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REPORT

OF THE

GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL

MADE

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CHIEF OF ENGINEERS,

BY

CLARENCE KING,

U. S. GEOLOGIST.



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UNITED STATES GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL.
CLARENCE KING, GEOLOGIST-IN-CHARGE.

B O T A N Y.

BY

SERENO WATSON,

AIDED BY

PROF. DANIEL C. EATON, AND OTHERS.

SUBMITTED TO THE CHIEF OF ENGINEERS AND PUBLISHED BY ORDER OF THE SECRETARY OF WAR
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ILLUSTRATED BY A MAP AND FORTY PLATES.

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BORRAGINACEÆ.

LITHOSPERMUM LONGIFLORUM, Spreng. From Southern Texas to Western Illinois, Wisconsin, and the Saskatchewan, and westward to Sonora, New Mexico, Colorado and the Rocky Mountains. Only on the foot-hills near Salt Lake City, rare; 5,000 feet altitude; May. (838.)

LITHOSPERMUM PILOSUM, Nutt. *Pl. Wyeth., Jour. Acad. Phil.*, 7. 43. (*L. ruderate*, Dougl. *Hook. Fl. Bor. Amer.*, 2. 89.) Stems 1–1½° high, herbaceous, strict, numerous from a perennial root, simple or branched above, hirsute, sulcate; leaves 1–3' long, numerous, sessile, linear or linear-lanceolate, acuminate but mostly pointless, strigose and somewhat hispid; spikes very leafy, short and terminal; flowers nearly sessile; calyx hirsute, 5-parted, lobes unequal, linear; corolla dull greenish-yellow, 3–4" long, villous, the broad cylindrical tube equaling the calyx, the lobes rounded ovate; throat naked but with somewhat prominent folds; nutlets large, 2" in length.—A well-marked species, but including *L. Torreyi*, Nutt., *l. c.*, as represented by an original specimen in Herb. Torrey. Washington Territory, (Douglas, Wyeth.) Frequent in the lower cañons, from the Washoe Mountains, Nevada, to the Wahsatch; 5–6,500 feet altitude; May–July. (839.)

295 Parry and 441 Hall & Harbour, (referred to this species,) are the same as 627 Fender, (*L. multiflorum*, Torr., Ms. in Herb.,) 1562 Wright, at least in part, and 442 Frémont, 1843, having slender branched stems 1–1½° high, with broadly linear subacute leaves, the yellow flowers nearly sessile in terminal elongated racemes, 6" long, the tube much exceeding the linear sepals; nutlets 1½" long, smooth and shining, (dull and scabrous in one of Wright's specimens.) This seems to be the *L. incisum*, Torr., of James's collection. *L. decumbens*, Torr., of that collection, is *L. hirtum*, Lehm.

MERTENSIA OBLONGIFOLIA, DC. *Gray's Revis. Mert., Sill. Jour.*, (n. s.,) 34. 340. Stems low (4–8" high,) smooth, suberect; leaves oblong or spatulate-lanceolate, for the most part obtuse; calyx 5-parted or deeply 5-cleft, the segments lanceolate or linear, acute, ciliate or nearly smooth, about half the length of the corolla-tube, which is glabrous within and 2–3-times longer than the 5-cleft limb; filaments dilated, as broad as the anthers or broader, but less in length.—Leaves nearly glabrous, often somewhat glaucous, more or less scabrous upon the margin with short stiff curved hairs, and occasionally roughish with similar hairs upon the upper surface; panicle short and crowded; flowers sometimes white. An early flowering species, growing on

moist slopes. In the mountains from Idaho to Colorado and Utah. Frequent in the Washoe, Trinity and East and West Humboldt Mountains, Nevada; 6-9,000 feet altitude; April-July. (840.)

Var. Somewhat taller, 10-12' high, with the flowers more loosely paniced; but for the obtuse leaves, approaching the smaller forms of *M. Sibirica*. East Humboldt Mountains, Nevada; 7,000 feet altitude; July. (841.)

MERTENSIA SIBIRICA, Don. *Gray, l. c.*, 340. Usually tall, 1-5° high, glaucescent, glabrous or subpubescent; cauline leaves ovate or ovate-lanceolate or often oblong-lanceolate, acute or acuminate; calyx 5-parted, the lobes oblong or oblong-linear, obtuse, ciliate, 2-4-times shorter than the tube of the corolla, which is sparingly pilose or almost glabrous within; limb of the corolla 5-cleft, more than half longer than the tube; filaments dilated, shorter than the anthers.—Mostly confined to the banks of mountain-streams, and quite variable; the taller specimens have often the leaves 6' or more in length and 2-3' broad, more or less petioled; in the lower ones they are more usually oblong-lanceolate and mostly sessile; panicles loose; pubescence as in the last; corolla 4-6" in length. Rocky Mountains of Colorado and Wyoming, and probably northward. In the East and West Humboldt Mountains, Nevada, and in the Wahsatch and Uintas; 6-9,000 feet altitude; June-August. (842.)

MERTENSIA PANICULATA, Don. Identical in foliage and habit with the last, but distinguished by its general roughness (varying in degree,) and by its lanceolate acute calyx-segments.—The extreme forms of the two species are sufficiently distinct, but numerous intermediate states can be referred as well to one as the other. All the specimens of the collection with elongated and acute calyx-lobes are placed here, whatever the degree of pubescence. Shore of Lake Superior, Rocky Mountains of Colorado and Wyoming, and northward; Behring Strait. Battle and Toyabe Mountains, Nevada, and in the Wahsatch and Uintas; 5-7,000 feet altitude; May-August. (843.)

Var. *NIVALIS*. A reduced alpine form, 3-6' high; hirsutely pubescent throughout, especially so upon the oblong-lanceolate calyx-lobes; leaves oblong, acute, the lowest petioled, the uppermost ovate and clasping. Uinta Mountains; 10-12,000 feet altitude; August. (844.)

MERTENSIA BREVISTYLA. Low (4-10') pubescent with short appressed rigid hairs, the lower surface of the leaves excepted; leaves oblong or oblong-lanceolate or oblanceolate, very obtuse; flowers in a loose panicle; calyx

deeply 5-cleft or 5-parted, very hirsute, lobes oblong- or ovate-lanceolate, usually acute; corolla-tube short, equaling or but little exceeding the calyx, and rarely as long as the deep-blue limb; anthers inserted near the base of the tube, and included within it; style very short.—This was collected by Frémont in 1844 on Spanish Fork in the Wahsatch; by Stansbury, also in the Wahsatch; by Burke in Southern Idaho, and by Hall & Harbour (443) in Colorado. It is a pretty species, of peculiar habit, growing on rather dry slopes; placed by Dr. Gray under *M. alpina*, but the differences are so constant and obvious that it seems to deserve higher rank. In the Wahsatch and Uintas; 5–7,000 feet altitude; May, July. PLATE XXIII. Fig. 1. Flowering stem; natural size. Fig. 2. Flower, laid open; enlarged six diameters. (845.)

AMSINCKIA¹ LYCOPSOIDES, Lehm. *DC. Prodr.* 10. 117. Very hirsute, erect, 2'–3° high, simple or branched; leaves ovate-, oblong- or linear-lanceolate, acute or obtuse, becoming white-papillose-scabrous with age; corolla 2–5'' in length, the deep-orange limb rather narrow, the throat pilose or glabrous, and the filaments variously inserted upon the tube.—The numerous specimens are so exceedingly variable in habit, foliage, position of the stamens and other characteristics of the flower, that it becomes unavoidable to include in this species both *A. Mexicana*, Mart. & Gal., and *A. intermedia*, and perhaps also *A. spectabilis*, Fisch. & Mey., and the Chilian species *A. angustifolia*, Lehm., as has already been suggested by both Dr. Torrey and Dr. Gray. From Washington Territory to Sonora, Arizona and Utah. Frequent on dry slopes from the Washoe Mountains to the Wahsatch; 4–6,500 feet altitude; April–July. (846.)

PIPTOCALYX² CIRCUMSCISSUS, Torr. (*Lithospermum*, H. & A. *DC. Prodr.* 10. 84.) Very hispid with white rigid hairs; stems numerous, branched, ascending, 1–2' high; leaves 2–4'' long; the deciduous portion of the 5-angled calyx about 1'' long; corolla very small, white, scarcely exceeding the calyx;

¹AMSINCKIA, LEHM. Calyx 5-parted. Corolla salver-form, plicate in æstivation but without scales, the tube narrow and usually much longer than the lobes. Stamens with very short filiform filaments. Style elongated, included. Nutlets 4, narrow-ovoid, more or less triangular, attached to the style to above the middle. Seeds exalbuminous, the radicle superior, and the obovate cotyledons 2-parted.—Annual, hispid, with alternate entire leaves and racemose spicate ebracteate yellow flowers.

²PIPTOCALYX, TORR. Calyx 5-cleft, circumscissile above the base, deciduous. Corolla salver-form, the throat with 5 folds or gibbæ but without scales. Stamens included. Nutlets 4, triangular-ovate, attenuated above, glabrous and shining, attached to the axis the whole length.—Annual, dwarf, with linear alternate leaves, the minute flowers in terminal leafy scorpioid racemes.

stamens with very short filaments, inserted upon the middle of the tube; nutlets very nearly smooth upon the back.—Beautifully figured in the unpublished plates of the Wilkes's Exploring Expedition. Collected by Tolmie and Burke in Southern Idaho and by Stansbury in Southwestern Wyoming. It is also 376 Frémont, from the Mohave Valley, Southern California, and 162 Anderson and 332 and 336 Torrey, from Western Nevada. On the Pah-Ute Mountains, Nevada, and on the shore of Antelope Island, Utah; June. (847.)

Var. Stems 2–5, erect and simple, $\frac{1}{2}$ –2' high. Probably only an early form of the species. Found near Carson City, Nevada; April. (848.)

*ERITRICHIMUM*¹ *VILLOSUM*, DC. *Prodr.* 10. 126. Stems 3–6' high, loosely branched at base and cæspitose, rooting below, the flowering shoots elongated, leafy, erect, pubescent; leaves elliptic-oblong, acute, sparingly villous with long silky hairs, racemes in pairs, erect, several-flowered, bracteate at base; nutlets truncate upon the back, which is surrounded by a margin of inflexed ciliate-serrate teeth. Var. *ARETIOIDES*, Hook. Dwarf, 3''–2' high, densely cæspitose and covered with soft silky hairs; lower leaves crowded, cauline few; tube of corolla scarcely exceeding the calyx, limb bright blue, 1–3'' in diameter; nutlets nearly 1'' in length, concave upon the back, the toothed margin conspicuous.—Probably biennial. Rocky Mountains of Colorado. Uinta Mountains, Utah; 12,000 feet altitude; August; the flowers considerably smaller than is usual in the Colorado specimens. (849.)

ERITRICHIMUM *ANGUSTIFOLIUM*, Torr. *Pac. R. R. Surv.* 5. 363. (*Williamson's Rep.*) Annual, very hispid with mostly spreading hairs; stem 3'–1° high, suberect, branched; leaves linear or narrowly oblong, obtuse; racemes terminating the branches, usually bifurcated and at length elongated, frequently short and subcapitate; flowers sessile, bractless; calyx (2–3'' long in fruit) very hispid with yellowish hairs, the lobes narrowly linear; corolla white, $\frac{1}{2}$ –1'' long, the stamens inserted near the base on very short filaments; nutlets (1–4) oblong, acute, nearly 1'' long, convex and very minutely granulated upon the back, attached to the style to the middle by a ventral groove.—

¹*ERITRICHIMUM*, SCHRAD. Calyx 5-parted. Corolla salverform, the throat closed by small obtuse scales. Stamens and style included. Nutlets 4, attached laterally, (usually) near the base, the surface of insertion very narrow, imperforate at base, flat (or convex) anteriorly, the angles smooth or rarely crenate.—Mostly annual, with entire and commonly alternate leaves, the usually very small blue or white flowers in lateral or axillary spicate racemes. Differing from *Myosotis* in the quincuncial aestivation of the corolla and the more or less lateral insertion of the nutlets, which are also usually rugose or granulate upon the back, and from *Echinosperrum* in the attachment of the nutlets (in most cases) not extending above the middle of the style, the nutlets not dilated below, prickles rare and not barbed, and the attachment of the seed ventral and not at the apex. DECANDOLLE, *Prodromus*.

Southern California, Arizona and Sonora, probably as far northward as Oregon. Frequent on the foot-hills and in the dry valleys from the Trinity Mountains to the Wahsatch; 4,300–5,000 feet altitude; May, June. (850.)

ERITRICHIMUM CALIFORNICUM, DC. *DC. Prodr.* 10. 130. Root slender, annual; stems weak, simple or usually diffusely branched, ascending, decumbent or prostrate; pubescence appressed, strigose; leaves linear or narrowly oblong, acute or obtuse, ciliate, occasionally opposite and subsheathing; racemes leafy at base, becoming much elongated; flowers sessile or upon very short pedicels; calyx 5-parted, lobes lanceolate or linear, about equaling the corolla, enlarging and spreading and subfoliaceous in fruit; corolla white, with 5 yellow 2-parted scales on the throat, the lobes of the limb very obtuse; nutlets triangular, rugose.—A quite variable species, growing in muddy and usually subalkaline localities; stems $\frac{1}{2}$ –1° in length, the calyx ordinarily very hispid with yellowish hairs. *E. Chorisianum* and *E. Scouleri*, with longer pedicelled flowers, are considered a variety. *E. connatifolium*, Kell., is doubtless the same. From Washington Territory to Southern California, Arizona, (Ives,) Colorado, and Northern Dakota, (Nicolet.) Frequent from the Wahshoe Mountains to the Wahsatch, both in the valleys and in the high cañons; 4–9,500 feet altitude; April–September. (851.)

ERITRICHIMUM GLOMERATUM, DC. *DC. Prodr.* 10. 131. “Perennial” or at least biennial; stem simple, erect, 6–18' high, usually solitary and rather stout and rigid, very hirsute with spreading hairs, leafy especially at base; leaves 2–4' long, alternate, oblong- or linear-spatulate or oblanceolate, subacute, hirsute and usually more or less appressed-pubescent; spikelets 5–7-flowered, lateral, axillary, clustered, more or less peduncled and usually bifurcated or the upper ones sessile, often forming a narrow elongated spike-like raceme, the subtending leaves often elongated-linear and conspicuous, as are also the bractlets; flowers 2–4" long, nearly sessile; calyx very hispid, 5-parted, the linear-lanceolate lobes equaling the corolla-tube, becoming much enlarged in fruit; limb of the white corolla broad and expanded, the truncated scales of the throat conspicuous; nutlets large, (1½" long,) ovate and narrowed above but obtuse, more or less rugose and tuberculated, especially upon the back, which is surrounded by an acute slightly raised margin, sulcate ventrally and attached to the elongated style to the middle.—A stout coarse species, well-marked though somewhat variable. From Arizona (Ives) and New Mexico northward to the Saskatchewan. Not seen in Nevada, and

found only in the Uintas and in Bear River Valley, Utah; 6-7,000 feet altitude; July. PLATE XXIII. Fig. 6. A spikelet; natural size. Fig. 8. Calyx, with matured fruit; enlarged two diameters. (852.)

Var. (?) *FULVOCANESCENS*. Low, subcæspitose and certainly perennial; stems several, 1-8' high, erect or ascending, hirsute; leaves $\frac{1}{2}$ -2' long, obovate or oblong-spatulate with very narrow petioles, obtuse, tomentose with a soft silky pubescence and hirsute; raceme short and terminal or compound, $\frac{1}{2}$ -3' long, the clusters few-several-flowered, densely hirsute with yellow or brownish hairs, the flowers distinctly pedicelled and frequently subumbeled, with inconspicuous narrow-lanceolate or more frequently ovate and obtuse or sometimes obsolete bractlets; flowers turning brown in drying and with the fruit nearly as in the last, but the calyx-lobes rather narrower and less enlarged in fruit.—Very probably a distinct species, but it seems sometimes to approach small forms of the last too nearly. It is 632 Fendler, from New Mexico, (*E. fulvocanescens*, Gray, Ms. in Herb.,) and 467, 522 and 577 Frémont, (1844,) probably collected in Utah. Frequent in the mountains through Nevada, from the base to nearly the highest peaks, and also found in the Wahsatch; 5-11,000 feet altitude; May-September. PLATE XXIII. Fig. 7. A spikelet; natural size. (853.)

ERITRICHIUM KINGII. Annual, hispid with spreading hairs, erect, branched, 4-8' high; leaves broadly spatulate, obtuse, alternate, the upper oblong or ovate, sessile and clasping; flowers in terminal somewhat bifurcate racemes, very shortly pedicelled, the lowermost only bracted; calyx hirsute with yellow hairs, 5-parted, the lobes oblong, obtuse, equaling the corolla-tube; corolla white, the limb broad (3-4") and expanded, the throat with conspicuous obtuse scales; nutlets $1\frac{1}{2}$ " long, ovate, obtuse, rugosely verrucose, attached to the very short style above the base, not at all margined upon the back but the edge rounded.—Allied to the preceding, but very distinct. In Truekee Pass and in the Trinity Mountains, Nevada; 4,500-6,000 feet altitude; May. PLATE XXIII. Fig. 3. A plant; natural size. Fig. 4. Flower, laid open; enlarged four diameters. Fig. 5. Calyx and mature fruit; enlarged two diameters. (854.)

ERITRICHIUM FULVUM, A. DC. *DC. Prodr.* 10. 132. (*Myosotis tenella*, Nutt., Ms.) Annual, low (1-10') and slender, hirsute with mostly spreading hairs; stems usually solitary, erect, branched from the base or more commonly simple and loosely panicle above; leaves mostly radical, rosulate,

sessile, oblong-lanceolate, subacute, $\frac{1}{2}$ –1' long, the radical ones more or less glabrous beneath, the cauline distant; racemes elongated or crowded; calyx 5-parted, densely hirsute with brownish yellow hairs, lobes lanceolate, acute, about equaling the corolla-tube; corolla white or pinkish, the limb $1\frac{1}{2}$ –3'' broad, exceeding the tube, the throat with 5 prominent scales; nutlets rugose, and granulate-tuberculate between the ridges.—The matured fruit, seen only in specimens collected by Stretch near Washoe City, is broadly ovate with an abrupt broad strongly incurved apex, somewhat tuberculate-eristate and also tuberculate-margined, obscurely transversely rugose. The only difference to be found between this and numerous specimens of *Plagiobotrys canescens*, Benth., is in the somewhat more strongly rugose fruit of the latter, and there can be little doubt that the two species should be united. California to Washington Territory. Foot-hills near Carson City; April. (855.)

ERITRICHUM MICRANTHUM, Torr. *Bot. Mex. Bound.*, 141. Annual, low (2–4',) canescently hispid; stem much and diffusely branched from the base upward; leaves linear, obtuse, 3–6'' long; racemes short, long-bracted; flowers crowded; calyx-lobes linear; corolla very minute, the throat naked; nutlets oblong, rather acute, very glabrous, convex upon the back, the internal angle prominent and sulcate.—The flowers are in short subcapitate racemes, sessile, shorter than the foliaceous linear bracts; corolla white, less than 1'' long, remaining calyptra-like after fading, the narrow tube equaling the calyx, without appendages, the lobes small and ovate; nutlets $\frac{1}{2}$ – $\frac{2}{3}$ '' long, shining, adherent to the slightly longer style by the whole inner angle, in this respect holding an extreme place in the genus. Indeed it does not differ from the genus *Krynitzkia*, as was observed by Dr. Torrey, except in its persistent calyx, while the point of attachment of the seed within the achenium is even higher than in *K. leiocarpa*. But a deciduous calyx is by no means a constant character in that only species of that genus, and as the recognized *Eritrichiums* vary considerably among themselves in the mode of attachment of the seed, and of the achenium to the style, there seems to be too little ground for the separation of these two species. Western Texas and New Mexico. Found on the sandy shore of Stansbury Island in Salt Lake; June. The roots afford a rich purple dye. (856.)

ERITRICHUM LEIOCARPUM. (*Krynitzkia*, F. & M., *DC. Prodr.* 10. 134. See remarks under the last species.) Annual, 6–18' high, hispid with more or less spreading hairs, diffusely branching from the base, the branches clon-

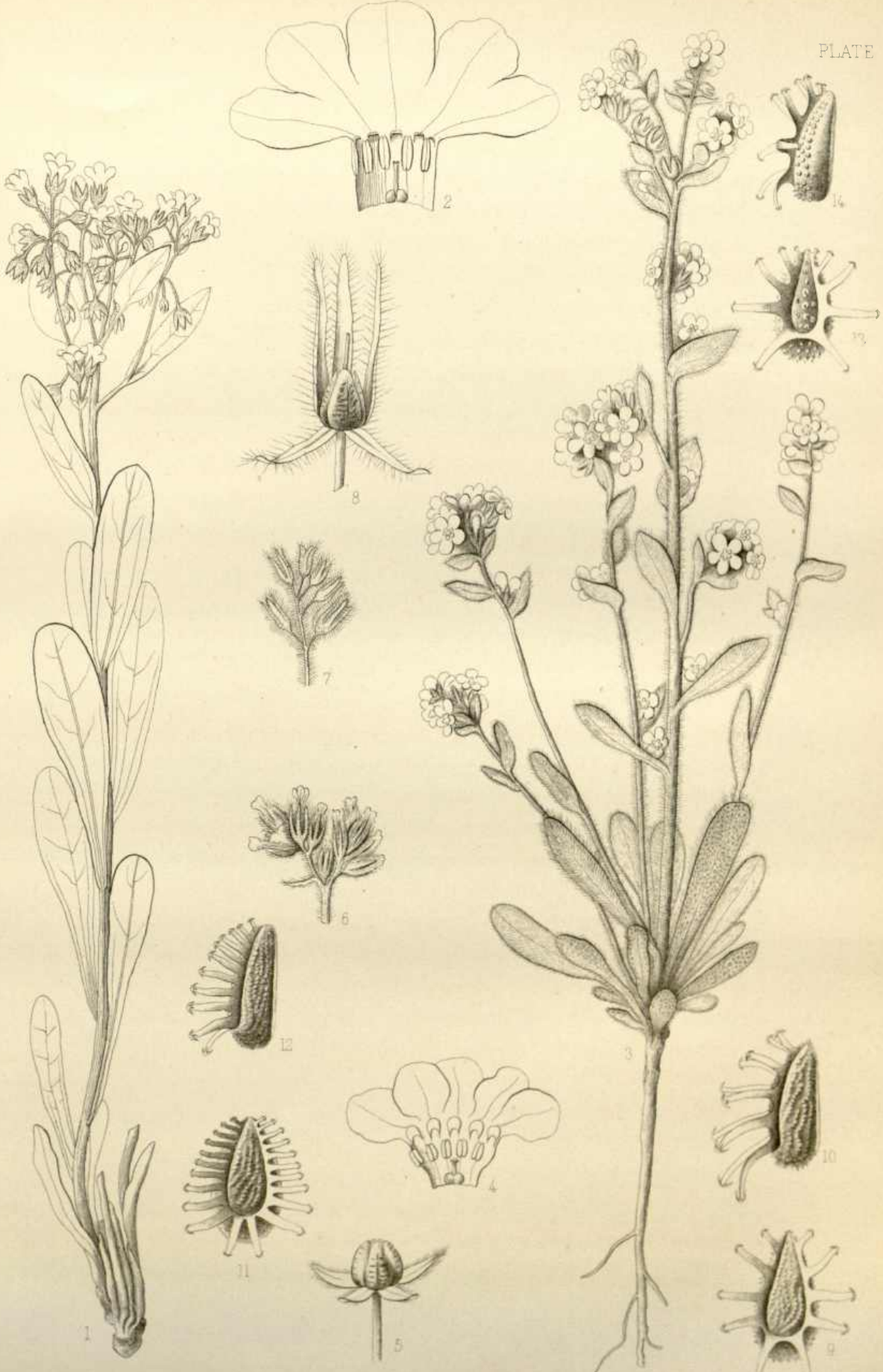
gated, weak and slender; leaves $\frac{1}{2}$ –1' long, oblong or oblong-linear; racemes terminal, short, usually bractless; flowers almost sessile; calyx-lobes linear becoming much elongated, often very hispid; corolla white, minute, (less than 1" long,) throat somewhat gibbous or scarcely so; nutlets oblong- or ovate-triangular, 1" long, perfectly glabrous and shining, rather flattened upon the back, the internal angle sulcate and attached nearly its whole length to the short style; calyx, with the fruit, often deciduous.—Closely allied to the last, but larger and much more loosely branched, and especially marked by its bractless and rarely at all capitate racemes. It varies much in the size and development and hairiness of the calyx, and apparently also in the prominence of the protuberances in the throat of the corolla. Early specimens with a short calyx (857) and the maturer form with the calyx well-developed (858) show wide extremes. *E. muriculatum*, Torr., *Bot. Wilkes's Exped., ined., t. 13.*, (not of DC.) is apparently in every respect the same thing, even to the deciduous calyx, except that the nutlets are very minutely granulated, with coarser scattered tubercles. The fruit of the present specimens shows under the microscope a very obscurely granulated surface, so that the difference is probably not constant. Southern California to Washington Territory. On the foot-hills and mountains from Western Nevada to the Wahsatch; 4–7,000 feet altitude; May–August.

ERITRICHIMUM PTEROCARYUM, Torr. *Bot. Wilkes's Expl. Exped., ined., t. 13.* Annual, 4'–1° in height, hirsute with spreading hairs, erect, branched; leaves linear or narrowly oblong, $\frac{1}{2}$ –1½' long; racemes terminal, usually bifurcate; flowers nearly sessile, rather crowded; calyx-lobes 1½–2" long, ovate or oblong, acute, densely hirsute with short yellow hairs; corolla white, small, the tube about equaling the calyx, with minute appendages; nutlets broadly ovate with a wide membranous irregularly crenate wing, or one of the nutlets oblong and wingless, strongly tuberculate upon the back and with a deep ventral groove, attached to the style the whole length.—A remarkable species with the wing of the fruit as broad as the body. Oregon, Northern Arizona, New Mexico, and Western Texas. Frequent on the foot-hills of the Washoe and Trinity Mountains, Nevada, and also found on Stansbury Island in Salt Lake; May, June. (859.)

ECHINOSPERMUM DEFLEXUM, Lehm. *DC. Prodr.* 10. 135. Biennial; stem erect, terete, fistulous, branched, villous with spreading hairs; leaves oblong-lanceolate, rather obtuse, ciliate at base, hirsute-pubescent; racemes

erect-spreading, bracteate below, with deflexed pedicels; calyx-lobes ovate, shorter than the corolla; nutlets compressed, with a single marginal row of barbed prickles, which are connate at base, the dorsal surface granulate and shortly pilose. Var. *FLORIBUNDUM*. (*E. floribundum*, Lehm.) Usually taller (2-4° high) than the European and Siberian form, the leaves acute or obtuse, and the dorsal surface of the nutlets variable, either nearly smooth, especially in the younger fruit as figured in the *Flora Bor.-Amer.*, or pilose, or coarsely granulate with the tubercles often pilose, and frequently with a few scattered imperfectly developed barbed prickles.—The central longitudinal ridge is more or less distinct and the marginal prickles vary in number and breadth. The flowers are either light blue or white, 2-7" in diameter. From New Mexico to the Saskatchewan and west to Northern California and Washington Territory. Frequent in the mountains from the Havallah range to the Wahsatch; 5-8,000 feet altitude; May-August. (860.)

ECHINOSPERMUM REDOWSKII, Lehm. *DC. Prodr.* 10. 137. Stem erect, pubescent, paniculately branched; leaves linear or sublanceolate, hoary with spreading hairs; calyx-lobes narrow-linear, equaling the corolla-tube; nutlets compressed, surrounded by a single row of barbed prickles, muriculate-rugose upon the back and sides, shorter than the enlarged calyx. Var. *OCCIDENTALE*. (*E. Redowskii*, Gray.) The tubercles, which are irregularly and thickly scattered over the faces of the nutlet, very sharply acute instead of rounded-obtuse as in Asiatic specimens.—Quite variable in its habit; from 3'-2° high, much branched at base and ascending, or with a single erect virgate stem; leaves and bracts usually linear-oblong, not unfrequently ovate-oblong or spatulate, always obtuse; flowers small, but little exceeding the calyx, blue; the prickly margin more or less contracted over the back of the nutlet, and the prickles more or less confluent. *E. patulum*, Lehm., of Western Asia, to which this plant was at first referred, differs from *E. Redowskii* (as shown by specimens in Herb. Gray.) only in the tuberculations upon the fruit, which in the former species are few in number, arranged regularly in longitudinal rows upon the back and upon the outer edge of the sides, and armed with curved points. The differences are represented with tolerable accuracy in the plate. From Western Texas to Arizona and northward to the Saskatchewan, Bear Lake and Fort Youkon. Frequent in the valleys and on the mountains from the Sierras to the Wahsatch; 4-8,000 feet altitude; May-July. PLATE XXIII. Figs. 9, 10. Achenium of *E. Redowskii*, Var. *occident-*



1, 2 MERTENSIA BREVISTYLA

3-5 ERITRICHUM KINGII

6-8 E. GLOMERATUM

9-14 ECHINOSPERMUM REDOWSKII, &c

ale. Figs. 11, 12. Achenium from Asiatic specimen of *E. Redowskii*. Figs. 13, 14. Achenium of *E. patulum*; all enlarged eight diameters. (861.)

Var. STRICTUM. (*E. strictum*, Nees., *App. Neuwied's Trav.* 17; not of Ledebour.) The prickles united over the back into a strongly inflexed border.—An extreme state, but various intermediate forms are frequent. New Mexico to Colorado and westward. Valleys and foot-hills of Western Nevada, with the last. (862.)

COLDENIA¹ HISPIDISSIMA, Gray. *Proc. Amer. Acad.* 5. 340. (*Eddy*, Torr. *Pac. R. R. Rep.* 2. 170, t. 8.) Prostrate, much-branched, very hispid; branches 3–10' long, from a woody base; leaves 3–5" long, linear, entire, revolute, acute, somewhat fascicled at the ends of the short branchlets, hispid with rigid white hairs; flowers solitary; calyx deeply 5-parted, lobes linear, tube indurated in fruit; corolla white, 2–3" long, salver-form, without scales;

¹ COLDENIA, L. (Including *Stegnocarpus*, Torr., *Eddy*, Torr., *Tiquilia*, Pers., and *Galapagoa*, Hook.) Calyx 5-parted or 5-cleft. Corolla funnelform, lobes subrounded, flat and spreading, throat naked. Stamens 5. Style bifid or 2-parted, short or elongated. Nutlets 4, coherent into a globose or 4-lobed fruit, at length separable, or more or less distinct. Albumen none or thin; embryo straight, or the rounded or ovate entire or 2-parted cotyledons incumbent upon the ascending radicle.—Shrubs or herbs, with alternate leaves and small sessile usually axillary flowers.

Dr. Gray (in *Proc. Amer. Acad.* 5. 340) has proposed the following arrangement of the species that have been referred to this genus:—

I. Fruit of 4 triangular nutlets, convex upon the back and closely united by their flat inner surfaces, thick and crustaceous.

§ 1. EUCOLDENIA, DC. Styles 2, short; fruit 4-lobed-globose; nutlets subconnate in pairs, at length separable. C. PROCUMBENS, L. Southern Asia.

§ 2. STEGNOCARPUS, DC. Style 2-cleft; fruit globose, separating into 4 nutlets. C. CANESCENS, DC. (*Stegnocarpus*, Torr. *Pac. R. R. Rep.* 2. 169, t. 7.) Northern Mexico and New Mexico.

II. Fruit deeply 4-lobed, the 4 nutlets (or fewer by abortion) ovate, small, attached only to the style by the inner angle, the pericarp thin.

§ 3. EDDYA, Torr. Style bifid toward the top; nutlets rough-papillose, with a thin crustaceous pericarp. C. HISPIDISSIMA, Gray.

§ 4. TIQUILIA, Pers. Style 2-cleft or divided; nutlets smooth, shining, with a very thin crustaceous pericarp; embryo with flat entire cotyledons, as in the preceding sections. Species three, all South American.

§ 5. TIQUILOPSIS, Gray. Corolla-tube with 5 scales at the base; pericarp almost membranous; cotyledons 2-parted, acuminate to each side of the radicle; otherwise as in the last. C. NUTTALLII, Hook

Another species has recently been added to the last section on account of its likeness in habit to *C. Nuttallii*, but without a knowledge of its fruit. The fuller description here given shows that it differs considerably from them all. The true relations of these rather heterogeneous species are not certain, but it would seem that all the latter division should rather be referred to the tribe *Borragae* than to the *Heliotropeae*, as was long ago stated by Dr. Torrey.

C. PALMERI, Gray. *Proc. Amer. Acad.* 8. 292. (*Tiquilia brevifolia*, Var. *plicata*, Torr. *Bot. Mex. Bound.* 136.) Shrubby, much-branched and spreading, 1° high, hoary with a short dense soft appressed pubescence without hirsute hairs; leaves 2–3" long, ovate, about equaling the petiole, thickly plicate-nerved; calyx short, 5-cleft, the ovate or lanceolate lobes about equaling the tube; corolla white, 3" or more in length, the tube twice exceeding the calyx, without scales at the base; stamens included, the unequal dilated filaments inserted at the base of the tube and adnate nearly their whole length; style as long as the corolla or exserted, very deeply cleft; fruit maturing but a single obovate-globose smooth nutlet, attached at the base and without ventral sulcus; albumen evident; cotyledons rounded, flat, entire, incumbent upon the shorter radicle.—Southern California, (Schott;) Arizona, (Palmer.)

stamens inserted near the top of the tube, unequal, included; style about equaling the stamens, cleft one-third its length; nutlets globose-ovate, attached by the inner angle, dull-gray, minutely papillose, scarcely $\frac{1}{8}$ " in width; pericarp thin and brittle; albumen none or very thin; cotyledons ovate, entire; radicle very short.—Western Texas, New Mexico, Northern Arizona, and Southern Utah, (Palmer, 1870.)

COLDENIA NUTTALLII, Hook. (*Tiquilia brevifolia*, Nutt. *Bot. Mex. Bound.* 136.) Annual, prostrate, diffusely branched, densely pubescent and hirsute with stiff white hairs; stems 3–15' long; leaves 2–3" long, equaling the petioles, ovate or rhomboidal, entire, strongly plicate-veined, margins revolute, somewhat fascicled; flowers numerous in axillary and terminal clusters, with narrow-subulate bractlets; calyx deeply 5-cleft, 1–2" long, the lobes linear and hirsute; corolla white, 2" long, funnelform with spreading lobes, with 5 scales at the base of the tube; stamens with very short filaments, inserted in the throat; style included; nutlets ovate, $\frac{1}{2}$ " long, smooth and shining, free at base and attached only to the style by a ventral sulcus nearly its whole length; albumen none; cotyledons 2-parted, accumbent to the radicle on each side.—Excellently figured in *Bot. Wilkes's Exped., ined., t. 12.* Southern California and Arizona; Oregon, (Wilkes, Geyer;) near Carson City, (339 Torrey.) Truckee and Carson Deserts and in Unionville Valley, Nevada; 4–5,000 feet altitude; June–August. (863.)

HELIOTROPIUM CURASSAVICUM, L. Virginia to Florida on the seacoast, and in saline or alkaline localities westward to Southern Illinois, Dakota, Oregon, California and Mexico. Truckee, Humboldt and Jordan Valleys, Nevada and Utah; 4–4,500 feet altitude; May–August. Stems prostrate or ascending; flowers white. (864.)

HYDROPHYLLACEÆ.¹

HYDROPHYLLUM MACROPHYLLUM, Nutt. Ohio, Indiana, and Kentucky.—
Var. OCCIDENTALE. Very variable in the degree of hispidness, in the size and section of the leaves, in the length of the peduncles and denseness of the inflorescence, and tending toward *H. capitatum*, from which it may be distinguished by its usually larger size, the oblong-lanceolate leaves (4–8'

¹ The determinations under this order are due to Dr. JOHN TORREY, (except in the very few cases where it is otherwise indicated,) and the descriptions of the new species were made with the aid of notes and sketches kindly furnished by him.