 figure was derived from Nova Scotia, and it is next to certain that the old Paris Garden plant came also from north-eastern Canada. Moreover, the only plant which I in my extensive travels have met with to match that of the figures mentioned, I met with, and collected, in Nova Scotia; though I should almost expect to find it in extreme northern New England. But that different phase, common enough in southern New England and far westward, with few flowers, most of which are axillary to large leaves, not even the few terminal ones equalling the foliage—such plants, eastern and western, whether of one species or an aggregate of several, are, like that fine plant of Bigelow's plate, manifestly as species nameless and nondescript.

Some Californian Maples.

For those smallest-leaved maples of California which have hitherto been jumbled together under the name of *Acer macrophyllum*, that appellation, as to its import is most unfortunate. It does not apply. The genuine *A. macrophyllum*, belonging to the valley of the Columbia and regions northward more than southward, with its leaves commonly ten inches broad and long, and not rarely a foot across, and even more, does not seem to have place in California at all, in any one of California's many and distinct climatic and floral regions. It may perchance some day be found in unexplored districts northwestward in the State, and toward the sea; but most unlike that is every one of a number of its California allies, each more or less localized—quite as in California species of trees, shrubs and herbs are apt to be localized—for all but one are furnished with leaves that make no kind of approach to those of *A. macrophyllum* in size, and are as diverse in form

and indument as are the maples of the whole of Atlantic North America. Of this condition, and of the falsity of that name for any California maple I became very clearly apprehensive while still a resident of the State twenty years since, but only recently has my attention been called again to these Californian trees, and this time with far more copious material available than all that I had myself gathered in former years. The following new species are very clear; and there are indications of half as many more in the National Herbarium and in my own, of which the incompleteness of the material precludes the satisfactory establishment of the species.

ACER FLABELLATUM. Leaves on elongated petioles of 3 to 6 inches and large, 4 to 6 inches long, widest a little above the middle, there measuring $5\frac{1}{2}$ to $7\frac{1}{2}$ inches, the base absolutely truncate without the suggestion even of a sinus, cleft to the middle only, the 3 main lobes subquadrate-obovate, shortly and broadly lobed at summit, the sinuses very narrowly V-shaped, upper face deep-green and sparsely muriculate, the lower showing very prominent veins and veinlets and everywhere glabrous except at the forking of the veins, there exhibiting a tuft of short hirsute hairs, but the margin unevenly hairy with softer hairs; samaras uncommonly divergent for the group, as well as narrow-winged, fully 2 inches long, the body shortly but stiffly bristly as well as tomentulose, the bristly hairs in shorter form and appressed extending to the whole wing, this $\frac{1}{2}$ inch broad, its inner margin conspicuously undulate.

Known only as collected on the Wilkes Exploring Expedition more than seventy years since in "Northern California," according to Dr. Torrey, by whom the label was written for the sheet (U. S. Herb, n. 17953) before me. The leaves of this are large enough for those of *A. macrophyllum*, but in not one of the several scores of sheets of northwestern, *i. e.* Oregonian, Washingtonian and British Columbian "*A. macrophyllum*" at hand is there any approach made to the not indistinctly fan-shaped cut of the leaves of *A. flabellatum*; and

the divergence of the samaras is almost equally of a new species, and one strongly marked notwithstanding that the dimensions of the leaf are very great in comparison with other Californian species herein presented.

ACER COPTOPHYLLUM. Leaves not large, commonly 3 or 4 inches long and $3\frac{1}{2}$ to 5 inches wide below the middle, deeply parted into uncommonly narrow segments leaving very large and open broadly V-shaped sinuses, each of the 3 larger segments 3-lobed, and deeply so, just above the middle, the lobes triangular-lanceolate, forming narrow and acute secondary sinuses; upper face of leaf glaucescent-green, soft to the touch by a coat of short stiffish hairs all pointing backwards to the base of the leaf, the lower face strongly reticulate, all veins and veinlets setulose-pubescent, the ciliation quite pronounced: samaras very large for the foliage, few in the raceme, also unusually divergent, showing a broad sinus, $1\frac{1}{4}$ to $1\frac{3}{4}$ inches long, the wing $\frac{1}{2}$ inch wide or more, almost softly setulose-pubescent, the body of the fruit scarcely at all bristly but obviously villous-tomentose.

The solitary but very fine specimen of this most excellent species has been in my herbarium (n. 11420) for more than a quarter of a century, having been sent me from some unmentioned special locality in Humboldt Co., as long ago as 1886, by C. C. Marshall, the same for whom I named *Ribes Marshallii*, and this new maple is quite as remarkable among members of its genus as that gooseberry is among its cognates. In selecting a name for it I have hesitated in making choice, for the character of the pubescence is quite as peculiar as is the open and much cut leaf-pattern.

ACER PLATYPTERUM. Leaves 3 to 5 inches long, of about the same breadth in the middle, exactly truncate at base, cleft below the middle, the segments much widened above the middle, forming oblong sinuses sometimes quite closed above, the subquadrate-obovate segment itself 3-lobed and the middle lobe large and 3-toothed, upper face not soft to the touch, yet

quite setulose under a lens, the setulae pointing forwards, lower face more stiffly setulose, but on the veinlets only, the veins proper with spreading hirsute hairs along their sides at and near their bases: racemes long and large; samaras about $1\frac{1}{4}$ inches long, moderately divergent, but wings excessively widened, $\frac{3}{4}$ inch wide in the middle and over-lapping, glabrous or very nearly so, the body densely bristly, but almost at summit only, the tomentellous indument very scanty and obscure.

Known only in a very good sheet of specimens (U. S. Herb. 469326), brought from Round Valley, Mendocino Co., in 1897, by V. K. Chesnut. The leaves almost as much dissected as in the last species, but very differently so, the segments even almost closing the sinuses. The wings of the samaras are the broadest known in the genus.

ACER AURITUM. Leaves pale and glaucescent above, there setose along the midvein and veinlets, the general surface rather closely muriculate, many of the points minutely bristle-tipped, the lower face, at least in full maturity, of a yellowish or subfuscous green and more sparsely muriculate and setulose, the segments palmate, broad (showing quite V-shaped sinuses), widening upwards and doubly lobed, *i. e.* the terminal secondary lobe itself conspicuously 3-lobed, the pair of basal lobes subdivided on the margin next the petiole, producing each a secondary lobe which two, ear-like, approach the petiole somewhat hastately or sagittately: fruiting racemes very large, commonly 6 or 7 inches long, 4 inches across, the area of each exceeding that of the largest leaves: samaras $1\frac{3}{4}$ inches long, diverging to form by their bases a long quadrate sinus, the whole body very hirsute, but shortly so, also tomentose underneath the hairs, the broad wings nearly glabrous.

Tree of Napa Valley and its immediately tributary wooded cañons, first collected by Brewer, on the State Survey (n. 1316), later by Pringle (25 Aug. 1882) at Calistoga at the head of the valley. The leaves of the species are of only a fourth or a third the size of *A. macrophyllum*, and extremely unlike them

in all particulars of specific character, while the fruit-clusters are the largest in the genus, far surpassing those of the great-leaved Oregonian tree. I should hold as typical of the species the specimens of Brewer, U. S. Herb. sheets 321447 and 321448. The *Calistoga* tree of Pringle, U. S. Herb, sheet 17948, differs somewhat, its racemes being distinctly pendulous in fruit, and the samaras are rather smaller.

ACER STELLATUM. Leaves small, the largest 4 inches wide and as long, those of the flowering twigs even smaller, the 5 lobes somewhat stellately radiating, lanceolate, acuminate and entire in the floral twigs, in the others widening upwards and 3-lobed at apex, the upper face of all leaves glaucescent-green and minutely setulose-roughened, the lower light-green, finely reticulate, very minutely if at all roughened with hair-points: racemes short, few flowered; samaras $1\frac{1}{2}$ inches long, suberect, the broad wings nearly meeting.

Cache Creek Cañon, Yolo Co., 8 May, 1903, C. F. Baker, his n. 2981 as in U. S. Herb., distributed with the printed note: "A small tree common along cañon walls and in adjacent gulches. Quite different in appearance from the form of the redwood districts."

ACER HEMIONITIS. Branches of the season green, glaucous, those of the preceding two years still green-barked, but without bloom: leaves not large, 4 or 5 inches long, of about the same breadth in the middle, palmately 5-parted, the sinuses rather narrowly and acutely V-shaped, the 3 principal segments subrhomboid-lanceolate, neither toothed nor yet entire, the margin only repand or wavy, the basal segments of the 5 small, nearly or quite entire, upper face of leaf sparsely muriculate within the meshes of the reticulation, and with very few bristly short hairs on the veinlets, the lower face only minutely and somewhat granulately roughened, the ciliation of the segments light and inconspicuous: samaras only 1 inch long, the body sparsely long-setose, and with an obscure yet

dense short indument under the bristles, the wing appressed-setulose throughout.

Tassajara Hot Springs, Monterey Co., 1 June, 1901. A. D. E. Elmer, his n. 3179 as in U. S. Herb., sheet 416370. Species of peculiar foliage closely simulating that of the fern *Hemionitis palmata* both as to size and form. The samaras, hardly larger than those of the eastern sugar maple, are of barely one-third the size of those of *A. macrophyllum*.

ACER DACTYLOPHYLLUM. Leaves 4 to 6 inches long, 6 to 8 inches wide by even the basal lobes, the whole digitately cleft into 5 not very unequal entire lanceolate lobes; upper face of leaf vivid green and polished, under a lens sparsely and minutely setulose, but the mid-vein quite hirsute, lower face with only a few setulae and these on the veinlets only, the ciliation of the lobes little pronounced: samaras little over an inch long, erect, their wings meeting in the middle, thus enclosing an inversely triangular-lanceolate sinus.

Species known to me in but a single branch sent me long ago by Mr. Parish, from San Bernardino Mountains, gathered in very mature leaf and well grown fruit 1 March, 1888. The type specimen is n. 11419 of my own herbarium; but there was sent along with it, and under the same label, but with date 29 June, a totally different thing, in mature fruit, and with the palmately lobed leaves of most maples of America. The leaves of *A. dactylophyllum*, as to their pattern, are unique in the genus. Their circumscription across the base, and then around from tip to tip of the five subequal segments, is almost exactly semicircular, and they are as nearly pointing forward, finger-like, as five segments of any such semi-circular figure may be.

ACER LEPTODACTYLON. Leaves large and long-petioled, the petioles 4 to 7 inches long, measurement of blade 5 to 8 inches lengthwise, 7 to 10 inches crosswise from tip to tip of the largest pair of segments, the whole 5-parted into lanceolate well tapering yet not quite acute segments either quite entire

or merely undulate marginally or with a few slight sinuate lobes, the whole of a vivid green on both faces but deeper above, the petiole and the veins of both faces villous-puberulent, the axils of midvein and veinlets with conspicuous villous tufts, both faces otherwise softly and shortly setulose : fruiting raceme large, erect, the rachis and pedicels villous-puberulent ; samaras small for the foliage, barely $1\frac{1}{4}$ inches long, more divergent than usual, the sinus broad and quadrate below, body densely villous-setose (if not better called soft-hirsute), wings very broad ($\frac{1}{2}$ inch), minutely puberulent.

This is another very strikingly marked species of southern California, and large-leaved even, but the foliage cut almost to the base into long narrow five-finger-like mostly entire segments. The locality is the Sulphur Mountains of Ventura Co., the collectors Abrams & McGregor, June, 1908 ; type on U. S. Herb. sheet 612966.

ACER POLITUM. Leaves about $5\frac{1}{2}$ inches long and a trifle broader above the middle, deeply 5-cleft, the sinuses narrowly and not acutely V-shaped, 3 larger lobes widening upwards and coarsely and unevenly toothed, the two basal divaricate-spreading, entire on the upper margin, sinuate-toothed on the lower, the base of the leaf as a whole nearly truncate, texture subcoriaceous, both faces glabrous and somewhat polished, even the usual ciliation wholly wanting : samaras only $1\frac{1}{4}$ inches long but the wings more than $\frac{1}{2}$ inch wide, slightly overlapping, very strongly transverse-striate and glabrous, the nutlets short-bristly, with little or no other indument.

Along Johnson's Creek back of Fort Tejon, Kern Co., 6 July, 1891, Coville & Funston, n. 1166 ; type on U. S. Herb. sheet 17945.

Certain Western Roses.

The original definition of *Rosa gymnocarpa* given by Nuttall, while loose enough easily to include a number of species is, on the other hand, such a diagnosis as effectually excludes a great

number of gymnocarpous kinds which, obviously distinct, have found place in the herbaria under the name *R. gymnocarpa*, yet only so because of hasty and superficial glances at the fruits alone.

In proposing the following segregates, I have left untouched all the Columbia River region material. This is Nuttall's original locality; and all that is in those seaward parts of Oregon and Washington may or may not be referable to true *R. gymnocarpa*; but all the new segregates are from parts of eastern and arid regions where Nuttall never traveled, at least as regards Oregonian and Washingtonian shrubs, while the more considerable number of Californian segregates are, in another way, as completely isolated not only from the true Oregonian type but from each other; and they will be found invested with diagnostic characters more pronounced than most of the published species of *Rosa* have to show.

ROSA GLAUCODERMIS. Bark of old branches ashy gray, of the younger and growing ones green and glaucous, rather well armed with prickles not stout, and all ascending rather than spreading: leaves rather large for the group, and lax, leaflets very distinctly petiolulate, usually 7, rarely 9, oval to obovate, with a shortly cuneate tapering to the base, sharply and doubly serrate, deep-green above, pale beneath, neither face either notably venulose or at all reticulate, glabrous; rachis slender, with very few prickles, the glandular hairs also very sparse and short; stipules broad throughout except as to the rather narrow and very acute lobes: fruit acutish at both ends.

Shasta Springs, Shasta Co., Calif., collected in 1894, by W. L. Jepson, communicated to U. S. Herb., there occupying sheet 480045. One of the characteristically Californian group with green and glaucous branches instead of the glabrous red ones of *R. gymnocarpa*; this the only species yet seen with distinctly petiolulate leaflets.

ROSA CRENULATA. Bark of old branches red-brown, of the younger pale-green, the prickles very few and firm; leaves of

middle size for the group; leaflets approximate, from almost meeting to fairly overlapping, not greatly unequal, all broadly obovate, obtuse, or the small lowest pair subtruncate, crenate rather than serrate, the margins of the crenatures beset with a few stipitate glands in place of secondary teeth, both faces softly but shortly villous-pubescent; rachis with here and there a rigid spine but everywhere pubescent, many of the soft hairs rather stiffer and gland-tipped; stipules very narrow below the middle, above that widened and ending in long divergent lobes, the marginal series of gland-tipped hairs both slender and short; peduncles with very few and short glandular prickles; fruit sub-globose.

Pine Ridge, Fresno County, California, at 5500 feet, collected by Hall & Chandler, June, 1900, their number 171 as in U. S. Herb. Noteworthy for the obtuse rounded indentation of the leaflets, and their soft pubescence.

ROSA PRIONOTA. Stems red-brown, glabrous except as beset with a few rather stout and hard spreading prickles: leaves very small, of 7 to 9 somewhat distant leaflets, these oval, obtuse, deeply and very acutely serrate, the primary serratures almost acuminate, the secondary much reduced, even obscure, both faces of a rather vivid green and glabrous, only the midvein conspicuous, its branches almost obsolete, but both faces under a lens notably reticulate; rachis quite strongly stipitate-glandular but without naked prickles; body of stipules broad, the lobes rather small, acuminate: peduncles short and shortly though somewhat densely glandular-hispid; fruit globose.

Lake County, California, on foot-hills south of Mt. Sanhedrin, 14 July, 1902, A. A. Heller, his n. 5858 as in U. S. Herb., sheet 416864. Remarkable for the deep sharp serrature of the quite extremely small leaflets.

ROSA PISCATORIA. Stems slender, upright, the bark green, very hispid with many short slender spreading or deflexed prickles and a few long stiff spreading ones, these commonly

infrastipular in pairs: leaves long but open, the rachis almost filiform and the small leaflets somewhat remote, always 7, broadly somewhat obovate, all except the terminal one—and this also sometimes—obtuse, doubly serrate, of thin texture, glabrous on both faces, rachis with very few proper prickles and more numerous slender-stiped glands; stipules of the earliest leaves with broad obtusish lobes, those of the later showing lobes acute to subfalcate-acuminate, the margin subserrately glandular: peduncles naked at summit, otherwise sparsely and shortly glandular-bristly.

Pescadero, San Mateo Co., Calif., May, 1903, A. D. E. Elmer. Extremely hispid as to stems, but foliage small and delicate.

ROSA CALVARIA. Shrub rather tall, slender and loosely leafy, the branches of the season only purplish under a coat of bloom, totally naked as to the usual armature of slender spines, these replaced by a pair of long stoutish basally flattened straight spreading infrastipular spines to every leaf: leaves uncommonly long-petioled and lax, of about 7 leaflets, the terminal one well separated from the others by a petiolule of $\frac{3}{4}$ inch, all rather large, round-obovate, obtuse or even subtruncate, the primary serratures broad, the secondary ones very numerous, both faces of a pallid green as if glaucous, but both densely soft-pubescent; the rachis sparsely hispid and densely puberulent; stipules small and narrow for the group, their lobes not large, triangular-lanceolate: flowers in threes, their peduncles naked, glaucous and even wholly glabrous; fruit not seen.

Collected by the writer, at the Calaveras Big Tree grove in June, 1889; type specimens on sheet 11192 of my herbarium. Leaves and leaflets excessively large for an ally of *R. gymnocarpa*.

ROSA ABIETORUM. Shrub apparently low and straggling, branches of all ages well armed with straight spreading prickles varying much in length: leaves large for the plant, commonly

of 7 leaflets all broad and obtuse, the pairs very unequal, the lowest round-obovate and obtuse or even retuse, of one-third the size of the uppermost pair, these only broadly obovate, all doubly serrate-toothed, deep-green above, pale beneath, somewhat reticulate-venulose on both faces, conspicuously so beneath; stipules of the breadth, and the glandular margin usual in the group, but their lobes narrow and acute, triangular-lanceolate to broadly subulate; peduncles very short, less than 1 inch long, naked and glabrous; fruits ovoid.

Inhabits fir woods of Klamath County, southern Oregon, where it was collected about Lake of the Woods, 25 July, 1897, by Coville & Applegate; type on U. S. Herb. sheet 380319.

ROSA AMPLIFOLIA. Shrub evidently large, bark of branches a year old dull red-brown, very sparsely armed with a few slender ascending prickles, the flowering twigs of the season with similar very sparse armature, but augmented by 1 to 3 infra-stipular spines: leaves very large for the group, of 7 not very unequal leaflets, all thin, rather deep-green above, glaucous beneath, but the feather-veins neither at all elevated nor whitened, but branching to form a manifest though faint reticulation, the pairs quite approximate, the outline oval and oval-elliptic, doubly serrate, the serratures not deep but salient; rachis unusually naked, the prickles and stalked glands very sparse and small; stipules small in proportion to the leaves: peduncles short, loosely glandular-hispid: fruit not seen.

Margin of Fish Lake, in the mountains of Jackson County, southern Oregon, at an altitude of 5,000 ft., collected by E. I. Applegate, 18 June, 1898; type on sheet 381523, U. S. Herb. The leaves are so very large, and have so much of the color, texture and pattern of those of *R. acicularis* that but for the small solitary flowers this would have passed readily with many for that species.

ROSA LEUCOPSIS. Shrub not small, the bark of growths of two seasons equally pale-green, unarmed except as to the

presence here and there, at the base of a stipule, of two small straight spines: leaves very large for the group, of commonly 5, as often 7 leaflets, these very thin, glabrous, pale glaucous green above and almost white beneath, here with rather elevated white feather-veins but no reticulation, the outline obovate or oval, not deeply yet somewhat doubly serrate-toothed; rachis slender, white, beset with here and there a small spine and more freely stipitate-glandular; stipules not very broad below, but the large triangular lobes of an area often equalling or exceeding that of the body: peduncles rather long, minutely but not sparsely glandular-hispid; fruit round-pyriform, orange-colored.

Sage plains of southeastern Oregon, in Lake County, collected 29 Sept., 1896, by H. E. Brown; type on U. S. Herb. sheet 283078, the collector's number being 99. Remarkable for the whitish pallor of both stems and foliage, as well as for the total absence of general armature.

ROSA HELLERI. Shrub stoutish, evidently tall, the dark red-brown bark softly prickly, the slender armature ascending: leaves rather ample yet compact, the commonly 9 leaflets approximate, even occasionally overlapping, of a pale glaucous-green, of oval to oval-elliptic outline, simply serrate toward the base, otherwise doubly so, both faces glabrous, neither one any more than very faintly reticulate; stipules large and broad; peduncles 1 inch long, shortly but rather densely glandular-hispid.

About Lake Waha, Nez Perces Co., Idaho, A. A. Heller, 25 June, 1896; type on U. S. Herb. sheet 267361. By the aspect of its foliage, with long pale almost crowded leaflets, this shrub at first glance seems more like the eastern so-called *R. blanda* than like *R. gymnocarpa*, and only a careful inspection with a lens brings the assurance that it is of this western small-flowered group.

ROSA APICULATA. Stems slender but rigid and upright, armed not sparsely with prickles partly long, stiff and ascend-

ing and partly short, slender and spreading or deflexed : leaves very small, the leaflets commonly 7, oval, obtuse, doubly serrate, glabrous on both faces and obscurely reticulate, rachis with here and there a stout prickle and many stipitate glands ; stipules broad, ending in acutely triangular lobes, the whole margin beset closely with unusually long-stalked glands : peduncles short, stiff and straight under the fruits, densely beset with gland-tipped prickles or bristles which are of unequal length but none long : fruit elongated, fully twice as long as broad, and ending in a narrow neck-like apiculation.

Collected on Whidbey Island, in Pugets Sound, near Coupeville, July, 1899, by De Alton Saunders ; type on sheet 364810, U. S. Herb.

ROSA DASYPODA. Stems armed with long straight slender slightly ascending prickles : leaflets mostly 5, occasionally 7, the terminal one and the pair next it oval, obtuse, the small lowest pair nearly orbicular, all doubly serrate, both faces glabrous, the lower pale, not reticulate, the rachis of the leaf beset with very few prickles and many short-stipitate glands ; stipules broad, ending in ovate acute lobes, glabrous except marginally, there closely beset with a series of shortly stipitate glands : fruit globose or depressed-globose, the fruiting peduncle straight, closely beset with stout straight prickles strongly gland-tipped.

Bear Creek, Wallowa Co., Oregon, at 3850 feet, E. P. Sheldon, 28 Aug., 1897, who reports that it is a bush three or four feet high, occurring in open woods along streams. Type sheet U. S. Herb. 528469.

