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CONTRIBUTIONS FROM THE ROCKY MOUNTAIN HERBARIUM. IV.

AVEN NELSON.

SOME CHENOPODIACEAE.

PROBABLY the most characteristic plants of the great saline plains of the West and the similar basins of the intermountain country are the Chenopodiaceae. Some of the genera in this family are known by name, at least, to most people. Such, for example, are greasewood, the salt-bushes, winter-fat, Russian-thistle, etc. Many of the species in this family are of remarkably wide distribution. As they become better known it is found that the range of some, once supposed to be quite circumscribed, is really quite extended. The strongly alkali-impregnated areas are so inhospitable that most plants are unable to occupy them, and nearly all the members of this family have in some way become tolerant of such soils. So far as the effect upon vegetation is concerned, all of the saline districts are essentially the same, the differences in the soil being apparently one of degree rather than of quality. This fact coupled with another, that this family has little competition on this kind of soil, may account in a measure for the unusually wide range of some of the species. Of course the other factors of environment are operative upon these plants as upon others, but they seem less potent than the soil in producing specific variation.

ATRIPLEX.

The foregoing remarks have been suggested by a rather extended study of certain species of Atriplex occurring within the Rocky mountain region. Not satisfied with the view afforded by the specimens in the Rocky Mountain Herbarium, the loan of another large collection was solicited.[1] Some notes

[1] I wish to express my thanks to Dr. William Trelease, Director of the Missouri Botanical Garden, for the privilege of examining all the specimens illustrating the species considered in this paper which are contained in the Engelmann herbarium and the general herbarium of the Garden.

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upon the results of the examination of this material may be of interest, especially since it served, in part, to disclose the new species herein proposed.

ATRIPLEX CANESCENS (Pursh) James, Catalogue 178.—This well known species is strongly marked by its winged fruits, and is more widely distributed than any of the species known to the writer. A very large series of specimens, covering a range extending from the Dakotas to California, show no marked differences, none sufficiently constant to constitute even a geographical form.

Atriplex aptera, n. sp.— Perennial, from a woody base, the annual stems fascicled, decumbent at base or even depressed, more or less branched, 1–3^{dm} high: leaves narrowly oblong, 2–4^{cm} long, 5–8^{mm} broad, mostly obtuse, the base cuneately narrowed to a subsessile base: fruiting spikes paniculate, crowded, bracteate; the bracts linear-lanceolate, gradually reduced upward or wanting: dioecious, only the pistillate plant seen; fruiting bracts united, scarcely stipitate, somewhat indurated, densely scurfy, appendaged with three or four more or less vertical rows of short vertically flattened processes, some of these often expanded but scarcely wing-like.

This is the only species that makes a close approach to *A. canescens*. It is readily distinguished, however, by its smaller size, less woody condition, and the wingless scurfy fruits. *A. canescens* occupies dry clay, chalk, and marl cliffs and ridges; while *A. aptera* occurs (so far as known) on moist saline flats. It is a most excellent forage plant. The type is *Elias Nelson* 738, Laramie, Wyoming, September 1901.

ATRIPLEX HYMENELYTRA (Torr.) Wats. Proc. Am. Acad. 9: 119.—The remarkable fruiting bracts will not permit this species to be confused with any other. From the available specimens it would seem that it does not come into the Rocky mountain region proper, but extends from southern Utah into southern California.

ATRIPLEX CONFERTIFOLIA (Torr.) Wats. Proc. Am. Acad. 9: 119.—This is peculiarly a Rocky mountain plant, but has an extended north and south range, in fact across the United States.

ATRIPLEX ACANTHOCARPA (Torr.) Wats. Proc. Am. Acad.

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9 : 117.—Though sometimes attributed to Colorado and Utah, it is doubtful if it comes so far north. The Colorado and Utah plants usually so named may stand as follows :

Atriplex cuneata, n. sp. — Perennial, with woody base, from two to several decimeters high, branched from the base, the branches decumbent : leaves numerous, on the erect branches of the current year, 1–3 cm long, entire, thick or semi-fleshy, from narrowly to broadly elliptic, obtuse at apex, cuneately tapering into a short petiole : flowers dioecious ; the staminate densely clustered in the upper leaf axils and in terminal spikes ; the pistillate axillary, one or more in each cluster : fruiting bracts united except at the tip, thickened and forming an ovate or subglobose fruit, rather thickly covered with irregular, rigid, flattened processes.

This species is closely allied to *A. acanthocarpa* (Torr.) Wats., in fact is probably included, in part, in Watson's description (Proc. Am. Acad. 9 : 117). It is probably not a part of *Obione acanthocarpa* Torr. Bot. Mex. Bound. 183. In any case, we must consider the typical form of that species as erect ; the leaves thin, undulate margined, oblong or lanceolate, usually acute and many of them subhastate. Excellent specimens of typical *A. acanthocarpa* and of the now proposed species show marked differences in many respects, which will account for the fact that the latter has as often been distributed as *A. Nuttallii* as under the former name. Its range seems to be from western Colorado into Utah and south to New Mexico and Arizona.

SPECIMENS EXAMINED : *Chas. Wright* 573, expedition of 1849 ; *Brandegee* 1086, S. W. Colorado, 1875, in the Hayden Survey; *Alice Eastwood*, Grand Junction, Colorado, 1891 ; *M. E. Jones* 5443, Emery, Utah, 1894 (type, in Rocky Mt. Herb.); *Baker, Earle*, and *Tracy* 420, Mancos, Colorado, 1898 ; *Myrtle Zuck*, Holbrook, Arizona, 1896.

ATRIPLEX NUTTALLII Wats. Proc. Am. Acad. 9 : 116.—This is preeminently the characteristic saltbush of the Rocky mountain plains. It is not so tolerant of alkali as most of the other species, some of which always replace it in strongly saline areas. It is a most valuable forage plant, surpassed in quality, but not in quantity, only by the following :

ATRIPLEX PABULARIS Aven Nelson, Bull. Torr. Bot. Club 25 : 203.—The known range of this well marked species is being gradually extended. It has been found now in several of the saline districts of Wyoming and will no doubt be found elsewhere.

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ATRIPLEX EREMICOLA G. E. O., Bull. Torr. Bot. Club **25**:284, is very closely allied to the preceding, distinguished principally by a more branched, woody, and decumbent base.[2] It may have to take varietal or even lower rank.

ATRIPLEX EXPANSA Wats. Proc. Am. Acad. **9**: 116.—A very large part of the specimens found under this name are quite distinct from typical *A. expansa*. In the collections of the Missouri Botanical Garden only two were found to be true *A. expansa*, while there were several which are now named as below. The typical form apparently extends westward from New Mexico on either side of the "boundary." It is a much larger plant, "growing in intricately entangled masses 6–10 feet in diameter and 4–6 feet high." Stems and branches have fairly long internodes, the spikes interrupted, leafless toward the apex.

Atriplex philonitra, n. sp.—Annual, silvery-white, with a dense scurfiness, freely branched throughout, widely spreading and forming low tangled masses, 2–4 ^{dm} high: leaves in young plants from broadly ovate to orbicular, 3-nerved, 1–3 ^{cm} long, on petioles mostly exceeding the leaves; in older plants very numerous, rhombic-ovate or subcordate, on the branches becoming acute, gradually smaller and bract-like: monoecious, androgynous and also with unisexual clusters, floriferous and leafy-bracted throughout, the crowded clusters at the closely approximated nodes of the spike-like branches: calyx small, only the tips of the sepals free: anthers large: fruiting bracts suborbicular, about 5 ^{mm} broad, barely united above by the irregularly toothed narrow margins, the backs appendaged by short, thick, flat processes: radical superior.

This has heretofore been confused with the preceding, from which the three forms of flower clusters on the same plant, and the crowded bracteate spikes easily distinguish it. The axial branch of each plant is usually wholly staminate. Most of the specimens collected in the Rocky mountains north of New Mexico and ticketed *A. expansa* will be found to belong here. I make the type of the species my no. 8171, Laramie river, Wyoming, Sept. 1900.

ATRIPLEX ARGENTEA Nutt. Gen. **1**:198.—*A. volutans* Aven Nel-

[2] For distinctions in seed (fruit) characters see "Seeds of commercial saltbushes," Bull. 27, U. S. Dept. of Agric., Div. of Bot.

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son, Bull. Torr. Bot. Club **25**:203.—In this species we have one of the most variable plants in respect to habit and size that has ever come under my observation. The original Nuttallian form is small and erect, but the large number of specimens at hand seem to furnish a complete series leading up to the other extreme represented by the large "tumble weed," often a meter in diameter, that was described as *A. volutans*. The distinctions as to the fruit characters are not sufficiently marked to maintain the latter as a species.[3] Its polymorphism is correlated with its wide range.

ATRIPLEX POWELLII Wats. Proc. Am. Acad. **9**:115.—Though this species is accredited to S. W. Colorado by Coulter's *Manual*, I am not sure that it rests upon any specimens except the type, which was grown under cultivation from seeds obtained from Arizona.

ATRIPLEX WOLFII Wats. Proc. Am. Acad. **9**:112.—This excellent species is still quite rare in herbaria, all the specimens seen by me being from Colorado. Allied to it but quite distinct, as will be seen, is the following:

Atriplex tenuissima, n. sp.—Annual, branched from near the base, the slender branches racemosely branched into filiform branchlets, 2–3^{dm} high, moderately white-scurfy throughout: leaves numerous, bract-like, oblong to lance-ovate or broader, 1–7 ^{mm} long: floriferous from near the base; the few-flowerd (1–3?) clusters axillary (pistillate plant the only one seen): fruiting bracts very small, mostly less than 2 ^{mm} long, triangular-ovate, completely united, forming a subpyramidal fruit irregularly and rather numerously tuberculate below the middle.

This proposed species is based upon a specimen in the Herbarium of the Missouri Botanical Garden, *M. E. Jones* 6525, Gunnison, Utah, Sept. 15, 1900, altitude about 1600 ^{m}. Distributed as *A. Wolfii*, to which it has some resemblance in habit, but the foliage and fruit are very distinct.

ATRIPLEX SACCARIA Wats. Proc. Am. Acad. **9**:112.—During several years of collecting in southern Wyoming, nothing answering to this description has yet been encountered, in this the supposed type locality. It seems barely possible that the species rests upon one of the numerous variations of the following:

[3] See Mr. G. N. Collin's valuable bulletin cited in the preceding footnote.

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ATRIPLEX TRUNCATA (Torr.) Gray, Proc. Am. Acad. 8:398.—If this species, like *A. argentea*, be confined within the limits of the original description, it becomes quite local and meagerly represented. Several forms, differing among themselves as to habit and size, and even to some extent as to fruit characters, seem best to leave united with it. A year ago the writer marked some of these forms for specific rank, and (unfortunately) went so far as to distribute two of them with herbarium names, "*ined.*" The numbers so distributed are 8141 and 8170. Including these forms its range now seems to be from W. Nebraska to Oregon.

ATRIPLEX SUCKLEYANA (Torr.) Rydb. Mem. N.Y. Bot. Gard. 1:134.—The original range, "upper Missouri and head-waters of the Yellowstone," may have added to it "near the North Platte and some of its tributaries."

Atriplex spatiosa, n. sp.—A large erect annual, freely and divergently branched, often 1^{m} high, greenish-gray, minutely scurfy throughout: leaves ovate 2–5 ^{cm} long, coarsely and irregularly toothed, cuneate at base, rarely subhastate, nearly sessile, acute at apex with a minute cusp; the floral gradually reduced, becoming lanceolate and bract-like: monecious, androgynous at least above, the flowers in small axillary clusters and in ebracteate terminal spikes: calyx deeply 5-cleft: fruiting bracts small, rarely 5 ^{mm} long, ovate-triangular or orbicular, appressed, free above, with green border, hastately toothed near base or with several smaller teeth, the back crested with a semicircle (usually) of small slender green appendages.

This species came under my observation some three years ago, but the specimens secured happened to be found on loose banks and railroad grades, and it was suspected that it might be an introduction. It is proposed even now with some hestitation but with more confidence, since in the Herbarium of the Missouri Botanical Garden is found a specimen by *Dr. Vasey*, no. 487 (Powell's Colo. Expd. 1868), which undoubtedly is the same thing, though it was distributed as *Obione argentea*. Two others occur which are probably the same, namely, *Hayden*, Ft. Pierre, 1853; and *Hitchcock* 439, Kansas, 1895; these also as *A. argentea*. The relationship is nevertheless rather with *A. rosea* L.

The type number is 8140, Granger, Wyoming, Aug. 1900; *Elias Nelson* 737, Laramie, Wyoming, Sept. 1901, may be named as the co-type.

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Atriplex carnosa, n. sp.—Annual, stout, branched, at length widely and diffusely so, sometimes nearly 1 m high: stems green, subglabrous: leaves thick and fleshy, oblong-lanceolate or broader, 3–7 cm long, on petioles less than half as long, mostly entire, the larger ones subhastate or with one or more large teeth near the base: fruiting spikes numerous, more or less panicled, at first dark green, becoming dark purple at maturity; the large fleshy clusters closely approximated, producing an almost continuous spike often 1 cm in diameter: fruiting bracts triangular-ovate, about 5 mm long and broad, usually one or more small teeth on the margins, smooth on the back or with one or two fleshy tubercles: radicle inferior or subascending.

This is a member of the *A. patula* group. *A. patula* does not occur in this region except as an introduction. Dr. Watson (Rev. N. A. Chenopodiaceae) states that the American form of *A. hastata* also differs somewhat from the European *A. hastata* L. It may of course at some time be separated. The other two varieties recognized by Watson are wholly distinct from the species now proposed, leaving only *A. lapathifolia* Rydb. Mem. N.Y. Bot. Gard. 7:133 with which to compare it. From this it seems to be distinct by its great fleshiness, its large spikes and lax habit, and hastately toothed leaves.

It occurs only in moist strongly alkali-impregnated soils, and seemingly extends from Nebraska across the middle Rocky mountains into Utah. The type is 8036, Laramie, Wyoming, 1900; wholly typical are 4465, Howell lakes, Wyoming, 1897; 1871, Laramie, Wyoming, 1895.

CHENOPODIUM.

Two years ago a very anomalous Chenopodium was discovered, growing in an alkali lake bed. The soil was moist, but the surface was covered with efflorescent salts. The plants were abundant and uniform in habit. The only known species that the plant suggested was *C. glaucum.* This led to an examination of *C. glaucum* and to further collections. After having seen many authentic specimens of both the introduced eastern form and the indigenous western form of *C. glaucum* there seems to be the best of reasons for designating this a new form as follows:

Chenopodium succosum, n. sp.—Stout, erect, 5–8 dm high, freely branched, the branches ascending or suberect, straw-

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colored, the whole plant fleshy and exceedingly succulent (specimens curing slowly and saved with difficulty): leaves from broadly lanceolate to oblanceolate or even linear in outline, entire or irregularly toothed (often hastately toothed and resembling those of *Monolepis chenopodiodes*), 2–5^{cm} long, on petioles about half as long, green on both sides and not noticeably mealy: floriferous thoughout: flower clusters axillary, spicate, very numerous: calyx membranous; the sepals usually 3, suborbicular: pericarp thin, rather loosely covering the small dark brown seed.

It is at once distinguished from *C. glaucum* by its erect habit, size, succulence, greenness, crowded inflorescence, and small seeds. Type no. 8182*a*, Albany co., Wyoming, Sept. 5, 1900.

Chenopodium Watsoni, n. n.—*C. olidum* Wats. Proc. Am. Acad. **9**: 95, not *C. olidum* Curt. Fl. Lond. fasc. V. *t. 20.*

Chenopodium subglabrum (Wats.), n. sp.—*C. leptophyllum subglabrum* Wats. Proc. Am. Acad. **9**: 95.—The following characters seem to indicate that this rather rare plant is not very closely allied to *C. leptophyllum* Nutt. It is glabrous, usually bright green; loosely and slenderly branched, the branches very widely divaricate; the few-flowered clusters scattered on the branches. In this last respect especially it is as strongly marked as in its habit. The flowers are often borne singly and never more than two or three in a cluster. The fruit is large and depressed, and the calyx loose and open at maturity. Of several specimens examined in the herbarium of the Missouri Botanical Garden, no. 274, by Mr. Waugh, Stillwater, Oklahoma, shows the fully developed characters especially well. The range of the species seems to be from the Upper Platte in eastern Wyoming to Indian Territory.

In contrast with the preceding the var. *oblongifolium* of *C. leptophyllum* seems much less well marked. It is often difficult to say whether a given plant should bear the varietal or specific designation. Under this varietal name, however, a form has been found that by reason of its habit and other characters seems to deserve specific rank.

Chenopodium desiccatum, n. sp.—Annual, densely white mealy

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throughout, freely branched, the branches paniculately branched, low and spreading, about 1^{dm} high (broader than high): leaves entire, from oblong to linear, mostly acute, some of them short petioled, $1-2^{cm}$ long: floriferous throughout; the small clusters in dense panicles which are naked towards the apex: calyx thickened with the dense mealiness, brittle, enclosing the fruit, the large (more than 1^{mm}) shining-black seed easily separable from the pericarp.

No. 5048, collected by *Elias Nelson*, Mill creek, Wyoming, Aug. 12, 1898 is made the type, while a collection by *J. H. Cowen*, Fort Collins, Colorado (wholly typical as represented in the Rocky Mountain Herbarium), July 29, 1896, may be designated the co-type.

Chenopodium cycloides, n. sp.—Annual, about 4^{dm} high, stoutish, divergently branched from near the base, nearly glabrous: leaves narrowly linear (the early ones wanting), $5-25^{mm}$ long, scattered on the branches or more crowded on slender branchlets, lightly scurfy on both sides: sepals 5, not scurfy, membranous, at maturity somewhat united and spreading, simulating a rotate wing about the large brown depressed or lenticular fruit: pericarp thin, close-fitting, transparent: seed more than 1^{mm} broad, embryo annular.

Of this seemingly remarkable distinct species I have seen but one collection, no. 435, by *A. S. Hitchcock*, Sand hills, Grant co., Kansas. It was distributed as *C. leptophyllum*, to which it is most nearly related, notwithstanding its very different appearance. The habit of the plant and its winged fruits at first sight suggest a Cycloloma rather than a Chenopodium. The type is the above number as it is found in the Herbarium of the Missouri Botanical Garden; the co-type, same number in the Rocky Mountain Herbarium.

DONDIA.

In the transfer of the different species from Suaeda to Dondia, there seems to have been some misunderstanding of the synonomy. Dr. Watson in his Revision (Proc. Am. Acad. **9**: 87–90) seems to have had this perfectly clear, and there the synonomy may be found in full up to that date. The following new combinations seem to be necessary:

Dondia Moquini (Torr.), n. comb.— *Chenopodina Moquini* Torr. Pacif. R. R. Rep. **7**: 18. 1856; *Suaeda Torreyana* Wats. Proc. Am.

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Acad. 9:88, 1874; *Dondia multiflora* Heller, Cat. N. A. Pl. 3. 1898.

Dondia multiflora (Torr.), n. comb.—*Suaeda fruticosa multiflora* Torr. Pacif. R. R. Rept. 4:130. 1857; *S. suffrutescens* Wats. Proc. Am. Acad. 9:88. 1874; *Dondia suffrutescens* Heller, Cat. N. A. Pl. 3. 1898.

Dondia erecta (Wats.), n. sp.—*Suaeda depressa erecta* Wats. Proc. Am. Acad. 9:90. 1874; *Dondia depressa erecta* Heller, Cat. N. A. Pl. 3. 1898.

This is given specific rank, not because a depressed erect plant is an anomaly, but because by reason of its constant well marked habit it is quite distinct. Not only is it erect, but its narrow leaves and strict branches give it an aspect quite its own.

MISCELLANEOUS SPECIES.

Recently a specimen of *Abronia fragrans* Nutt. was received from T. D. A. Cockerell, of New Mexico. It seemed so different from the Wyoming form of that species that it led to an inquiry as to the typical *A. fragrans*. All the literature indicates a viscid pubescent plant, and that is just what we find in specimens secured to the southward and eastward of Wyoming. The Wyoming form, which seems to extend northward and westward, differs so essentially, it seems to me, that it may well bear a varietal name.

ABRONIA FRAGRANS **glaucescens,** n. var.—Growing in clumps, freely branched, suberect, 15–25 ^{dm} high: stems glabrous or nearly so below, upwardly becoming puberulent and subviscid: leaves wholly glabrous, light green above, lighter and more or less glaucous below (often silvery-glaucous): the white flowers crowded in the involucres and forming spherical clusters 5 ^{cm} or more in diameter (locally known as "snowballs"): fruit terminating in a conical beak one-third as long as the narrowly winged obconical body.

Abronia cheradophila, n. n.—*Abronia arenaria* Rydb. Mem. N. Y. Bot. Gard. 1:137; not *A. arenaria* Menzies, ex. Hook. Exot. Fl. *t. 193*.

Allionia glandulifera, n. sp.—Perennial from woody rootstocks: stems one or more from the crowns, somewhat dichotomously

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branched, finely striate, silvery-glaucous below, greener upward and becoming glandular-pubescent, 3–5 dm high: leaves linear-lanceolate, mostly with one or more pairs of lateral nerves, obscurely undulate-toothed, glabrous or the uppermost viscid-pubescent, green and nearly normal in texture, 7–12 cm long, 5–10 mm broad: inflorescence a large freely branched cyme, nearly naked, densely viscid or glandular-pubescent throughout, even on the small bracts: involucres mostly three-flowered, salverform in anthesis, 1 cm or less in diameter, the bracts elliptic-ovate, subacute, distinct nearly to the base: perianth white or pinkish, broadly funnelform, 7–10 mm long, hirtellous without and within; its limb deeply four-lobed, each lobe bifid, giving eight subequal obtuse elliptic segments: stamens three, well exserted as also the style: fruits narrowly obovate, about 5 mm long, inconspicuously ribbed, somewhat tumidly rugose, moderately pubescent.

This is the Rocky mountain form of what has passed as *A. linearis* Pursh, but from that it is readily distinguished by its broader leaves of normal texture, its viscid-pubescent paniculate cyme, and the bifid lobes of the perianth.

ENOMEGRA.[4]—Coarse perennial herbs with thick milky (white) sap and alternate pinnate or bipinnate leaves; green or sometimes glaucescent but not blotched with white; densely hispid-spinescent on stem and capsules and more sparsely so on the toothed lobes of the leaves and on their veins; also a short puberulence which on the stem and especially on the capsules tends to become hispid. Flowers subsessile, in close clusters on the ends of the leafy simple stems. Sepals 3, hispid near the cornuate, subcucullate apex, conspicuously reticulate veiny and inequilateral by the wing-like membranous margin on one side. Petals 4–6, white, suborbicular or reniform. Stamens numerous, filament and anther both narrow, sub-equal. Stigma dilated, four-lobed. Capsule cylindric-ellipsoid, four-valved. Seeds numerous, flattened, scarcely pitted. (Anagram of *Argemone*.)

This genus must rest mainly upon the color of the sap (no one seems to have made the observation that it is white), the character of the pubescence, the simple stems, and the crowded inflorescence. The glaucescent blotching

[4] This new genus unintentionally reached publication first in the writer's *Key to Rocky mountain flora* (1902), p. 27, but it seems best to give it this fuller additional publication.

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with white in Argemone is noticeably absent in Enomegra. *Argemone intermedia* and *Enomegra bipinnatifida* are often associated in the field but are never confused. The veriest tyro distinguishes them almost as far as he can see them, as I have repeatedly proven. Even children before breaking them down say "yellow" (sap), "white," "yellow," "white," etc. Possibly the genus is monotypic but I rather suspect not. In either case some of the characters given above are specific rather than generic. Collectors too often make inadequate notes, and even in plants of this family the color of the sap is not mentioned. I have not collected personally the second of the species that follow.

Enomegra bipinnatifida, n. comb.—*Argemone bipinnatifida* Greene, Pitt. **3**: 346.

ENOMEGRA HISPIDA, Aven Nelson, *Key Rocky Mt. Fl.* 27.—*Argemone hispida* Gray, Pl. Fendl. 5.

Draba uber, n. sp.—Stems several to many from a short branched caudex, moderately stout, 1–2 dm high (including the long fruiting racemes), lightly pubescent with mostly simple hairs: basal leaves densely rosulate on the crowns, oblanceolate, 1–2 cm long, tapering into a short petiole or subsessile, moderately stellate-pubescent as are also the stem leaves; stem leaves few, oblong, sessile but neither auriculate nor clasping: inflorescence crowded in fruit as well as in flower; flowers yellow, small: sepals subglabrous: petals spatulate, 4–6 mm long: fruiting from near the base up, the dense raceme leafless and ebracteate above the middle: pedicels stoutish, ascending, about 5 mm long: pods lanceolate, 10–12 mm long, puberulent with mostly simple hairs, 24–36-seeded, usually strongly twisted; style evident (1 mm), stoutish, glabrous.

In habit this species simulates *D. streptocarpa* Gray, but in some of the floral and fruit characters it is most nearly allied to *D. surculifera* Aven Nelson. From the latter it differs in the smaller leaves, long crowded fruiting raceme, narrower petals, more numerous seeds, and the denser and more uniform pubescence. *D. surculifera* occupies shaded slopes, under cliffs and trees in subalpine stations, while *D. uber* is found on open alpine slopes. Type no. 7875, Telephone mines, August 1, 1900.

Lesquerella macrocarpa, n. sp.—Moderately stellate-pubescent throughout; freely branched from crown of a slender taproot; the branches decumbent-spreading with assurgent tips, 7–15 cm long: crown leaves from orbicular to obovate, 7–20 mm long,

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mostly short petioled; stem leaves from broadly to narrowly oblong or oblanceolate, 15–30 mm long including the short tapering petiole: raceme crowded even in fruit, naked above: petals obovate, emarginate, two of them with slightly narrowed and claw-like base, 5–7 mm long: pod nearly globose, 5–8 mm in diameter, two or three ovules in each cell; style 2–3 mm long: pedicels recurved, 5–10 mm long.

This excellent species has the appearance of a Physaria, but of course is at once separated by the fruit. It was secured on naked clay flats and ridges on the Red desert, near the Bush ranch, Sweetwater co. Wyoming, June 10, 1900. The type number is 7081. It was again collected not far from the type locality in June 1901, by *Merrill* and *Wilcox*, no. 568.

Opulaster Ramaleyi, n. sp.—Shrubby, 1–2 m high; the stems and older branches brown with fibrous-shreddy bark; young branchlets green, glabrous and somewhat angled: leaves numerous and large, broadly ovate or subcordate in outline, some of them slightly incisely 3-lobed, the margin more or less doubly crenately dentate, 2–7 cm long and almost as broad, glabrous on both sides except occasionally some ciliolations on the veins below: pubescence on pedicels soft and rather long, somewhat tufted and substellate; on hypanthium and calyx short, hoary-tomentose: sepals ovate, acute, soon reflexed in blossom but erect in fruit, about 3 mm long: petals orbicular, slightly exceeding the sepals: anthers dark purple: ovaries four, loosely united to the middle, densely pubescent; carpels elliptic, inflated, more than twice as long as the sepals, about 7 mm long, moderately divergent, nearly distinct, pubescent, somewhat laterally compressed at apex and terminated by the short style, usually three maturing (sometimes only two): seeds single in the cells, obovoid, shining, about 2 mm long.

This is *O. opulifolius* probably, in so far as Rocky mountain specimens have been so named. It is not the *O. opulifolius* (L.) Kuntze of the eastern United States. The characters as given show that, and it is at once evident to the eye when both species are seen together. The type specimens are nos. 108, 793, and 874 by *Francis Ramaley*, all from the same locality, near Boulder, Colorado, 1900 and 1901. The earlier number is in blossom, the two later in fruit. No. 2406 by *G. E. Osterhout*, 1901, is the same and from the same locality.

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Anogra Nuttallii, n. comb.—*Oenothera albicaulis* Nutt. Fras. Cat., name only; T. & G. Fl. N. A. 1: 495; not Pursh, Fl. Am. Sept. 733; *O. Nuttallii* Sweet, Hort. Brit. Ed. 2: 199.—Perennial from woody horizontal rootstocks with short vertical caudices or crowns: stems one to several from the crown, erect, 5–10^{dm} high, freely branched above, the somewhat shreddy bark white and glistening; branchlets slender, widely divaricate: leaves very numerous, somewhat fascicled at the axis, softly and minutely puberulent on the lower surface, broadly linear, acute at apex, tapering gradually to the nearly sessile base, margin entire or merely denticulate; the primary ones of the fascicles 4–10^{cm} long, 5–8^{mm} broad; the secondary ones similar but quite small: flowers in the crowded terminal axils of the branches, somewhat drooping in bud: calyx glandular-puberulent on the tube; calyx-lobes narrowly lanceolate, 2–3^{cm} long, about as long as the tube, scarcely puberulent, the tips free: petals white, broadly obovate, entire or denticulate at the broad apex, nearly as long as the reflexed calyx-lobes: anthers linear, 15^{mm} long, as long as the filament: stigmas exserted, linear, about 10^{mm} long: mature capsule cylindrical, about 3^{cm} long, pale, minutely puberulent except on the rather broad whitish sutures, not contorted: seeds narrowly ovate, light green, copiously speckled with purple, indistinctly striate under a lens, about 2^{mm} long.

I have long intended to give a name to this perfectly valid species. In fact I have distributed some specimens under the herbarium name *Anogra arenaria.* A more careful study of the synonomy convinces me now that the above name is tenable. *Oenothera albicaulis* Nutt. never was a synonym of *O. pallida* Lindl. Bot. Reg. 14: *pl. 1142.* It was evidently the purpose of Sweet to distinguish this species of Nuttall from Pursh's species of the same name, as it was also of Spach in his *Baumannia Nuttalliana* (Hist. Veg. 4: 352) and *Anogra Nuttalliana* (Nouv. Ann. Mus. Par. 4: 339).

This species is very common on sandy plains and banks from Nebraska to Utah. It is at once distinguishable from *Anogra pallida* by the pubescent leaves, inflorescence, and capsules; the larger flowers (resembling those of *A. albicaulis* Pursh rather than those of *A. pallida*), and the larger straight capsules and characteristic seeds.

Lavauxia Howardi (Jones), n. comb.—*Oenothera Howardi* Jones, Zoe 3: 301.—For some reason this species has been completely ignored by recent writers on the allies of *Oenothera*, as

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has also *Oenothera Johnsoni* Parry, Am. Naturalist 9: 270. Jones suggests the possibility that the species he describes is *O. Johnsoni*, but at the same time points out characters that unmistakably distinguish the two. While the description of *O. Johnsoni* is very meager, yet in so essential a matter as the character of the capsule it is very explicit. Certainly no observer, least of all Parry, would have compared a large perennial such as *Lavauxia Howardi* with the small annual *Lavauxia priminervis* (Gray) Small, which has a capsule similar to that attributed to *O. Johnsoni*. The species to which *Lavauxia Howardi* is closely allied is *L. brachycarpa* (Gray) Britton Mem. Torr. Club 5: 235; *Oenothera brachycarpa* Gray, Pl. Wright 1: 70, and Coulter, Contrib. U. S. Nat. Herb. 2: 116; but here again the character of the capsule serves to distinguish these two. In the latter it is smooth and acute, with narrow wings; while in the former it is larger, oblong-obtuse, broadly winged, and cinereous pubescent. The leaves also are all oblanceolate, tapering into the petiole, from entire to coarsely and irregularly toothed, therefore the lamina continuous and not distinguished into lateral and terminal lobes.

The species occurs on arid denudated hills from northern Colorado through Utah to Nevada.

COLORADO AND WYOMING THORNS.

Crataegus Wheeleri, n. sp.— Probably a small shrub, the branches slender and virgate: leaves narrowly oblong to elliptic, 3–5^{cm} long, 1–2^{cm} broad, from acute to obtusely rounded at apex, cuneately tapering at base to a slender petiole one-fourth to one-half as long as the blade, the shallow crenate serratures wanting on the cuneate base, light green and glabrous below, brighter green but obscurely and sparsely appressed strigulose above, firmer in texture and somewhat glossy above at maturity: spines slender, flexible, glossy black, 2–3^{cm} long: flowers small, 12–14^{mm} broad, on slender glabrous pedicels, in close few-flowered corymbs: calyx-tube obconic, glabrous; calyx-lobes small, triangular, at length reflexed: petals suborbicular, about 4^{mm} in diameter: stamens 20; anthers yellowish-white: pistils 5: fruit small, sub-globose, 6–8^{mm} in diameter, purplish-black (in dried specimens), in few-fruited suberect clusters; flesh seem-

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ingly very thin and dry: nutlets 5, nearly smooth, about 5^{mm} long.

This species is not so well represented before me as I wish it were, but it is so evidently distinct from the known Rocky mountain species that I have no hesitancy in pronouncing it new. Among the western species it is most nearly allied to *C. rivularis* Nutt. The size of the tree or shrub is not known to me, but from the herbarium specimens I suspect that it is quite small. The type was collected by *H. N. Wheeler* at Sapinero, Colorado, 1898, no. 532; co-type, *C. S. Crandall's* collection in the Black cañon of the Gunnison, Colorado, August 22, 1896.

Cartaegus cerronis, n. sp.—Tree-like in form, 2–5^{m} high, rather widely branched; trunk short and stout, with rough bark; young twigs brown, passing into the gray of the older ones; lenticels small, nearly white: leaves broadly elliptic-ovate, 3–5^{cm} long, 2–3^{cm} broad, coarsely and serrately few-toothed, the teeth with finer gland-tipped acute serrations, acute or acuminate at apex, the abruptly cuneate base entire or remotely serrulate, light green and perfectly glabrous below, sparsely ciliate pubescent above, especially on the veins; petiole slender, without glands, chaneled above, 5–20^{mm} long: thorns numerous, short (2–3^{cm}), stout and thick for the length, straight, rarely a little deflexed, very dark morocco-red, with small light-covered lenticels: the paniculate corymb 5–10–flowered, congested in blossom but more open in fruit: calyx tube only 2–3^{mm} long, shorter than its lobes; lobes ovate, with a broad gland margined acumination: petals suborbicular, with shallow crenations, noticeably reticulate veined, 6–8^{mm} broad: stamens few (1–8, mostly 5–8); anthers large, purple: pistils 5: mature fruit not at hand; nutlets 5.

This excellent species seems to be an inhabitant of Colorado and Wyoming. I take as the type *Baker's* no. 46, Cerro summit, Colorado (altitude about 2500^{m}), flowers June 7, fruit July 12, 1901; excellent flowering specimens, 660 *Ramaley*, near Boulder, Colorado, May 20, 1901. The following numbers from Wyoming, by the writer, are probably the same, though only fruiting specimens are at hand: 2491, Pass creek, 1896; 606, Casper, 1894; also 5060, by *E. Nelson*, Seminole mts., 1898. It has probably at times been distributed as *C. rivularis* Nutt., but it has rather the appearance of *C. Douglasii* Lindl.

Crataegus sheridana, n. sp.—Becoming a small tree 3–5^{m} high; the young twigs gloss-brown or red-brown, becoming

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grayish on older branches; lenticels rather few and large; spines slender, noticeably curved and deflexed, 4–5^{cm} long, dark brown, the glazed surface marked by the few whitish lenticels: leaves oval to almost orbicular, coarsely and incisely toothed with rather blunt gland-tipped serratures, the rounded or abruptly cuneately-narrowed base merely serrate and scarcely decurrent upon the slender petiole; pubescence various, sparse and softly strigose on lower surface of leaves (mostly on the veins), minute and appressed on the upper, ciliate on the petioles, the youngest twigs, the pedicels, the calices, and fruits: corymb 5–11 flowered: calyx-lobes ovate-lanceolate, with several glands on the margins, 4–5^{mm} long: stamens (seemingly) 8–10: pistils 3 or 4: nutlets 3–5, often slightly crested-bisulcate dorsally, about 5^{mm} long: fruit nearly spherical, 8–9^{mm} in diameter, scarlet-red.

The Crataegus here described has passed for *C. macrantha* Lodd. While it may be most nearly allied to that it is doubtful if anything referable to that species occurs in the Rocky mountains. Another close ally of it is found in *C. Piperi* Britt., from which it differs in pubescence, the absence of glands on the petioles, in the straight styles, the shorter filaments, and the smaller differently colored fruits.

The type is no. 8673, Sheridan, Wyoming, July 24, 1901; fully ripe fruits from same locality October, 1902. Sundance, Wyoming, July 2, 1896, no. 2104, seems to be the same.

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