

CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY

NEW SERIES.—No. XLVIII

ISSUED

AUG 15 1916

- I. The True Mertensias of Western North America
- II. Revision of the Genus *Oreocarya*
- III. Notes on Certain Borraginaceae

By J. FRANCIS MACBRIDE

HARVARD UNIVERSITY PRESS

CAMBRIDGE, MASS., U. S. A.

AUGUST, 1916

421 (1909). *Pulmonaria alpina* Torr. Ann. Lyc. ii. 224 (1827). — Montana, Wyoming, Colorado. — MONTANA: near Pony, July 7 & 9, 1897, *Rydberg & Bessey*, no. 4867; Spanish Peaks, July 10, 1901, *J. Vogel*. WYOMING: Yellowstone Park, July 13, 1899, *A. & E. Nelson*, no. 5811; Dune Lake, July 18, 1896, *Aven Nelson*, no. 2434. COLORADO: Saddle Cliffs, July 6, 1901, *A. E. & E. S. Clements*, no. 405; Pike's Peak, Aug. 27, 1895, *Canby*.

30a. var. *perplexa* (Rydb.), comb. nov. *M. perplexa* Rydb. Bull. Torr. Club xxxi. 639 (1905); *M. alpina* Gray, Syn. Fl. ii. pt. 1, 201 (1886), in part. — COLORADO: 1868, *Vasey*, no. 437; Gray's Peak & vicinity, July & August, 1885, *H. N. Patterson*, nos. 113 & 114, in part; 1872, *Gray*.

30b. var. *humilis* (Rydb.), comb. nov. *M. humilis* Rydb. Bull. Torr. Club xxxvi. 681 (1909). *M. alpina* A. Nels. in Coulter & Nelson Man. R. Mt., as to description and glabrous specimens; Gray, Syn. Fl. l. c. in part. — High Plains; southern Wyoming and Colorado. — WYOMING: Laramie Hills & Sand Creek, Albany Co., May 16, 1894 & June 2, 1900, *Aven Nelson*, nos. 33 & 7043. COLORADO: headwaters of Clear Creek, 1861, *Parry*, no. 287.

31. *M. CANESCENS* Rydb. Bull. Torr. Club xxxi. 640 (1905). *M. cana* Rydb. Bull. Torr. Club xxxvi. 698 (1909). — COLORADO: Berthoud Pass, Grand Co., July, 1903, *Tweedy*, no. 5664 (R. Mt. Herb.); Gray's Peak & Vicinity, July & Aug., 1885, *H. N. Patterson*, no. 114, in part.

32. *M. BREVISTYLA* Wats. Bot. King's Expl. 239 (1871). *M. alpina* (Torr.) G. Don, var. *brevistyla* (Wats.) Jones, Contrib. W. Bot. xii. 56 (1908). *M. alpina* Gray, Syn. Fl. l. c. in part. — UTAH: Emigration Canyon, Salt Lake Co., June 14, 1913, *Garrett*, no. 2716; Wasatch Mts., May, 1869, *Watson*, no. 485; Red Butte Canyon, Salt Lake Co., April 22, 1905, *Garrett*, no. 1075; Red Butte & Parley's Canyons, May 8, 1909, & May 29, 1908, *Mrs. Joseph Clemens*.

Rydberg includes this species in his Flora of Colorado and Nelson in the Coulter & Nelson Manual gives the range as "western central Rocky Mountains." However the specimens I have seen have all come from Utah.

II. REVISION OF THE GENUS OREOCARYA

This group of plants has never been revised as a genus. When Dr. Gray treated it as a section under *Krynitzkia*, Proc. Am. Acad. xx. 277 et seq. (1885), he recognized seven species and at that time but few more had been proposed. Then in 1896 Dr. Greene (Pitt. iii. 109–115) added seven species to his genus *Oreocarya*, Pitt. i. 57 (1887), and discussed the status of some of the older species. The

next work of importance in this connection was by Dr. Rydberg in his Flora of Colorado, Bull. 100, Colo. Agric. Exp. Sta., 286 (1906), where he keyed out nineteen species. Miss Alice Eastwood, in a paper devoted to this genus, Bull. Torr. Club. xxx. 238-246 (1903), contributed largely to this increase in the number of recognized species. Finally the treatment by Professor Aven Nelson in the Coulter-Nelson Man. R. Mt. Bot. 416-419 (1909) gave a key and also descriptions with citations, recognizing nineteen species for the central Rocky Mountain region. Since the genus reaches its greatest development in Colorado I am most indebted to these works, but floras covering the outskirts of the range of the genus have been helpful for their regions, notably Wootton & Standley in Contrib. U. S. Nat. Herb. xix. 544-546 (1915) and Piper, Contrib. U. S. Nat. Herb. xi. 481-482 (1906). When one considers that sixty species have been credited to this genus although only nineteen have appeared in any one work, the need of a general revision is apparent. It is of interest that this remarkable increase from seven species in 1885 to sixty in 1916 has been largely warranted, having been due at least in great part, to the discovery that the species possess excellent characters of fruit, which may serve to distinguish them when other characters are not apparent. In this respect *Oreocarya* resembles greatly *Cryptantha*. Other characters that are important are the shape of the calyx-divisions, nature of the pubescence and the inflorescence. Habit, size of corolla and duration are often to be considered. The color of the corolla is constantly white, yellow, or white and yellow. Compared with *Mertensia* the genus furnishes some striking contrasts. For instance, the characters are usually perfectly definite and the species rarely exhibit perplexing variations. This may be illustrated concretely by the fact that, although forty-five species of *Oreocarya* are recognized only three have been noted as varieties while in *Mertensia*, the recognition of thirty-two species has disclosed nineteen variations that seemed to be worthy a name. The genus, therefore, is not difficult provided the specimens are in fruit. But it is impossible in many cases to determine accurately specimens that are only in flower. Collectors, therefore, should use the same effort and care to secure mature plants as in the genus *Cryptantha*.

A very promising and interesting field for investigation, in this group especially, is a study of the degree to which certain species

are restricted to certain soils. Such a study would probably explain the peculiarly local character of many species and the widely interrupted ranges of others. The genus is admirably suited to this kind of study as species are known from many types of soils, as limestone, granite, shales, etc., and in many cases the range of the species would doubtless be found to be correlated with the occurrence of certain formations.

I have seen at least one specimen of nearly every species included. *O. interrupta* Greene, Pitt. iii. 111 (1896), and *O. urticacea* Woot. & Standl. Contrib. U. S. Nat. Herb. xvi. 166 (1913) I have not seen. The former is very poorly described. It may be related to *O. nitida* but is of enormous size ("1 1/2-3 feet high"). It is said to abound in woods east of Wells, Nevada. The latter may be a good species related to *O. glomerata* and confined to New Mexico. *Krynitzkia fulvocanescens* Gray, var. *idahoensis* Jones. Contrib. W. Bot. xiii. 6 (1910) and *K. multicaulis* Torr., var. *setosa* Jones, l. c. 4, I have not been able to place. Mr. Jones stands practically alone in not recognizing the genus *Oreocarya*. This, of course, is a matter of personal opinion but it is not clear on what grounds he persists in using *Krynitzkia* to the displacement of the earlier and valid *Cryptantha*. Such action does not accord with his work in other groups.

All specimens cited are in the Gray Herbarium except when the citation is followed by the abbreviation "R. Mt. Herb.," in which case I am indebted to Professor Nelson for the loan of Rocky Mountain Herbarium material.

KEY TO THE SPECIES AND VARIETIES

- a. Nutlets bordered by a conspicuous wing; robust plants 5-10 dm. high with long ebracteate spikes; corolla small, white, the tube included in the calyx, the latter enlarged and ovoid in fruit. 1. *O. setosissima.*
- a. Nutlets never conspicuously winged, sometimes with an acute margin simulating a narrow wing; plants lower, often tufted; inflorescence bracteate; corolla white or yellow, the tube included or exerted from the calyx, the latter sometimes enlarged in fruit b.
- b. Inflorescence a virgate spike-like thrysus with all but the uppermost floral leaves much longer than the short cymes; nutlets broadly ovate, lustrous, sparsely rugose or smooth. 2. *O. virgata.*
- b. Inflorescence various but seldom if ever so spike-like and at least the upper floral leaves reduced to comparatively short bracts which slightly if at all exceed the cymes or racemose branches c.

- c. Corolla white, 3–6 mm. long, the tube not exerted from calyx; nutlets rough or rarely smooth and then the fruit depressed and subglobose (except in *O. salmonensis*); plants usually rather unattractive *d.*
- d. Fruit conical; the nutlets smooth and lustrous; pubescence white, not at all fulvescent even in the thyrsoid-glomerate inflorescence; plants not tufted 3. *O. salmonensis.*
- d. Fruit conical, the nutlets rough (or at least wrinkled), or if smooth, fruit depressed-globular; pubescence, especially in the inflorescence, often fulvescent; plants various in habit *e.*
- e. Nutlets more or less rugose (cf. *O. aperta*), often muriculate as well; plants usually biennial or scarcely more enduring, mostly from a tap-root; stems usually 1–4 dm. high (*O. sericea* & *O. humilis* are low caespitose perennials) *f.*
- f. Calyx-lobes ovate-lanceolate, little exceeding the mature nutlets; inflorescence a rather few-branched panicle *g.*
- g. Pubescence on leaves and calyx appressed; nutlets tuberculately rugose 4. *O. elata.*
- g. Pubescence on calyx spreading; nutlets reticulately rugose, the surface appearing nearly foveolate 5. *O. Bakeri.*
- f. Calyx-lobes lanceolate or linear, much exceeding the nutlets; inflorescence thyrsoid-glomerate (rarely paniculate) *g.*
- g. Biennials or short-lived perennials, not, or scarcely, tufted (*O. celosioides*, sometimes perennial) *h.*
- h. Flowers in axillary and terminal paniced racemes; nutlets sharply carinate 6. *O. insolita.*
- h. Flowers thyrsoid-glomerate or in an open thyrus, not in paniced racemes; nutlets with rounded or merely acute backs *i.*
- i. Nutlets confluent tuberculate so as to form semi-star-shaped designs; inflorescence an open branched thyrus 7. *O. aperta.*
- i. Nutlets more or less distinctly rugose, the elevations never confluent into star-shaped designs *j.*
- j. Inflorescence a broad open thyrus, the branches usually branched; nutlets ovate to broadly ovate *k.*
- k. Nutlets ovate with sharply acute or slightly winged margin, not ridged 8. *O. thyriflora.*
- k. Nutlets broadly ovate or almost oval, distinctly but narrowly winged and rather strongly ridged 9. *O. virginensis.*
- j. Inflorescence, at least in anthesis, a narrow more or less spike-like thyrus; nutlets ovate-lanceolate *k.*

- k.* Stems simple, or several from the base, and then the central usually the largest *l.*
- l.* Leaves not satiny; stiffish hairs present and more or less spreading *m.*
- m.* Leaves obovate, spatulate or oblanceolate *n.*
- n.* Nutlets ovate, rugose, indistinctly muriculate, acutely margined, 3.5–5.5 mm. long; species of the Northwest 10. *O. celosioides.*
- n.* Nutlets narrowly ovate, rugose and muriculate, usually less acutely margined, about 3 mm. long; species of the eastern Rocky Mountains.
Stem simple or several from the caudex; lower leaves obovate. 11. *O. glomerata.*
- Stems simple or with several distinctly secondary branches from the base; lower leaves oblanceolate 12. *O. affinis.*
- m.* Leaves linear or narrowly oblanceolate 13. *O. Macounii.*
- l.* Leaves satiny above; stiffish hairs present on the under surface only 14. *O. argentea.*
- k.* Stems 2–many, tufted; leaves strikingly setose-ciliate 15. *O. spiculifera.*
- g.* Perennials, tufted *h.*
- h.* Nutlets more or less rugose and somewhat muriculate *i.*
- i.* Inflorescence congested even in fruit, the pedicels very short; calyx-lobes less than 5 mm. long 16. *O. sericea.*
- i.* Inflorescence moderately open in fruit, the pedicels becoming 5 mm. long, the calyx-lobes about 6 mm. long. 17. *O. echinoides.*
- h.* Nutlets not at all muriculate but somewhat rugose, the rugae low and blunt, the surface appearing merely wrinkled. . . 18. *O. nubigena.*
- e.* Nutlets (cf. *e*³) never truly rugose, but if tuberculate, some of the tubercles often somewhat confluent; tufted perennials with ultimately branched caudices clothed with dead leaf-bases; stems 0.5–1 (rarely 2) dm. high *f.*
- f.* Leaves satiny-pubescent, apparently with only one sort of closely appressed hairs; nutlets densely muriculate, the murications very sharp 19. *O. cana.*
- f.* Leaves canescent but the pubescence evidently of two sorts, a strigose or tomentulose indument interspersed with stiffish more or less spreading hairs *g.*

- Leaves tomentose and hispid; nutlets tuberculate, some of the tubercles confluent rugulose. 20. *O. depressa*.
- g.* Leaves strigillose and hispid, not or scarcely tomentose; nutlets not at all tuberculate-rugose *h.*
- h.* Densely cespitose species only about 1 dm. high; inflorescence congested even in fruit *i.*
- i.* Hispid pubescence of leaves about as evident as the appressed strigillose pubescence *j.*
- j.* Nutlets sinuously and finely rugulose and minutely papillose; plants of clay or shale slopes. 21. *O. caespitosa*.
- j.* Nutlets muriculate, with one kind of papillae; leaves strigillose and hispid; plants of saline flats. . . . 22. *O. Shantzii*.
- j.* Nutlets muriculate with one kind of papillae; leaves subtomentose and hispid; plants of upland non-saline soils. 23. *O. dolosa*.
- i.* Hispid pubescence of leaves more noticeable than the strigillose indument; nutlets muriculate with distinct papillae. 24. *O. nana*.
- h.* Plants about 1.5 dm. high, more loosely tufted; inflorescence becoming moderately open in fruit *i.*
- i.* Branches of inflorescence floriferous from their bases; hispid pubescence of leaves somewhat spreading; nutlets muriculate with distinct papillae. . 25. *O. commixta*.
- i.* Branches of inflorescence peduncled, especially the lower, floriferous only toward their apices; all pubescence of leaves appressed; nutlets roughened with fine interlaced lines and minute papillae. 26. *O. propria*.
- e.* Nutlets smooth or essentially so (except in the Mexican *O. Palmeri*) and separated by an open space, the fruit being depressed-globular; inflorescence racemose-paniculate *f.*
- f.* Nutlets smooth, lustrous; species not typically Mexican *g.*
- g.* Stems and leaves very pubescent *h.*
- h.* Strigosely canescent, the pubescence mostly appressed; plants usually less than 2 dm high.
- Stems erect or ascending; keel of nutlet not strongly elevated above scar. 27. *O. suffruticosa*.
- Stems subdecumbent; keel of nutlet more or less strongly elevated above scar. 27a. var. *abortiva*.
- h.* Hispid with a spreading pubescence, at least the stems; plants often more than 2 dm. high *i.*
- i.* Pubescence of leaves in part hispid-spreading. 28. *O. multicaulis*.

- mm. long in flower; nutlets strongly rugose, or if tuberculate, some of the tubercles confluent into rugae *i*.
- i*. Calyx-divisions linear or linear-lanceolate; nutlets with no excavated groove in the ventral face but the scar sometimes open *j*.
- j*. Calyx-divisions about 5 mm. long in flower, 8–10 in fruit; basal leaves 5–10 mm. broad; nutlets tuberculate, the tubercles in part confluent.....38. *O. Wetherillii*.
- j*. Calyx-divisions about 6 mm. long, scarcely longer in fruit; basal leaves 2–5 mm. broad; nutlets strongly rugose, keeled.....39. *O. tenuis*.
- i*. Calyx-divisions ovate-lanceolate; nutlets variously roughened and with an open excavated groove in the ventral face *j*.
- j*. Nutlets sharply tuberculate and somewhat sinuously rugose.....40. *O. Shockleyi*.
- j*. Nutlets reticulately rugose, the ridges interlacing, nearly foveolate....41. *O. eulophus*.
- j*. Nutlets sharply transversely rugose and with minute papillae intervening.....42. *O. flavoculata*.
- d*. Nutlets smooth, lustrous; leaves linear-lanceolate or oblanceolate, acute or acuminate; plants tufted but never densely so *e*.
- e*. Flowers bright yellow, in a spicate thyrus.....43. *O. flava*.
- e*. Flowers yellowish, in an interrupted thyrus; fruit somewhat depressed.....44. *O. confertiflora*.
- e*. Flowers white, in an interrupted thyrus; fruit conical.....45. *O. leucophaea*.

1. *O. SETOSISSIMA* (Gray) Greene, Pitt. i. 58 (1887). *Eritrichium setosissimum* Gray, Proc. Am. Acad. xii. 81 (1877). *Krynitzkia setosissima* Gray, l. c. xx. 276 (1885). — Arizona and southern Utah. — UTAH: Fish Lake, Sevier Co., Aug. 25, 1875, *L. F. Ward*; St. George, Washington Co., *Palmer*. ARIZONA: steep rocky slopes, Thompson's Ranch, White Mts., July 14, 1910, *Goodding*, no. 589; about Grand Canon of the Colorado, June 26, 1898, *MacDougal*, no. 165; Flagstaff, 1883, *H. H. Rusby*, no. 306; Fort Apache, June 21–30, *Palmer*, no. 591.

2. *O. VIRGATA* (Porter) Greene, Pitt. i. 58 (1887). *Eritrichium virgatum* Porter, Hayden Report 479 (1870). *E. glomeratum* (Pursh) A. DC., var. *virgatum* Porter, in Coulter & Porter, Fl. Colo. 102 (1874). *Krynitzkia virgata* (Porter) Gray, Proc. Am. Acad. xx. 279 (1885). — Southeastern Wyoming to Central Colorado. — WYOMING: Sandy slopes, Chug Creek, Albany Co., June 29, 1900, *Aven Nelson*, no. 7338; Telephone Canyon, Albany Co., June 15, 1894, *Aven Nelson*, no. 231. COLORADO: *F. E. & E. S. Clements*, no. 102; Boulder, June 24, 1901, *Osterhout*, no. 2,463; Gould Creek,

Pike's Peak, Aug. 12, 1903, *J. C. Blumer*; mountains on road from Denver to Idaho Springs, Aug. 2, 1872, *Porter*.

This species is often common within the limits of its range and in spring and early summer when other vegetation is still low, with its erect sentinel-like habit, adds a military touch to the otherwise seemingly free and open sweep of hill and plain. The nutlets, though commonly slightly rugose, are sometimes quite smooth. This latter form has been designated forma *spicata* (Rydb.) Macbr. Proc. Am. Acad. li. 546 (1916), i. e. *O. spicata* Rydb. Bull. Torr. Club xxxvi. 678 (1909), and occurs with the typical form.

3. *O. SALMONENSIS* Nels. & Macbr. Bot. Gaz. lxi. 43 (1916). — Known only by the type from prairies, in loose soil, Salmon, Lemhi Co., Idaho, June, 1896, *Charles L. Kirkley* (R. Mt. Herb.). This plant seems to be biennial.

4. *O. ELATA* Eastw. Bull. Torr. Club xxx. 241 (1903). — COLORADO: Grand Junction, Mesa Co., May 15, 1892, *Alice Eastwood*.

5. *O. BAKERI* Greene, Pitt. iv. 92 (1899). — Sage plains of the C Manxos River, Montezuma Co., Colorado. I have not seen this species.

6. *O. insolita*, spec. nov., biennis radice tenui; caulibus 1-2, mediocriter hispidis 3-4 dm. altis; foliis radicalibus spathulatis 3-5 cm. longis 5-12 mm. latis strigillosis et paullo adpresse hispidis; foliis caulinis similibus sed gradatim reductis; racemis terminalibus paniculatis vel inferioribus axillaribus-pedunculatis, remotifloris post anthesin; calyce 5-partito laciniis fructiferis 7-8 mm. longis dense hispidis, pilis vix fulvescentibus; corolla alba circa 5 mm. longa, tubo calycem non superante; nuculis ovatis, acute marginatis tuberculato-rugosis et minute muriculatis, acute carinatis. — NEVADA: Los Vegas, May 4, 1905, *Goodding*, no. 2286 (TYPE, Gray Herb., duplicate, R. Mt. Herb.).

Species of unusual aspect, somewhat like that of *O. elata* but with different calyx and pubescence. The nutlets are remarkably carinate for the genus.

7. *O. APERTA* Eastw. Bull. Torr. Club xxx. 241 (1903). — Apparently known only from Grand Junction, Mesa Co., Colorado. I have seen no collection.

8. *O. THYRSIFLORA* Greene, Pitt. iii. 111 (1896). *O. hispidissima* (Torr.) Rydb. Bull. Torr. Club xxxiii. 150 (1906). *Eritrichium glomeratum* (Pursh) DC., var. *hispidissimum* Torr. Bot. Mex. Bound. 140 (1859). — Southern Wyoming to western Texas. — WYOMING: Laramie Hills, Albany Co., July 7, 1894, and Chug Creek, June 29, 1900, *Aven Nelson*, nos. 418 & 7306. COLORADO: Callaway Ranch, Larimer Co., June 23, 1890 (R. Mt. Herb.). NEW MEXICO: 1847, *Fendler*, no. 637.

9. *O. VIRGINENSIS* (Jones) Macbr. Proc. Am. Acad. li. 547 (1916). *Krynitzkia glomerata* (Pursh) Gray, var. *virginensis* Jones, Contrib. W. Bot. xiii. 5 (1910). — UTAH: La Verkin, May 8, 1894, Jones, no. 5195 (R. Mt. Herb.); Diamond Valley, May 16, 1902, Goodding, no. 830; "southern Utah, northern Arizona, etc.," 1877, Palmer; Valley of the Virgin, near St. George, 1874, Parry, no. 173.

10. *O. CELOSIODES* Eastw. Bull. Torr. Club xxx. 240 (1903). *O. sericea* Piper Contrib. U. S. Nat. Herb. xi. 482 (1906), not (Gray) Greene. *Krynitzkia glomerata* (Pursh) Gray, Syn. Fl. ii. pt. 1. 429 (1886) as to Washington specimens. — WASHINGTON east of the Cascade Mts.: Wenatchee, May 28, 1899, Whited, no. 1099; Spokane, May 16, 1896 & May, 1897, Piper, no. 2294; Spokane, June 3 & June 19, 1913, G. W. Turesson (R. Mt. Herb.); Rock Island, Kittitas Co., July 11, 1893, Sandberg & Leiberger, no. 440; Rattlesnake Mts., Yakima Region, May 11, 1901, J. S. Cotton, no. 359; near Columbus, June 10, 1886, Suksdorf; Klickitat, June, 1879, Howell; 1883, Brandegee, no. 996.

Piper may be justified in distinguishing two species here, but if the material from eastern Washington represents a species distinct from that of the Columbia Valley, it cannot bear the name *O. sericea*, which must be used to designate a very different plant of the Rocky Mountains. *O. celosioides* is certainly very closely related to *O. glomerata* but seems to be distinguishable and is geographically removed from that species.

11. *O. GLOMERATA* (Pursh) Greene, Pitt. i. 58 (1887). *Cynoglossum glomeratum* Pursh, Fl. Am. Sept. ii. 729 (1814). *Myosotis glomerata* Nutt. Gen. i. 112 (1818). *Eritrichium glomeratum* (Pursh) DC. Prod. x. 131 (1846). *Krynitzkia glomerata* (Pursh) Gray, Proc. Am. Acad. xx. 279 (1885). — ALBERTA to southern Wyoming, Nebraska and the Dakotas. — SOUTH DAKOTA: Cheyenne River, Aug. 10, 1891, T. A. Williams; Whitewood, July 7, 1892, Rydberg, no. 893 (Rydberg calls this *O. perennis*). NEBRASKA: Fort Robinson, May 21, 1890, J. M. Bates. ALBERTA: Lethbridge, June 8, 1894, John Macoun, no. 5802. MONTANA: Spanish Basin, Gallatin Co., June 23, 1897, Rydberg & Bessey, no. 4883; mouth of Shields River, June 6, 1883, F. Lamson-Scribner, no. 174; near Missoula, June 12, 1901, MacDougal, no. 169. WYOMING: Powder River, Big Horn Co., July 18, 1901, Goodding, no. 287; Uva, July 10, 1894, Aven Nelson, no. 388; Cheyenne River, T. A. Williams. UPPER MISSOURI: Dr. Suckley.

This is the commonest species of its range. It is somewhat variable in habit, size of corolla, and so forth, but the variations seem to represent merely conditions of one species and do not admit of sharp definition. Indeed, it is possible that the scope of this species

should be broadened to include *O. celosioides* and the next, thus more nearly conforming to Gray's interpretation (Syn. Fl. l. c.). Undoubtedly the group is the most complex in the genus and distinctive characters of fruit, so obvious in other groups, here, strangely enough, seem to be mostly lacking.

12. *O. AFFINIS* Greene, Pitt. iii. 110 (1896). *O. pustulata* Blankinship, Mont. Agric. Coll. Sci. Studies, Bot. i. 96 (1905). — Southern Wyoming. — Birds Eye, Fremont Co., June 24 and June 10, 1910, *Aven Nelson*, nos. 9355 & 9411; Fort Steele, Carbon Co., June 16, 1900 & 1907, *Aven Nelson*, nos. 7428 & 9045; Greene River, June 14, 1898, *Aven Nelson*, no. 4715; Rock River, Albany Co., June 18, 1901, & Salt Creek, Natrona Co., July 9, 1901, *Goodding*, nos. 29 & 230.

This species reaches its typical development on the red clay hills of southeastern Wyoming. Dr. Nelson has observed that it blooms about a month earlier than *O. glomerata* which, about Laramie, at least, persists for two years, or possibly longer, and belongs to the grassy foothills. *O. affinis*, however, becomes perennial westward, and this fact makes it very difficult to distinguish in the herbarium some forms from *O. glomerata*. In general, however, the latter is a larger coarser plant restricted to a more northerly and more eastern range. The perennial state of *O. affinis* has been named var. *perennis* A. Nels., Eryth. vii. 67 (1899), i. e. *O. perennis* (A. Nels.) Rydb., Bull. Torr. Club xxxiii. 150 (1906).

13. *O. MACOUNII* Eastw. ex Rydb. Bull. Torr. Club xl. 480 (1913). — SASKATCHEWAN: 1858, *Bourgeau*. Also "Carlton House," presumably by Dr. Richardson.

14. *O. ARGENTEA* Rydb. Bull. Torr. Club xxxi. 637 (1905). — Northwestern Colorado. — Hayden, Routt Co., July 10, 1913, *Osterhout*, no. 4940 (R. Mt. Herb.).

15. *O. SPICULIFERA* Piper, Contrib. U. S. Nat. Herb. xi. 481 (1906). *O. cilio-hirsuta* Nels. & Macbr. Bot. Gaz. lv. 378 (1913). — Eastern Washington to southwestern Idaho. — IDAHO: Minidoka, Lincoln Co., June 23, 1912, *Nelson & Macbride*, no. 1799; Boise-Payette Project, Canyon Co., June 2, 1911, *Macbride*, no. 875. WASHINGTON: Ritzville, Adams Co., June 6, 1893, *Sandberg & Leiberg*, no. 164.

16. *O. SERICEA* (Gray) Greene, Pitt. i. 58 (1887). *Krynitzkia sericea* Gray, Proc. Am. Acad. xx. 279 (1885). *Eritrichium glomeratum* (Pursh) DC., var. *humile* Gray, l. c. x. 61 (1875) and Syn. Fl. ii. pt. 1. 196 (1878), in part. — Montana to Utah. — MONTANA: Bridger's Pass, 1856, *Henry Engelmann*. WYOMING: Mammoth Hot Springs, Yellowstone Park, June 1885, *Tweedy*, no. 816.

UTAH: Wasatch Mts., 1844, *Fremont's Expedition*; Grass Valley, May 17, 1875, *L. F. Ward*; City Creek and Emigration Conyons, near Salt Lake, May 28 & April 22, 1908, *Mrs. Joseph Clemens*; near Salt Lake City, April 24, 1907, *A. O. Garrett*, no. 2060a.

When Dr. Gray proposed this species (l. c.) he used an herbarium name which Nuttall had given to a plant now known to be restricted to the Platte River region of western Nebraska and adjacent Wyoming. Dr. Rydberg would retain the name *O. sericea* for that plant, but Gray's use of the name, as indicated by his description, the range he gives and his annotations in the herbarium, shows that he did not know Nuttall's plant. It is true that he took it to be the same as the species he was describing but since he clearly applied the name to the very different Rocky Mountain plant, of which he had plenty of material, it is rather that species that must be known as *O. sericea*, and the use of the name for the Platte River plant unknown to him would be absurd.

17. *O. echinoides* (Jones), comb. nov. *Eritrichium glomeratum* (Pursh) DC., var. *humile* Gray, Proc. Am. Acad. x. 61 (1875), and Syn. Fl. ii. pt. 1. 196 (1878), in part. *Krynitzkia echinoides* Jones, Proc. Calif. Acad. Sci. ser. 2, v. 709 (1895) in part. *O. humilis* (Gray) Greene, Pitt. iii. 112 (1896). *O. hispida* Nels. & Kenn. Proc. Biol. Soc. Wash. xix. 156 (1906). — NEVADA and adjacent California. — NEVADA: Monitor Valley, Utah, July 1865, *Watson*, no. 853; Carson Valley, Ormsby Co., April 24, 1904, *H. G. True*, no. 865 (R. Mt. Herb.). CALIFORNIA: Castle Peak, Nevada Co., Aug. 3, 1903, *Heller*.

For a discussion on the application of the name *O. humilis* see Proc. Am. Acad. li. 548 (1916).

18. *O. NUBIGENA* Greene, Pitt. iii. 112 (1896). — Eastern California to northern Nevada. — NEVADA: Santa Rosa Mts., July 11, 1898, *Cusick*, no. 2028. CALIFORNIA: Cloud's Rest, Yosemite, 1872, *Gray*.

An effort should be made to secure this species in fruit. The nutlets are not rugose in the usual definite fashion but the surface is nevertheless somewhat wrinkled and this does not seem to be due to drying as the wrinkles persist in fruits softened with hot water. My no. 987 from Silver City, Idaho (in young flower), distributed as *O. flavoculata*?, probably is of this species.

19. *O. CANA* A. Nels. Bot. Gaz. xxxiv. 30 (1902). *Krynitzkia sericea* Gray, Proc. Am. Acad. xx. 280 (1885), as to Nuttall's plant only, not as to description nor specimens so labeled by Gray in herb. — Barren hills, western Nebraska and along the North Platte

River into eastern Wyoming. — Platte River, *Dr. Hayden*. NEBRASKA: Scott's Bluff, May 30, 1858, *H. W. Wagner*. WYOMING: gravelly hilltops, Fort Laramie, Goshen Co., June 29, 1901, *Aven Nelson*, no. 8309.

20. *O. depressa* (Jones), comb. nov. *Krynitzkia depressa* Jones, *Contrib. W. Bot.* xiii. 5 (1910). — Southern Utah and eastern Nevada. — UTAH: among junipers, Modena, Iron Co., June 2, 1902, *Gooding*, no. 996.

21. *O. CAESPITOSA* A. Nels. *Eryth.* vii. 65 (1899). — Southern Wyoming and adjacent Idaho. — Clay foothills, Fort Steele, Carbon Co., June 16, 1900, *Aven Nelson*, no. 7255; shale ridges, Bush Ranch, Sweetwater Co., June 10, 1900, *Aven Nelson*, no. 7078; Bitter Creek, Sweetwater Co., June 16, 1898, *Aven Nelson*, no. 4772. IDAHO: clayey hilltops, Montpelier, May 15, 1910, *Macbride*, no. 2.

22. *O. SHANTZII* Tidestr. *Proc. Biol. Soc. Wash.* xxvi. 122 (1913). — Saline flats about Salt Lake, Utah. — Tooele, near Grantsville, June 7, 1914, *A. O. Garrett*; Grant's Station, Aug. 6, 1912, *Kearney & Shantz*, no. 3098 (TYPE, in the U. S. Nat. Herb.).

Besides the characters given in the original description the following are noteworthy. Plant about 1 dm. high; inflorescence very bristly with nearly white widely spreading setae; nutlets with an evident but not pronounced dorsal ridge, sharp-edged, not at all rugose, 2.5–3.5 mm. long. I wish to thank Mr. Maxon, associate curator of the National Herbarium, for the loan of the type.

✓ 23. *O. dolosa*, spec. nov., perennis caespitosa 7–10 cm. alta; caulibus striatis adpresse strigosis et mediocriter molliter patentisque hirsutis; foliis radicalibus circa 3 cm. longis circa 4 mm. latis strigosis et cum pilis longioribus firmissimis adpressis intermixtis; foliis caulinis similibus sed brevioribus; thyrsis spiciformibus 3–5 cm. longis 1.5–2 cm. latis, floris subfasciculatis; calycibus hispidissimis paullo fulvescentibus lobis linearibus fructiferis circa 6 mm. longis; corolla 5 mm. longa, tubo calycem non superante; nuculis ovatis 3 mm. longis subcarinatis dense muriculatis sulco infra medium aperto. — UTAH: college bench, Logan, Cache Co., June 4, 1909, *Charles Piper Smith*, no. 1605 (TYPE, R. Mt. Herb.). IDAHO: Benchland, Pocatello, May 17, 1909, *J. W. Slaughter*, no. 7 (R. Mt. Herb.); Soda Springs, Bannock Co., June 22, 1892, *A. Isabel Mulford*.

Until the fruit is examined this species is very deceiving as in habit and pubescence it resembles *O. sericea* to which the type was referred. This resemblance is purely superficial, however, the plant being related to *O. nana*. The differently, and more densely, pubescent leaves, the scarcely at all tawny pubescence of the inflores-

cence and the broader nutlets with shorter open groove are salient features that distinguish *O. dolosa* from that species. It seems to be confined to northern Utah and adjacent southeastern Idaho.

24. *O. NANA* Eastw. Bull. Torr. Club xxx. 213 (1903). — Western Colorado. — COLORADO: Grand Junction, May 17, 1892, *Alice Eastwood*.

25. *O. commixta*, spec. nov., perennis cristata 1.5–2 dm. alta; caulibus molliter cum pilis patentibus hirsutis etiam adpresse strigillosis floriferis fere ad basem; foliis radicalibus spathulatis obtusis 4–5 cm. longis 5–8 mm. latis subviridibus adpresse strigillosis et paullo hispidis cum pilis plus minusve patentibus; foliis caulinis paucis oblanceolatis; thyrsis 1–1.5 dm. longis, circa 2 cm. crassis valde setoso-hispidis aliquid fulvescentibus; pedicellis fructiferis circa 5 mm. longis et calycis laciniis 8 mm. longis linearibus vel lineari-lanceolatis; corolla alba 5 mm. longa, tubo 3 mm. longo calycem non superante; nuculis nitidulis ovatis circa 3 mm. longis dorso mediocriter dense muriculatis omnino non rugosis, angulis acute marginatis ad apicem, faciebus ventralibus fere laevibus, sulco angusto fere ad apicem aperto. — UTAH: sandy slides, Juab, Juab Co., June 9, 1902, *Goodding*, no. 1074 (TYPE, Gray Herb., duplicate R. Mt. Herb.). NEVADA: stony benches, Jarbidge, Elko Co., July 6, 1912, *Nelson & Macbride*, no. 1960, & stony slopes, July 8, no. 1980.

This very distinct species was distributed as *O. Eastwoodae* (which is *O. flavoculata*). It is not, however, a member of that group of species, as it has the nutlets and short corolla of *O. nana* and related species. It forms, with *O. propria*, a distinct subgroup in this section of tufted perennials all characterized by muriculate or tuberculate, but not at all rugose nutlets. The long pedicels and relatively long calyx resemble those of *O. humilis* (Gray) Greene and this may be that species in part as interpreted by Greene, Pitt. iii. 112 (1896). But the name *O. humilis* must be used for a plant of Nevada and adjacent California (see Proc. Am. Acad. li. 548 (1916)), the nutlets of which are more or less rugose and only indistinctly muriculate.

26. *O. PROPRIA* Nels. & Macbr. Bot. Gaz. lxi (1916). — OREGON: chalky hillside, Malheur Valley, near Harper Ranch, June 8, 1896, *Leiberg*, no. 2223; Vale, Malheur Co., May 14, 1896, *Leiberg*, no. 2049.

27. *O. SUFFRUTICOSA* (Torr.) Greene, Pitt. i. 57 (1887). *O. disticha* Eastw. Bull. Torr. Club xxx. 268 (1903). *Myosotis suffruticosa* Torr. Ann. Lyc. N. Y. ii. 225 (1827). *Eritrichium Jamesii* Torr. in Marcy, Expl. Red. Riv. 262 (1854). *Krynitzkia Jamesii*

(Torr.) Gray, Proc. Am. Acad. xx. 278 (1885), in part. — South Dakota and Wyoming to western Texas, Arizona and Chihuahua, Mexico. — KANSAS: Hamilton Co., Aug. 3, 1895, *Hitchcock*, no. 347. OKLAHOMA: Creek Valley, near Knowles, Beaver Co., May 5, 1913, *G. W. Stevens*, no. 335. WYOMING: Powder River, June 25, 1910, *Aven Nelson*, no. 9379; Platte River at Ferris, July 19, 1898, *Elias Nelson*, no. 4906; Casper, Natrona Co., July 6, 1901, *Goodding*, no. 208. COLORADO: North Denver, Aug. 12, 1910, *Alice Eastwood*. UTAH: Barton Range, San Juan Co., July 13, 1895, *Alice Eastwood*. NEW MEXICO: 1847, *Fendler*, no. 631; 1851, *Wright*; Nara Visa, Aug. 18, 1910, *Geo. L. Fisher*, no. 64. ARIZONA: Cosnino, Aug. 9, 1884, *Jones*, no. 4042 (R. Mt. Herb.). MEXICO: between Casas Grandes & Sabinal, Chihuahua, Sept. 4-5, 1899, *E. W. Nelson*, no. 6350 (R. Mt. Herb.).

27a. var. ABORTIVA (Greene) Macbr. Proc. Am. Acad. li. 547 (1916). *O. abortiva* Greene, Pitt. iii. 114 (1896). *Krynitzkia multicaulis* Torr., var. *abortiva* (Greene) Jones, Contrib. W. Bot. xiii. 5 (1910). — Southern California and southeastern Nevada. — NEVADA: Lee Canyon, Charleston Mts., Clark Co., July 28, 1913, *Heller*, no. 11,016. CALIFORNIA: Bear Valley, San Bernardino Mts., Aug., 1882, *S. B. & W. F. Parish*, no. 1480; and June, 1895, *S. B. Parish*, no. 3694.

28. *O. MULTICAULIS* (Torr.) Greene, Pitt. iii. 114 (1896). *Eritrichium multicaule* Torr. in Marcy, Expl. Red Riv. 262 (1854). *Krynitzkia Jamesii* (Torr.) Gray, Proc. Am. Acad. xx. 278 (1885), in part. — Colorado to Arizona and western Texas. — TEXAS: Upper Concho, April, *J. Reverchon*; Big Spring, Howard Co., June 11, 1900, *Eggert*. COLORADO: Arboles, June, 1899, *C. F. Baker*, no. 563; Gunnison, July 17, 1901, *C. F. Baker*, no. 455. NEW MEXICO: 1847, *Fendler*, no. 636; 1852, *Wright*, no. 1568; Mangas Springs, Grant Co., May 17, 1903, *Metcalf*, no. 70. ARIZONA: Outlaw Canyon, Chiracahua Mts., Aug. 6, 1907, *Goodding*, no. 2349; Metcalfe, Oct. 1, 1900, *Davidson*, no. 608.

28a. var. CINEREA (Greene) Macbr. Proc. Am. Acad. li. 546 (1916). *O. cinerea* Greene, Pitt. iii. 113 (1896). *O. Lemmoni* Eastw. Bull. Torr. Club xxx. 239 (1903). — Colorado, New Mexico, Arizona and to Chihuahua, Mexico. — COLORADO: plains, Pueblo, 1873, *Greene*. NEW MEXICO: Mogollon Mts., Socorro Co., Aug. 9, 1903, *Metcalf*, no. 431. ARIZONA: 1884, *Lemmon*, no. 3303; vicinity of Flagstaff, June 4, 1898, *MacDougal*, no. 49 & 204, and Aug. 16, 1884, *Jones*, no. 4007 (R. Mt. Herb.); rim of Grand Canyon at Grand Canyon, June, 1915, *Macbride & Payson*, no. 950. MEXICO: Casas Grandes, Chihuahua, May 13, 1899, *Goldman*, no. 407 (Nat. Herb.).

Miss Eastwood bases her species (l. c.) on the subrotate corolla with the statement that the corollas of all other known species

“are distinctly salverform.” However, the corollas of our material collected by Lemmon are no more nearly rotate than those of many specimens of other species in this group. Otherwise *O. Lemmoni* seems to be one of many states of the var. *cinerea* transitional to the species.

28b. var. *laxa*, var. nov., foliis linearibus, saepius 10 cm. longis; racemis elongatis laxifloris. — MEXICO: sand hills near Paso del Norte, Chihuahua, Sept. 20, 1886, *C. G. Pringle*, no. 776 (TYPE, Gray Herb.).

The printed label bears this statement, — “Narrower-leaved form” — A. Gray. It is, probably, only a sand-hill condition, but it may be considered as an ecological variety worthy designation on account of its very different aspect, caused not only by the long narrow leaves but also by the lax-flowered racemes.

29. *O. PUSTULOSA* Rydb. Bull. Torr. Club xl. 480 (1913). — Southeastern Utah. — Hammond Canyon, Elk Mts., Aug. 10, 1911, *Rydberg & Garrett*, no. 9569 (R. Mt. Herb.).

This species is unique because of its glabrous stems and lower leaf-surfaces.

30. *O. PALMERI* (Gray) Greene, Pitt. i. 57 (1887). *Krynitzkia Palmeri* Gray, Proc. Am. Acad. xx. 277 (1885). — MEXICO: Sierra Madre, 40 miles south of Saltillo, Coahuila, March, 1880, *Palmer*.

31. *O. PARADOXA* A. Nels. Bot. Gaz. lvi. 69 (1913). *O. gypsophila* Payson, Bot. Gaz. lx. 380 (1915). — COLORADO: dry “gyp” hills, Paradox, Montrose Co., June 17, 1912, *Ernest P. Walker*, no. 91; gypsum hill, Paradox Valley, Montrose Co., June 18, 1914, *Edwin Payson*, no. 458.

The description calls for muriculate nutlets but the muriculations are usually more or less confluent into transverse rugae. Payson writes me that in his judgment these plants are the same species, the “yellow corolla-tube” described for *O. paradoxa* being merely a condition of drying since both collections display the same coloration, although *O. gypsophila* was observed to be “pure white in the field.” Material of *O. paradoxa* was not at hand at the time *O. gypsophila* was described.

32. *O. OBLATA* (Jones) Macbr. Proc. Am. Acad. li. 548 (1916). *Krynitzkia oblata* Jones, Contrib. W. Bot. xiii. 4 (1910). — Arizona to southern New Mexico and adjacent Texas. — Add to the specimens already cited by me (l. c.). — NEW MEXICO: Organ Mountains, Dona Ana Co., April 4, 1903, *Wootton* (R. Mt. Herb.). The collection by Jones from Peach Springs, Arizona, and cited by him

(l. c.) as of this species, is, in some part, *O. multicaulis* (Torr.) Greene, var. *cinera* (Greene) Macbr.

33. ✓ *O. Paysonii*, spec. nov., ut videtur perennis cristata; caulibus circa 2 dm. altis strigosis et plus minusve hispidis imprimis ad apicem; foliis radicalibus spathulatis acutis vel subacutis circa 5 cm. longis 7 mm. latis canescenti-strigillosis et cum pilis nonnullis longioribus firmissculis adpressis intermixtis; foliis caulinis paucis sursum gradatim reductis; thyrsis congestis terminalibus vel floribus nonnullis fasciculato-axillaribus; calyce 5-partito laciniis dense albo-hispidis linearibus 7–10 mm. longis; corolla alba 12–15 mm. longa tubo calycem superante circa 3 mm.; fructu plus minusve depresso-globo angulis lateralibus conniventibus; nuculis nitidulis fere disciformibus et angulis acutissime marginatis, dorso convexiusculis parce sed valde albo-tuberculatis omnino non rugosis, caeterum laevibus, faciebus ventralibus subcarinatis. — NEW MEXICO: Limestone hills, Berendo Creek, Sierra Co., May 12, 1905, *Metcalf*, no. 1576 (TYPE, Gray Herb.).

I have seen no *Oreocarya* with nutlets that approach so nearly a disk in shape. The keeled ventral face of the nutlets and the subglobose fruit suggest a relationship to *O. oblata*, but the nutlets touch at the edges and the aspect of the plant is rather that of *O. Wetherillii*. I have named this attractive plant in recognition of the special trips Mr. Edwin Payson made for me to the type-localities of rare *Oreocaryas*. His collections have been valuable, not only in this work but in that on related genera, so that it seems peculiarly fitting to connect his name with this group.

34. *O. FULVOCANESCENS* (Gray) Greene, Pitt. i. 58 (1887). *Eritrichium fulvocanescens* Gray, Proc. Am. Acad. x. 61 (1875). *Krynitzkia fulvocanescens* Gray, l. c. xx. 280 (1885). *K. echinoides* Jones, Proc. Calif. Acad. Sci. ser. 2, v. 709 (1895), in part. For a discussion on the proper application of the name *fulvocanescens* see Proc. Am. Acad. li. 547–548 (1916). — Southwestern Colorado, adjacent Utah and northern New Mexico. — COLORADO: common on “gyp” hills, Paradox, Montrose Co., June 13, 1912, *Ernest P. Walker*, no. 85; dry mesa, Naturita, Montrose Co., May 4, 1914, *Edwin Payson*, no. 271. NEW MEXICO: near Santa Fe, 1847, *Fendler*, no. 632; hills at Santa Fe, May 13, 1897, *A. A. & E. Gertrude Heller*, no. 3517; Aztec, San Juan Co., Aug. 1899, *C. F. Baker*, no. 561. UTAH: Circo, May 2, 1890, *Jones* (R. Mt. Herb.).

35. *O. NITIDA* Greene, Pl. Baker. iii. 21 (1901). — Western Colorado. — Grand Junction, May 17, 1892, *Alice Eastwood*; rocky foothill, Paradox, Montrose Co., June 21, 1912, *Ernest P. Walker*, no. 156; Deer Run, Mesa Co., June 11, 1901, *C. F. Baker*, no. 95. — Possibly this plant is only a large variety of *O. fulvocanescens*.

36. *O. HORRIDULA* Greene, Pl. Baker. iii. 20 (1901). — Western Colorado. — Grand Junction, Mesa Co., June 14, 1892, *Alice Eastwood*.

37. *O. LONGIFLORA* A. Nels. Eryth. vii. 67 (1899). — Western Colorado, Palisades, Mesa Co., May 14, 1898, *C. S. Crandall*; Delta, Delta Co., May 20, 1911, *Osterhout*, no. 4497; Montrose, Montrose Co., May 23, 1912, *Edwin Payson*, no. 35.

38. *O. WETHERILLII* Eastw. Bull. Torr. Club xxx. 242 (1903). *Krynitzkia glomerata* (Pursh) Gray, var. *acuta* Jones, Zoe ii. 250 (1891). — UTAH: Cisco, Grand Co., June 2, 1890, *Jones*.

39. *O. TENUIS* Eastw. Bull. Torr. Club xxx. 244 (1903). — UTAH: Court House Wash, near Moab, June 25, 1892, *Alice Eastwood*.

40. *O. SHOCKLEYI* Eastw. Bull. Torr. Club xxx. 245 (1903). — Southwestern Nevada. — White Mts., near Sunland, Mineral Co., June 25, 1912, *Heller*, no. 10508.

41. *O. EULOPHUS* Rydb. Bull. Torr. Club xxxi. 637 (1905). *Krynitzkia mensana* Jones, Contrib. W. Bot. xiii. 4 (1910). — Central Colorado to southern Utah. — COLORADO: McCoys, Eagle Co., June 14, 1903, *Osterhout*, no. 2750 (R. Mt. Herb.); dry mesa, Naturita, May 22, 1914, *Edwin Payson*, no. 337; dry hillsides beneath junipers, no. 670 (R. Mt. Herb.). UTAH: Glenwood, Sevier Co., May 22, 1875, *L. F. Ward*.

42. *O. FLAVOCULATA* A. Nels. Eryth. vii. 66 (1899). *O. flavoculata* A. Nels. var. *spathulata* A. Nels. l. c. 67; *O. cristata* Eastw. Bull. Torr. Club xxx. 244 (1903); *O. Eastwoodae* Nels. & Kenn. Muhl. iii. 141 (1908), as to description and type, not as to Utah specimens. — Southern Wyoming to western Colorado and eastern Nevada. — WYOMING: Cooper Creek, Albany Co., June 6, 1898, *Elias Nelson*, no. 4337; Evanston, Uinta Co., June 4, 1898, *Aven Nelson*, no. 4513; Steamboat Mt., Sweetwater Co., June 9, 1900, *Aven Nelson*, no. 7090; Kemmerer, Uinta Co., June 1, 1907, *Aven Nelson*, no. 9028; Point of Rocks, Sweetwater Co., June 17, 1901, *Merrill & Wilcox*, no. 457; Fort Steele, Carbon Co., June 18, 1898, *Aven Nelson*, no. 4815. COLORADO: dry hillside, Naturita, April 22, 1914, *Edwin Payson*, no. 246. UTAH: Brush Creek Canyon, Uinta Mts., July 7, 1912, *Goodding*, no. 1282. NEVADA: Mormon Mts., Lincoln Co., July, 1906, *Kennedy & Goodding*, no. 146 (R. Mt. Herb.).

This, and the three preceding plants form a group of closely related species, scarcely distinguishable except by fruit-characters. The nutlets however are peculiar for each species. This should emphasize to collectors the desirability or even necessity of securing *Oreocaryas* in fruiting condition, and should serve as a warning not to "pass up" plants in the field because they "look the same" as some collected the day before.

43. *O. FLAVA* A. Nels. Bull. Torr. Club. xxv. 202 (1898). — Southern Wyoming. — Dry sandy soil, Leucite Hills, Sweetwater Co., June 17, 1901, *Merrill & Wilcox*, no. 497, & Washington's Ranch, June 30, no. 726; Cooper Creek, June 18, 1892, *Aven Nelson*, no. 22; dry shale and sandy ridges, Steamboat Mt., Sweetwater Co., June 9, 1900, *Aven Nelson*, no. 7067; sandy slopes, Alcova, Natrona Co., July 1, 1901, *Goodding*, no. 164.

44. *O. CONFERTIFLORA* Greene, Pitt. iii. 112 (1896). *O. leucophaea* (Dougl.) Greene, var. *confertiflora* (Greene) Parish, Eryth. vii. 95 (1899). *O. lutescens* Greene, Pitt. iv. 93 (1899). *O. lutea* Greene, Muhl. ii. 230 (1906), name only. *O. alata* (Jones) A. Nels. in Coulter & Nelson Man. R. Mt. Bot. 417 (1909). *Krynitzkia leucophaea* (Dougl.) Gray, var. *alata* Jones, Proc. Calif. Acad. ser. 2, v. 710 (1895). — Western Colorado to southeastern California. — COLORADO: dry hills among junipers, June 19, 1915, Grand Junction, *Macbride & Payson*, no. 705; Mesa Co., 1893, *H. C. Long*; Dolores River near Mesa Creek, June 11, 1914, *Edwin Payson*, no. 405. UTAH: Diamond Valley, May 16, 1902, *Goodding*, no. 814; Beaver Dam Mts., May 1874, *Parry*, no. 166. NEVADA: The Muddy Range, Clark Co., April 10, 1905, *Goodding*, no. 2221. NEW MEXICO: *Palmer*, no. 63; Aztec, April, 1899, *C. F. Baker*, no. 562. CALIFORNIA: Silver Canyon, White Mts., Inyo Co., May 9, 1906, *Heller*, no. 8211; Erskin Creek, 1897, *Purpus*, no. 5323; borders of Mojave Desert, May, 1882, *S. B. & W. F. Parish*, no. 1316.

Parish (l. c.) seems to have overlooked the fact that, in addition to the very good fruiting differences between *O. confertiflora* of the Southwest and *O. leucophaea* of the Northwest, the flowers of the latter are pure white. The ranges of these two species do not meet.

45. *O. LEUCOPHAEA* (Dougl.) Greene, Pitt. i. 58 (1887). *Myosotis leucophaea* Dougl. ex Lehm. Pug. ii. 22 (1830). *Eritrichium leucophaeum* (Dougl.) A. DC. Prod. x. 129 (1846). *Krynitzkia leucophaea* (Dougl.) Gray, Proc. Am. Acad. xx. 280 (1885). — Northern Oregon and Washington east of the Cascade Mts. to British Columbia. — WASHINGTON: arid barrens of the Columbia, *Douglas*; Pasco, May 29, 1899, *Piper*, no. 2987; Egbert Springs, July 4, 1893, *Sandberg & Leiberg*, no. 373; Walla Walla region, June, 1883, *T. S. Brandegee*, no. 997; Morgan's Ferry, Yakima River, June 8, 1884, *Suksdorf*, no. 407; Wallula, Walla Walla Co., May 23, 1903, *Cotton*, no. 1027.