

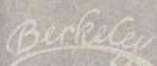
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DEPARTMENT OF THE INTERIOR,

U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES.

F. V. HAYDEN, U. S. GEOLOGIST-IN-CHARGE.

MISCELLANEOUS PUBLICATIONS—No. 4.

SYNOPSIS

OF THE

FLORA OF COLORADO,

BY

THOMAS C. PORTER

AND

JOHN M. COULTER.

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WASHINGTON:

GOVERNMENT PRINTING OFFICE.

March 20, 1874.

REPORT OF THE GEOLOGICAL SURVEY OF THE TERRITORY OF COLORADO  
PUBLISHED BY THE GEOLOGICAL SURVEY OF THE TERRITORY OF COLORADO

MISCELLANEOUS PUBLICATIONS—No. 1

FLORA OF COLORADO

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JOHN M. COULTER

WASHINGTON  
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## PREFATORY NOTE.

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The "Synopsis of the Flora of Colorado," which the survey now presents to the public, has been prepared by Prof. Thomas C. Porter, of Lafayette College, Easton, Pennsylvania, and Mr. John M. Coulter, one of the assistants connected with the survey for the past two years. It is intended to be a type of a series of "handbooks" of different branches of natural history, to be published from time to time as a part of the series of "Miscellaneous Publications," for the use of students all over the country. No. 3 of the series is now passing through the press, and has been prepared by the eminent ornithologist, Dr. E. Cones, U. S. A. It will form an octavo volume of several hundred pages, bringing the whole subject of western ornithology up to date. The mountain regions of Colorado are now so accessible to the traveling public, that this synopsis will prove a most valuable aid to students, and travelers who can, are annually visiting Colorado in great numbers. Indeed, the mountainous portions more nearly resemble the Alpine districts of Central Europe, not only in the scenery, but also in the different forms of vegetation. The tide of travel is fast turning in this direction, and the demand for works of this kind will necessarily be very great. It should be stated here, that the obligations of the survey to Professor Porter, for his share in the work, are very much increased from the fact that he occupied several months in its preparation without compensation from the Government.

F. V. HAYDEN,  
*United States Geologist.*

OFFICE UNITED STATES GEOLOGICAL AND GEOGRAPHICAL  
SURVEY OF THE TERRITORIES, *January 14, 1874.*

LETTER TO THE EDITOR

1877  
1878  
1879

The following is a list of the names of the persons who have been elected to the office of the Secretary of the Board of Education for the year 1877-1878. The names are given in the order in which they were elected, and are arranged in alphabetical order of their surnames. The names of the persons who were elected to the office of the Secretary of the Board of Education for the year 1878-1879 are given in the order in which they were elected, and are arranged in alphabetical order of their surnames. The names of the persons who were elected to the office of the Secretary of the Board of Education for the year 1879-1880 are given in the order in which they were elected, and are arranged in alphabetical order of their surnames.

## LETTER TO THE GEOLOGIST-IN-CHARGE.

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LAFAYETTE COLLEGE,  
Easton, Pa., January 15, 1874.

SIR: In lieu of a simple list of the plants obtained in Colorado during the explorations of last summer, I have the honor to present you herewith a condensed Synopsis of the Flora of the Territory, prepared in conjunction with Prof. John M. Coulter of the Survey.

The work is based chiefly on collections made, in 1861 and succeeding years, by Dr. C. C. Parry, whose indefatigable labors have added so much to our knowledge of the flora of the region; in 1862, by Messrs. Hall and Harbour; in 1867, by Dr. W. A. Bell, of Manitou Springs; in 1868, by Dr. F. V. Hayden; in 1869, by B. H. Smith, Esq., of Denver; in 1871, by Dr. George Smith and W. M. Canby, Esq.; in 1871 and 1873, by Messrs. Meehan and Hooper; in 1872, by J. H. Redfield, Esq.; in 1872 and 1873, by T. S. Brandegee, Esq., of Cañon City, Rev. E. L. Greene, of Pueblo, and T. C. Porter; and in 1873, by J. M. Coulter.

The plan followed in the Synopsis is that of Mr. Watson in his excellent Catalogue, volume V of Clarence King's Report. Descriptions are given of all the orders, genera, and species not contained in Gray's Manual, Chapman's Flora, and other botanies of the States east of the Mississippi River.

For the elaboration of the *Musci* and *Hepaticæ* we are greatly indebted to Leo Lesquereux, Esq., of Columbus, Ohio; of the *Lichens*, to Henry Willey, Esq., of Amherst, Mass.; and of the *Fungi*, to Charles H. Peck, Esq., of Albany, N. Y.

Thanks are due also to Dr. Gray and S. Watson, Esq., of Cambridge, Mass., and Dr. George Thurber, of New York City, for kindly assistance in the determination of difficult and doubtful species; and to J. H. Redfield, esq., of Philadelphia, for valuable services rendered.

To Mr. Brandegee, for his large and fine collections from the southern part of the Territory, and to the Rev. E. L. Greene, for lists and specimens of rare species, we are under special obligations.

References to the authorities consulted and used are to be found at the proper places in the body of the work.

I regret that circumstances have prevented the completion of an introductory article on the geographical distribution of the plants embraced in this synopsis.

THOS. C. PORTER.

Dr. F. V. HAYDEN, *U. S. Geologist.*

LETTER TO THE GEOLOGIST-GENERAL

WASHINGTON, D.C.

January 15, 1911

I have the honor to acknowledge the receipt of your letter of the 12th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration. It is a matter of course that the same will be given the most careful attention and that every effort will be made to secure the most favorable result possible. I am, Sir, very respectfully,  
 Yours very truly,  
 J. H. Kirtland

J. H. KIRTLAND

U.S. GEOLOGICAL SURVEY

## ADDITIONS.

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After *ASTRAGALUS KENTROPHYTA*, Gray, page 30, insert—

*ASTRAGALUS TEGETARIUS*, Watson, *King's Rep.*, vol. 5, p. 76, pl. 13. Perennial, dwarf, caespitose, canescent, with a silky pubescence; stems 2''-6'' long, numerous and branched, from a much-branched caudex, procumbent; stipules membranous, mostly acuminate, sheathing; leaflets 3-5 pairs, 2''-3'' long, linear, acute; peduncles slender, about equaling the leaves, 1-3-flowered; flowers small, 2''-3'' long, ochroleucous, the keel purplish; calyx-teeth as long as the campanulate tube; legume 2''-3'' long, chartaceous, sessile, compressed, pubescent, ovate, oblong, straight, erect, 1-celled, 6-ovuled, 1-2-seeded.

Var. ? *IMPLEXUS*, W. M. Canby. Leaflets in 2 pairs, crowded on the stems; stipules tipped with a short straight point; flowers violet, the keel deep purple; legumes mostly smaller, 1''-2'' long, turgid, ovate, obtuse, 3-4-ovuled, 1- (rarely 2-) seeded.—South Park, *Canby*; *Hoopes*; *Porter*.

After *ZYGADENUS NUTTALLII*, Gray, p. 133, insert—

*VERATRUM ALBUM*, L.—Middle Park, *Parry*.

1847

Faint, illegible text, possibly bleed-through from the reverse side of the page. The text is too light to transcribe accurately.

## CORRECTIONS.

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- Page 5. For "BERBERIS AQUIFOLIUM," put "B. AQUIFOLIUM."
19. For "RHUS TOXICODENDRON," put "RHUS TOXICODENDRON."
32. For "*A. Lathyrus*," (ninth line from bottom,) put "*A Lathyrus*."
42. For "RIBES FLORIDUM, L'Her.," put "RIBES FLORIDUM, L."
46. For "*Æ. Nuttallii*, T. & G.," (sixth line from top,) put "*Æ. Nuttallii*, Torr."
50. For "*O. brevistyla*," (eighth line from top,) put "*O. brevistylis*."
63. For "SOLIDAGO LANCEOLATA, T. & G.," put "SOLIDAGO LANCEOLATA, L."
70. For "HELIOPSIS LAEVIS, Pursh," put "HELIOPSIS LAEVIS, Pers."
94. For "MIMULUS FLORIBUNDUS, Gr.," put "MIMULUS FLORIBUNDUS, Dougl."
94. For "DC. Prod. 10, p. 1, 331," (sixth line from bottom,) put "DC. Prod. 10, p. 331."
114. For "ACERTES DECUMBENS," put "ACERATES DECUMBENS."
118. For "Dumont," after *SUEDA MARITIMA*, put "Dumont."
124. For "SHEPHERDIA CANADENSIS, L.," put "SHEPHERDIA CANADENSIS, Nutt."
127. For "HUMULUS LUPULUS," put "H. LUPULUS."
130. For "PINUS ARISTATA, Engelm, DC. Prod., l. c., p. 400," put "PINUS BALFOURIANA, Murr., (*P. aristata*, Engelm.)"
136. For "MONTANUS," (third line from the top,) put "MONTANUS."
140. For "var. MINOR, Olney," put "var MINOR, Boott."
157. For "ORTHOTRICHUM HALLII, Sully. & Lesqx.," put "O. HALLII, Sull. & Lesqx."
160. For "var. *S. alpinum*," (ninth line from top,) put "var. *δ. alpinum*."
161. For "ENGYRIUM," (first line at top,) put "EUGYRIUM."
161. For "CTEIDIUM," (thirteenth line from bottom,) put "CTEINIDIUM."
163. For "ENDOCOCEUS," put "ENDOCOCCUS."
163. For "AGARICUS LACCATUS, Scop.," put *A. LACCATUS*, Scop."
164. For "LENZITES SEPIRIA," put "L. SEPIARIA."
164. For "PUCCINIA PORTERI," put "P. PORTERI."
164. For "Pec.," after *PEZIZA VULCANALIS*, put "Peck."

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SYNOPSIS OF THE CASES OF

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# SYNOPSIS OF THE FLORA OF COLORADO.



## RANUNCULACEÆ.

**CLEMATIS DOUGLASHII**, Hook. Stem simple, erect, 1°-2° high, 1-flowered, sparingly hairy, woolly at the joints; leaves hairy, 2-3 pinnatifid; sepals thick, deep purple within, paler externally, spreading at the apex, much longer than the stamens.—Common in the mountains at middle elevations.—*Hall & Harbour*, 2; *Dr. Smith*; *Meehan*; *Porter*; *Coulter*.

**CLEMATIS SCOTTII**, Porter (*n. sp.*) More or less villous, with soft, spreading hairs; bushy, branching from a suffrutescent base, branches erect, 9'-18', not climbing; leaves opposite on rather long petioles, pinnate; leaflets five pairs, ovate or lanceolate, acute or acuminate, petiolulate, strongly veined beneath, lower ones often 2-3 cleft; flowers axillary and terminal, nodding, peduncles 3'-6'; sepals 4, ovate, with reflexed summits nearly 1' long, dark or brownish purple, thickish but not leathery as in *C. Viorna*, more or less tomentose on the outside; carpels silky pubescent, with densely plumose tails 1'-1½' in length.—Named for Hon. John Scott, who collected it in 1872, at Soda Springs, 35 miles west of Cañon City. *Brandegee*, Fremont County, in fruit. *Redfield*.

**CLEMATIS LIGUSTICIFOLIA**, Nutt. Climbing, somewhat pubescent, flowers white, in paniculate corymbs, diœcious; leaves pinnate and ternate, (mostly 5-foliolate,) the coriaceous leaflets oblong, acute, mostly somewhat lanceolate-cuneate, incisely toothed and trifid; petals and stamens equal in length; carpels with long plumose tails.—Common along water-courses, at the base of the foot-hills, and ascending the ravines, climbing over bushes and producing a great abundance of white flowers.—*Hall & Harbour*, 3; *Dr. Smith*; *Porter*; *Redfield*.

**CLEMATIS ALPINA**, Mill., var. **OCHOTENSIS**, Gr. *DC. Prod.*, 1, p. 10. Leaves biternately divided, segments ovate or oblong lanceolate, acuminate, frequently three-lobed, irregularly toothed; sepals 4, lance-ovate purplish blue; antheriferous petals linear.—A trailing, woody-stemmed plant, 6' high, nearly glabrous; carpels glabrous; tails 1½' long, very finely plumose.—Georgetown, *Dr. Smith*. Chiann Cañon, *Porter*. Clear Creek Cañon, at 9,000 feet altitude, *Coulter*.

**THALICTRUM ALPINUM**, L. Stem simple, 2'-8' high, slightly pubescent, scapiform; leaves mostly radical, 2-3 ternate; leaflets roundish, about ½' long, somewhat lobed, crenately toothed; flowers perfect, nodding in a simple raceme; pedicels slender; sepals 4, oblong; stigmas thick and pubescent; carpels ovate, sessile.—In damp, mossy ground, at 9 to 10,000 feet altitude, rare. *Hall & Harbour*, 10. Cache Creek, near Granite, *Porter*.

**THALICTRUM PURPURASCENS**, L. Anthers rather shorter than in eastern specimens.—Cañon City and Wet Mountain Valley, *Brandegee*. Foot-hills along the Platte River, June 28, *Coulter*. In flower.

**THALICTRUM SPARSIFLORUM**, Turcz. (*T. clavatum*, Hook., not of DC.) 1°-2° high; panicle loosely few flowered, long-pedicel, flowers

perfect; filaments clavate; anthers elliptical, pointless; ovaries 8-10; carpels compressed, dimidiate, not striate, thrice shorter than the persistent style; upper leaves sessile, 2-3 ternate, leaflets often small. Subalpine.—*Hall & Harbour*, 9; *Parry*, 1872.

*THALICTRUM FENDLERI*, Eng. *Plant. Fendl.*, p.5. Dioecious, glabrous; leaves petioled, or the uppermost sessile; leaflets round-cordate, 3-lobed; filaments scarcely thickened at the apex; anthers long-mucronate; carpels sessile, obliquely ovate, compressed, sharp-edged, with 4-6 strong lateral ribs, three times longer than the recurved style. In other respects like *T. Cornuti*.—Common in the mountains at middle elevations.—*Hall & Harbour*, 8; *Dr. Smith*; *Canby*; *Brandegee*; *Parry*; *Porter*; *Coulter*. On Mount Elbert, near Twin Lakes, at 12,000 feet altitude.

*ANEMONE PATENS* L., var. *NUTTALLIANA*, Gr.—On the plains and extending up into the mountains. *Hall & Harbour*, 4; *B. H. Smith*; *Meehan*; *Parry*; *Porter*; *Coulter*. Gray's Peak, at 12,000 feet altitude *Redfield*.

*ANEMONE CAROLINIANA*, Walt.—*Hall & Harbour*, 6. On the plains.

*ANEMONE PARVIFLORA*, Michx.—Near Mount Lincoln, July 15, *Coulter*.

*ANEMONE MULTIFIDA*, DC.—Found in the mountains at middle elevations and upward. *Hall & Harbour*, 5; *B. H. Smith*; *Porter*; *Parry*; *Coulter*.

*ANEMONE CYLINDRICA*, Gr.—Green Horn Mountains, June, 1873, *Brandegee*. Idaho Springs, *Redfield*.

*ANEMONE PENNSYLVANICA*, L. Common in the foot-hills. *Dr. Smith*; *B. H. Smith*; *Meehan*; *Brandegee*; *Coulter*. Colorado Springs, *Redfield*.

*ANEMONE NARCISSIFLORA*, L. Villous, leaves palmately 3-5 parted, segments cuneiform, incisedly many-cleft, lobes linear, acute; involucre somewhat similar, sessile, leaflets 3-5 cleft; pedicels several, umbel, leafless, 1-flowered; flowers white; carpels without tails, much compressed, roundish oval, glabrous.—Alpine. *Hall & Harbour*, 7; Mount Lincoln at 13,500 feet altitude, July 9, *Coulter*.

*MYOSURUS MINIMUS*, L.—South Park, *Hall & Harbour*, 20.

*RANUNCULUS AQUATILIS*, L., var. *TRICHOPHYLLUS*, Chaix.—Common in stagnant or slow-flowing waters in the foot-hills. *Brandegee*; *Coulter*.

Var. *STAGNATILIS*, DC. (*R. divaricatus*, Schrank.)—Ponds and slow streams at middle elevations. *Dr. Smith*; *Brandegee*; *Coulter*.

*RANUNCULUS ALISMÆFOLIUS*, Geyer, var. *MONTANUS*, Watson. Low, 6' high, alpine, stems ascending, leaves entire; carpels rather shorter-beaked than usual in the species.—*Parry* 79; *Vasey* 15. Sierra Madre Range, *Coulter*.

*RANUNCULUS FLAMMULA*, L., var. *REPTANS*, Gr.—*Hall & Harbour*, 18.

*RANUNCULUS GLABERRIMUS*, Hook. Very glabrous; stems 1 (sometimes 2) from a root of thickened fasciculated fibers, few-flowered, 3'-5' high; radical leaves elliptical, variable in breadth, tapering into long, slender petioles, mostly entire, rarely cleft, cauline leaves sessile, usually 2-3 cleft; peduncles 1-flowered, those of the axils elongated and divaricate; flowers 6'' broad; petals obovate, twice as long as the sepals; heads of carpels globose; achenia with a short curved beak, puberulent, resembling those of *R. affinis*. This seems to be the plant referred to by Dr. Gray in his Enumeration of Hall and Harbour's col-

lection in the note attached to No. 19.—Near Long's Peak, June 1, at 9,000 feet altitude, *Coulter*.

**RANUNCULUS CYMBALARIA**, Pursh.—Common in marshy ground on the plains and in the mountains. *Hall & Harbour*, 11; *Dr. Smith*; *B. H. Smith*; *Porter*; *Brandegee*; *Coulter*.

**RANUNCULUS AFFINIS**, R. Br. Radical leaves petioled, usually pedately multifid; cauline ones sessile, digitate, with broadly linear lobes; stem erect, few-flowered; carpels with recurved beaks in oblong cylindrical heads, more or less pubescent throughout. Var. **LEIOCARPUS**, Trautv. Lower leaves usually lobed or crenate; from 8'-12' high; flowers small; carpels smooth or somewhat pubescent.—*Hall & Harbour*, 15; *Vasey*, 13; *B. H. Smith*; *Porter*; *Coulter*.

Var. **CARDIOPHYLLUS**, Gr. (*R. cardiophyllus*, Hook.) Hirsutely pubescent, radical leaves round-cordate, undivided or many cleft; cauline ones palmately many-cleft; flower 1' in diameter.—*Hall & Harbour*, 16.

**RANUNCULUS NUTTALLII**, Gr. (*Cyrtorrhynca ranunculina*, Nutt. *Fl. N. Am.* 1, p. 26.) *Gray's En. Hall & Harbour*, p. 56. Note. Smooth, 6'-8' high; root fascicled; radical leaves biternately divided, segments 3-5 parted, lobes oblong or linear, sometimes 2-3 cleft; branches subtended by a small leaf, few-flowered; petals spatulate, yellow, a little longer than the broader sepals, which are also yellow, thickened above the base; style long, slender, incurved; carpels rather few, collected into a globose head, glabrous, cylindrical-oblong, grooved, many-nerved; stigma subulate.—*Hall & Harbour*, 13. Near Long's Peak, June 1, at 9,000 feet altitude, *Coulter*.

**RANUNCULUS SCALERATUS**, L.—Platte River, *Hall*. Cherry Creek, *Dr. Smith*. Bear Creek Cañon, *Coulter*.

**RANUNCULUS MULTIFIDUS**, Pursh., var. **REPENS**, Hook. Creeping; leaves all round-reniform, palmately 3-5 cleft.—*Wilson's Creek*, July, *Brandegee*.

**RANUNCULUS HYPERBOREUS**, Rottb., var. **NATANS**, C. A. Meyer. Stem filiform, creeping; leaves glabrous, petioled, 3 cleft; lobes oval-oblong, divaricate, the lateral ones somewhat 2 cleft, middle one entire; sheaths bi-auriculate at base; heads of carpels globose, compact; style wanting.—Much resembles forms of the preceding, but distinguished by the absence of styles.—In swamps at middle elevations. *Hall & Harbour*, 12. Clear Creek, *Coulter*.

**RANUNCULUS PYGMÆUS**, Wahl. Stem erect, never creeping, 1'-2' high, 1-flowered; leaves glabrous, 3-5 cleft; radical ones petioled, cauline ones sessile; calyx glabrous, longer than the somewhat reflexed petals; heads oblong; carpels subglobose, not margined at the back, pointed with a short hooked style.—Mount Evans, on dry ground, at 13,000 feet altitude, *Greene*.

**RANUNCULUS NIVALIS**, R. Br., var. **ESCHSCHOLTZII**, Watson. (*R. Eschscholtzii*, Schlecht.) Radical leaves 3-parted, the divisions lobed, ciliate; stem about 1-flowered; calyx hirsute, with whitish hairs, shorter than the petals; style shorter than the achenia.—*Hall & Harbour*, 14; *Vasey*, 17; *Parry*.

**RANUNCULUS ADONEUS**, Gr. *Gray's En. Pl. Hall & Harbour*, p. 17. Note. Low, sparsely villous, becoming glabrous; root fasciculate, fibrous; stems branching from the base, 1-3 leaved above, sometimes erect, very simple, 1-flowered, but sometimes sarmentose-decumbent, and 2-3 flowered; leaves twice pedately parted, segments narrowly linear; petioles scarious, base dilated; peduncle short; corolla golden-yellow, often ex-

ceeding 1' in diameter; petals flabelliform, twice exceeding the sub-villous oval sepals; basilar scale small, adnate; achenia crowded in an oval head, smooth, turgid; beak rather long, ensiform, scarious-winged on each side.—In the high alpine region, close to the snow, *Hall & Harbour*, 17; *Parry*. Chicago Lakes at 12,000 feet altitude, June, *Coulter*. Gray's Peak, 13,000 feet, *Redfield*.

RANUNCULUS REPENS, L.—*Meehan*; *Greene*; *Porter*.

RANUNCULUS PENNSYLVANICUS, L.—Platte River near Denver, *Dr. Smith*. Wet Mountain Valley, *Redfield*.

CALTHA LEPTOSEPALA, DC. Stem 1-leaved or naked, mostly 1-flowered, erect, 3'-1° high; radical leaves on long petioles, ovate-cordate, obscurely crenate; sepals 8-10, oblong, white or tinged with blue; style short and recurved; stigma obtuse; carpels 8-10, oblong.—Very abundant in subalpine swamps. An excellent pot-herb. *Hall & Harbour*, 21; *Parry*; *Meehan*; *Brandege*; *Coulter*. May to September.

TROLLIUS LAXUS, Salisb.—Associated with the preceding, but less common.—*Hall & Harbour*, 22; *Brandege*; *Coulter*. Gray's Peak, *Redfield*. June and July.

AQUILEGIA VULGARIS, L., var. BREVISTYLA Gr. (*A. brevistyla*, Hook.) Stems low, 6'-8' high, spreading; leaves bi-ternate; leaflets 3-lobed, crenate, 6''-9'' long, crenatures ovate, rotund; flowers small, blue, about 6'' long including the spur; sepals oblong-ovate; petals a little exceeding the stamens; spurs hooked at the tip; styles shorter, included.—*Hall & Harbour*, 23. Mountains near Pike's Peak, *Canby*; *Meehan*.

AQUILEGIA CANADENSIS, L. Styles longer than the stamens.—Along subalpine rivulets. Mount Elbert near Twin Lakes, *Porter*. La Plata Mountain at 11,000 feet altitude, July, *Coulter*.

AQUILEGIA CÆRULEA, Torr. *Ann. N. Y. Lyc.* 2, p. 164. Spur straight, very slender, 1½'-2'; sepals rhomboid-ovate, acute, longer than the petals; stamens and style shorter than the corolla; stem 1°-3° high, glabrous, few-flowered; flowers 2'-2½' in diameter, pale blue, sometimes ochroleucous, pinkish or white. Leaves mostly radical, glaucous beneath; leaflets deeply cleft.—On shaded mountain-slopes from 7-11,000 feet altitude. A very beautiful and showy plant in flower. June to September. *Hall & Harbour*, 24; *Parry*; *Dr. Smith*; *Porter*; *Coulter*. Gray's Peak, *Redfield*.

AQUILEGIA CHRYSANTHA, Gr. *Proc. Am. Acad.* 8, p. 621, (*A. leptocera* Nutt., var. *flava*. Gr. *Pl. Wright.* 2, p. 9.) Smaller than the former and more slender in stems and foliage; peduncles often pubescent; flowers deep yellow, spurs more slender; sepals about 9'' long, lanceolate-oblong, longer but not broader than the limb of the petals.—Grand Cañon of the Arkansas, June 3, *Brandege*.

DELPHINIUM ELATUM, L., var. (?) OCCIDENTALE, Watson. *King's Rep.*, vol. 5, p. 11. Tall, 5° high, glabrous or densely pubescent above; leaves deeply 3-5 cleft, divisions broadly cuneate, somewhat 3-lobed and sparingly gashed-toothed, the teeth narrowing abruptly to a callous point; racemes many-flowered, often densely so, simple or paniced; flowers pubescent, sometimes white; spur longer than the sepals; lower petals broad, slightly notched, often erosely-dentate, more or less densely bearded, the claw spurred at base.—In *Coulter's* specimens from the Twin Lakes the spur is shorter than the sepals and the lower petals are very acute; stems very stout; flowers large, in crowded racemes.—*Hall & Harbour*, 25; *Coulter*.

**DELPHINIUM SCOPULORUM**, Gr. *Pl. Wright*, 2, p. 9. Puberulent or glabrous; stem leafy, simple, 1°-2° high; petioles dilated at base; leaves orbicular in outline, 3-5 parted, divisions deeply 2-3-cleft, segments many-lobed or lacinate; raceme strict; many-flowered; flowers smoothish; spur longer than the sepals; lower petals bifid, sparingly bearded within; claw spurred at base; carpels 3, erect, nearly glabrous.—Wet Mountain Valley, *Brandegee*. *Hall & Harbour*, 26.

**VAR?** Stems 2°-5° high, stout, paniced; racemes slender, elongated; flowers scattered, small; spur straight, ascending.—Ute Pass, *Porter*. Wet Mountain Valley, *Brandegee*.

**DELPHINIUM AZUREUM**, Michx.—Cañon City, June 26, *Brandegee*.

**DELPHINIUM MENZIESII**, DC. More or less pubescent; stems stout, 1°-2° high, leaves orbicular in outline, 5-7 parted, divisions 2-3 cleft; bracts mostly entire, lower ones 3-cleft; raceme simple, few to many-flowered; spur usually curved, longer than the sepals, ascending; capsules glabrous; root grumous. Closely resembles the eastern *D. tricornis*.—*Hall & Harbour*, 28. In the foot-hills west of Denver, *Coulter*.

**ACONITUM NASUTUM**, Fisch. Petals erect, with the spur arcuate; galea conical, prone; spur descending; raceme somewhat paniced; divisions of the leaves rather broad, coarsely lacinate-toothed. Stem stout, 3°-6° high, pubescent above; flowers purple or white.—*Hall & Harbour*, 29; *Parry*. Weston's Pass, July 18, at 11,000 feet altitude, *Coulter*.

**ACTÆA SPICATA**, L., var. **ARGUTA**, Torr. (*A. arguta*, Nutt. *Fl. N. Am.*, p. 35.) Stouter than *A. spicata*, var. *rubra* of Gray's Manual; leaflets larger and more serrated; petals oblong, obtuse; otherwise nearly the same.—Mountains near Denver, *Dr. Smith*. Oak Creek, Fremont County, *Brandegee*. St. Vrain Cañon, *Coulter*.

### BERBERIDACEÆ.

**BERBERIS AQUIFOLIUM**, Pursh. Leaflets 1-6 pairs, not approximated to the base of the petiole, coriaceous, ovate-lanceolate or elliptical oblong, oblique and slightly cordate at base, margin repand with thorny or spinulose cuspidate teeth; racemes short, nearly erect, clustered; filaments 2-toothed; berries dark purple.—An under-shrub 2°-5° high, branching, the branches often procumbent. Leaflets 1½'-3' long, obscurely reticulated on both sides, the veins all rising from the midrib.—*Hall & Harbour*, 30. Head-waters of the Arkansas, *Porter*. Near Long's Peak, *Coulter*.

### NYPHÆACEÆ.

**NUPHAR POLYSEPALUM**, Eng. *Proc. Saint Louis Acad.*, April 17, 1865, p. 282. Leaves broadly ovate, deeply cordate, with a narrow sinus; sepals 9-12, concave, the middle ones very large; petals 12-18, spatulate, retuse; stamens very numerous; anthers truncate, appendiculate at the apex, equaling or shorter than the at-length-recurved filaments; stigmatic rays of the striate, urceolate ovary 13-21, almost reaching the crenate margin of the umbilicate disk, neither constricted nor beaked toward the apex.—Leaves longer in proportion to their breadth than those of *N. advena*; sinus narrower and more closed; flowers very large; outer sepals greenish and yellowish, inner ones more or less tinged with red.—Mountain-lakes around Long's Peak, *Parry*. Cold Lake in the Sierra Madre Range, at 10,000 feet altitude, *Coulter*.

## PAPAVERACEÆ.

PAPAVER ALPINUM, L. Scape one-flowered, 2'-3' high, naked, hispid as well as the calyx with brownish hairs; leaves lance-ovate in outline, deeply pinnatifid, divisions rarely incised; flower nodding in the bud, 6''-8'' in diameter; petals lemon-yellow; capsule obovate, hispid. Nearest var. *flaviflorum*, Koch. *Fl. Germ.* 1, p. 25.—Alpine. *Hall; Parry*, 147; *Meehan*. California Gulch at 12,500 feet altitude, *Coulter*.

ARGEMONE MEXICANA, L. Most common on the plains along the foot-hills. Stout, 2°-3° high; flowers large, 2'-3' in diameter, white, very rarely yellow.—*Hall; Dr. Smith; B. H. Smith; Porter; Coulter*.

## FUMARIACEÆ.

CORYDALIS AUREA, L., var. CURVISILIQUA, Eng.—Common in the mountains. *Dr. Smith; B. H. Smith; Canby; Porter; Coulter*.

## CRUCIFERÆ.

NASTURTIUM OFFICINALE, R. Br.—Platte River near Denver, *Dr. Smith*. Golden City, *Greene*.

NASTURTIUM SINUATUM, Nutt.—Platte River near Denver, *Dr. Smith*.

NASTURTIUM OBTUSUM, Nutt.—*Hall & Harbour*, 32; *Porter*. Oro City, *Coulter*.

NASTURTIUM PALUSTRE, D. C.—*Dr. Smith; Porter; Brandegee*. Near Denver, *Coulter; Redfield*.

ARIBIS HIRSUTA, Scop.—Common everywhere in Colorado. *Dr. Smith; Meehan; Brandegee; Coulter; Redfield*.

ARABIS DRUMMONDII, Gr.—Very variable; stem strict or slender and flexuous; glabrous or covered with a stellate pubescence; pods erect and straight or spreading and arcuate. *Dr. Smith; Coulter*.

Var. ALPINA, Watson. A reduced alpine or subalpine form with a few crowded purple or white flowers; glabrous or stellately pubescent.—White House Mountain, August, at 11,000 feet altitude, *Coulter*.

ARABIS RETROFRACTA, Grah. (*Streptanthus angustifolius*, Nutt.) Stems several from one root, 12'-18' high, virgate, branching near the summit; radical leaves lanceolate, linear, sparingly hirsute, lower cauline much broader, closely amplexicaul, upper ones smaller, oblong-lanceolate, smooth, erect; flowers small, pale red; petals oblong-oval, the limb exserted; sepals short, smooth, almost coriaceous.—*Hall & Harbour*, 35.

CARDAMINE CORDIFOLIA, Gr. *Pl. Fendl.*, p. 8. Stem 1°-3° high, erect, simple, from a fibrous, creeping rhizoma, glabrous or pilose at base, leafy to the top; leaves all petioled, cordate, sparingly repand-dentate or angular-toothed, ciliate, 2'-4' in diameter; lowest orbicular; the upper triangular-cordate, sub-acuminate; flowers rather large, white; siliques erect, 2 to 3 times longer than the pedicels.—Common in swamps at middle elevations. *Hall & Harbour*, 34; *Dr. Smith; Parry; Meehan; Coulter*. Sangre de Cristo Range, *Redfield*.

CARDAMINE HIRSUTA, L.—*Hall & Harbour*, 33.

VESICARIA STENOPHYLLA, Gr. *Pl. Lindh.*, 2, p. 149. Low, branches several, spreading from a thick, woody caudex, a span or less high; leaves linear or linear spatulate, crowded; silvery pubescent, mostly entire;

raceme densely many-flowered; flowers golden yellow; silicle membranaceous, very smooth, equaling or a little longer than the style.—Cañon City, August 13, 1872, in fruit, *Brandegee*. Bluffs at Pueblo, *Greene*.

*VESICARIA LUDOVICIANA*, DC. Canescent with a stellate pubescence; stem 6'-8' high, simple or somewhat branched above; radical leaves spatulate, entire, obtuse, cauline linear; flowers golden yellow; petals obovate; style slender, longer than the ovary and nearly as long as the obovate, globose, hairy silicle.—Platte River near Denver, *Dr. Smith*; *Coulter*.

*VESICARIA MONTANA*, Gr. *Proc. Acad. Phil.*, March, 1863, p. 58. Silvery canescent; stems spreading from a perennial root, leafy; leaves spatulate; the radical subovate, petioled, sometimes 1-2 toothed; fruiting raceme elongated, silicle oval or ellipsoidal, whitish-pubescent, a little longer than the slender style, a little shorter than the upwardly curving, spreading pedicel.—Well marked by the oval or oblong silicle, in some specimens 3" long but scarcely half that breadth, hoary with a fine stellate pubescence; seeds 4 or 6 in each cell, wingless; petals spatulate, light yellow; filaments filiform.—*Hall & Harbour*, 49; *B. H. Smith*; *Meehan*; *Porter*. Found in the mountains at middle elevations.

*PHYSARIA*<sup>1</sup> *DIDYMOCARPA*, Gr. (*Vesicaria*, Hook.) Canescent with a stellate pubescence; radical leaves broadly obovate-spatulate, occasionally lyrate, cauline spatulate-lanceolate, mostly entire; siliques large, globose-didymous, deeply emarginate above and below.—A low, decumbent, profusely branched perennial. Flower showy; petals oblong-spatulate, exceeding the oblong sepals; silicles varying in size, the lobes usually approximate, sometimes considerably divergent; septum lanceolate.—*Hall & Harbour*, 47; *Dr. Smith*; *B. H. Smith*. Long's Peak, May 27, *Coulter*.

*DRABA ALPINA*, L. Rather rigid; scapes naked, mostly somewhat hirsute; leaves spatulate-lanceolate, plane, more or less pilose with branching hairs; petals yellow, more than twice the length of the calyx; silicles somewhat corymbed, oblong-elliptical; style very short.—Dwarf, 1'-4' high; alpine and subalpine, very variable.—Mount Lincoln at 13,000 feet altitude, July, in flower, *Coulter*. Gray's Peak at 12,000 feet, *Redfield*.

*DRABA AUREA*, Vahl. More or less pubescent; stem erect, leafy; leaves lanceolate or ovate-lanceolate, entire or toothed; corymbs terminal and axillary; silicles oblong-lanceolate, pubescent, exceeding the pedicels; petals yellow, emarginate; style rather short. Variable.—In the mountains from 7-14,000 feet altitude. *Hall & Harbour*, 44; *Dr. Smith*; *Meehan*; *Brandegee*; *Coulter*. Gray's Peak, *Redfield*.

*DRABA STREPTOCARPA*, Gr. *Sill. Jour.* 1862, vol. 33, p. 13. A span high; radical leaves rosulate, spatulate-lanceolate, acutish, attenuated into a large-margined petiole,  $\frac{3}{4}$ '-1 $\frac{1}{2}$ ' long, cauline about  $\frac{1}{2}$ ', oblong or oblong-lanceolate, very entire, sessile; hairs simple or simply forked, long, rigid, shaggy, spreading; racemes often paniculate, many-flowered; petals golden yellow, twice longer than the calyx, mostly retuse or emarginate; style a little shorter than the ovary; stigma emarginate, capitate; fructiferous pedicels 3" long, more or less spreading; silicles  $\frac{1}{2}$ '- $\frac{3}{4}$ ' long, linear or oblong-ovate, minutely or strongly hispid-ciliate, usually much twisted, turns often 3-4; style long,  $\frac{1}{2}$ "-2".—Easily distinguished

<sup>1</sup> *PHYSARIA*, Nutt.—Characters as in *Vesicaria*, except that the silicle is didymous, much inflated, membranaceous, and the cotyledons contrary to the narrow septum.

from *D. aurea*, which it most resembles, by its lack of stellular pubescence, longer styles and the more twisted silicles.—In the mountains from 7–14,000 feet altitude. Alpine forms much dwarfed. *Hall & Harbour*, 45; *Parry, Canby*; *Brandegee*; *Coulter*.

*DRABA CRASSIFOLIA*, Grah. Scape naked or with a single leaf, 1'–3' high; leaves lanceolate-linear, entire or somewhat serrate, ciliate with simple hairs; calyx and pedicels glabrous; flowers small, yellow or white; petals a little exceeding the calyx, retuse; silicles ovate-elliptical, glabrous.—*Hall & Harbour*, 41. Sangre de Cristo Pass, *Brandegee*.

*DRABA NEMOROSA*, L., var. *LUTEA*, Gr. (*D. lutea*, DC.) Pubescent; stem branching, leafy, 6'–15' high, very slender, sometimes branching from the base; pubescence simple or forked; leaves oval, cauline ones lanceolate, toothed; flowers very small, yellow; petals about twice as long as the calyx; style none; silicles oblong-elliptical, rather obtuse, glabrous, about 4" long, one-third to one-half the length of the slender spreading pedicels. Alpine and subalpine.—*Hall & Harbour*, 42. Sierra Madre Range at 11–13,000 feet altitude, *Coulter*.

Var. *ALPINA*, Porter. Dwarf, 2'–3' high, branching from the base; fruiting raceme short; flowers white; pedicels shorter than the silicles; stigmas distinctly 2-lobed.—Mount Lincoln, at 13,000 feet altitude, July, *Coulter*.

*DRABA CUNEIFOLIA*, Nutt.—Cañon City, *Brandegee*.

*SISYMBRIUM CANESCENS*, Nutt. Very variable in the division of the leaves and the amount of pubescence, the latter always branched.—Very common on the plains and in the mountains at all heights. *Hall & Harbour*, 40; *Dr. Smith*; *Meehan*; *Porter*; *Brandegee*; *Coulter*.

*SISYMBRIUM GLAUCUM*, Nutt. Annual, glaucous, about 1° high, much branched, leaves entire, radical ones small, spatulate, cauline ovate, sagittate and clasping, rather acute; flowers minute, pale purple; petals cuneate-oblong, twice as long as the sepals; silicles  $\frac{3}{4}$  long, glabrous; style almost none; seeds in a single or partly in a double series; cotyledons decidedly incumbent.

South Park, July, 1872, *Porter*. A slender dwarf-form, 3'–4' in height, with smaller leaves and shorter siliques.

*SMELOWSKIA*<sup>1</sup> *CALYCINA*, Meyer. (*Hutchinsia*, Desv.) Leaves mostly radical on long petioles, deeply pinnatifid; flowers white, in dense corymbs, the limb of the petal roundish; calyx persistent; stem 4'–6' high, elongating in fruit. Alpine and subalpine.—*Hall & Harbour*, 43. Mount Lincoln at 1,300 feet altitude, July, *Coulter*.

*ERYSIMUM CHEIRANTHOIDES*, L.—*Hall & Harbour*, 38. Twin Lakes at 9,000 feet altitude, *Porter*.

*ERYSIMUM ASPERUM*, DC., var. *ARKANSANUM*, Nutt.—Variable and abundant on the plains and mountains. *Hall & Harbour*, 39; *Dr. Smith*; *Porter*; *Coulter*.

Var. *PUMILUM*, Watson. *King's Rep.*, vol. 5, p. 24. (*E. pumilum*, Nutt.) Somewhat scabrous, stems 2'–4' high; leaves linear, all entire; flowers pale yellow, conspicuous; petals longer than the calyx; stigma small, nearly entire; pedicels very short; siliques flatly 4-sided, 3' long, erect.—*Hall & Harbour*, 39. Alpine.

<sup>1</sup> *SMELOWSKIA*, C. A. Meyer. Sepals short, equal; silicle rather short, narrowed at each end, somewhat tetragonal or laterally compressed; valves concave, submembranous, with included filiform replum and membranous septum; style short and stigma simple. Seeds few in one row, immarginate, funiculus setaceous, free; cotyledons incumbent.—Perennial hoary, tomentose subscaespitose herbs, with 1–2 pinnatifid leaves and bractless flowers. *Benth.* and *Hook.*



*HESPERIS PALLASII*, Torr. & Gray. *Fl. N. Am.* 2, p. 666. Sparsely pubescent with closely appressed hairs fixed by the middle and acute at each end, minutely scabrous under the microscope; stems 3'-6' high; from a fusiform root; radical leaves numerous, linear or lanceolate-linear, sparingly toothed, 1'-1½' long, tapering into a petiole; raceme short; pedicels much shorter than the flowers; flowers large for the size of the plant; upper cauline leaves linear; sepals oblong, obtuse, with scarious margins, gibbous at base, 4" long; petals with a long, broad, pale-colored claw which exceeds the sepals; limb round-obovate, purple; anthers cordate at base; ovary hairy; stigma capitate, somewhat 2-lobed.—The blunt lobes of the capitate stigma, which do not connive, separate this plant from the genus *Hesperis*. In all its other characters it seems to accord well with the brief description of Pursh's *Cheiranthus Pallasii*. The specimens are in flower only, with no mature siliques.—Chicago Lakes at 12,000 feet altitude, June, *Coulter*.

*STANLEYA* <sup>1</sup> *PINNATIFIDA*, Nutt. (*S. integrifolia*, James.) Stems 2° to 3° high, often several from one root; lower leaves lyrate-pinnatifid or nearly entire, large, sometimes minutely pubescent beneath; upper leaves entire, narrowed at the base into a slender petiole; filaments very long and slender, pubescent below with a glandular enlargement at the base; siliques 2' long, somewhat torulose, twice longer than the stipe. *Hall & Harbour*, 50; *Coulter*. Colorado City, *Porter*.

<sup>2</sup>*THELYPODIUM INTEGRIFOLIUM*, Endl. (*Pachypodium*, Nutt.) Stem terete, smooth, 3°-5° high, attenuated upward and sending out numerous branches toward the summit; leaves entire, radical ones petioled, oblong-elliptical, cauline lanceolate, sessile, uppermost nearly linear; flowers almost corymbose, crowded, pale rose-color; pedicels ½' long, almost horizontal, twice as long as the calyx; petals spatulate, obovate; siliques short, abruptly pointed, on a short stipe.—South Park, July, *Porter*. Wet Mountain Valley, *Brandege*. *Hall & Harbour*, 51.

*THELYPODIUM LINEARIFOLIUM*, Gr. (*Streptanthus*, Gr. *Pl. Fendl.*, p. 7.) Very glabrous, 1° or more high, from an annual or biennial root often branched from the base, erect, paniculate at the top; leaves linear, or the lower lanceolate, acutish, very entire, attenuate at base, sessile, somewhat rigid, pale, 1½'-2' long; sepals turning purplish; petals obovate, rose-purple, ½' or less; claws scarcely twice longer than the lax calyx; siliques erect, on spreading pedicels, very slender, teretish, 2' to 2½' long, apiculate with a very short style; valves carinate, 1-nerved; seeds oblong, without margins.—Cañon City and Wet Mountain Valley, *Brandege*.

*THELYPODIUM WRIGHTII*, Gr. *Pl. Wright* 1, p. 7. Stem 2°-3° high, from a biennial or annual root; leaves broadly or narrowly lanceolate, 2' to 4' long, repand-dentate or denticulate, all narrowed into a short petiole; flowering racemes short and dense, fruiting raceme moderate-

<sup>1</sup> *STANLEYA*, Nutt. Sepals long, spreading. Petals narrowed, elongated, with long claws. Anthers twisted; siliques long-stipitate, slender, nearly terete, subcompressed; valves 1-nerved; style short or none; stigma simple. Seeds in one row, oblong, pendulous; cotyledons incumbent.—Perennial, glabrous, glaucous; flowers yellow, in long, strict, many flowered, bractless racemes. *Benth.* and *Hook*.

<sup>2</sup>*THELYPODIUM*, Endl. Sepals elongated, equal at base, often colored. Petals long, linear, or with a plane lamina, unguiculate. Anthers linear. Siliques sessile or with a very short thick stipe, linear, sub terete or somewhat compressed, torulose, not greatly elongated; valves convex, subcarinately 1-nerved; style rather short; stigma nearly entire. Seeds in one row, oblong, somewhat compressed, immarginate or scarcely margined; cotyledons more or less incumbent.—Annual or perennial, with spicately racemed bractless white or rose-colored flowers; siliques 1' to 2½' long. *S. Watson*.

ly elongated, 4'-5' long; pedicels divaricate, 6'' long; petals scarcely exceeding the calyx; siliques slender, 2' long, widely spreading; on very short stipes; seeds oblong, emarginate.—Cañon City, *Brandegee*. Webster Cañon, *Redfield*.

*CAMELINA SATIVA*, Crantz. *Greene*. On the road from Denver to Idaho Springs, *Porter*. Introduced.

*LEPIDIUM INTERMEDIUM*, Gr.—*Porter*. Weston's Pass, July 18, *Coulter*. Denver, *Redfield*.—This species shows considerable variation. Apetalous states are not uncommon; one form from the neighborhood of Denver has such slender, delicate racemes and small pods, that if the pods were oval and not orbicular, it could be safely referred to *L. rudemale*, L. Denver, *Dr Smith*. Cañon City, *Brandegee*.

*LEPIDIUM ALYSSOIDES*, Gr. *Pl. Fendl.*, p. 10. Annual, glabrous, 6' to 12' high; stems diffuse, corymbose-racemose; branches minutely puberulent; leaves narrowly linear, mucronulate, attenuate at base, very entire, 1½'-2' long, 1''-2'' wide, lowest often pinnately 3-5 lobed; racemes dense, corymbose; petals round-spatulate, thrice longer than the calyx; stamens 6; silicles ovate, wingless, scarcely emarginate, glabrous; style very short, but thrice the length of the minute emargination.—South Park, July, *Porter*. Near Pueblo, *Greene*; *Redfield*.

*LEPIDIUM MONTANUM*, Nutt. Nearly glabrous, decumbent; branches many from a long, somewhat woody root, 8' to 12', spreading in a circular manner; radical leaves usually more or less bi-pinnatifid, segments short, acute, upper leaves trifid or entire; flowers rather conspicuous, sepals oval-oblong; petals nearly twice as long as the sepals; style conspicuous; silicles 2'' long, indistinctly reticulated, elliptical, slightly emarginate, wingless; pedicels 3''-4'' long; cotyledons incumbent.—South Park, *Canby*; *Porter*.

*LEPIDIUM SATIVUM*, L.—Near Denver, *Dr. Smith*. Introduced. Distinguished by its larger, ovate, winged pods, slightly notched at the top.

*THLASPI ALPESTRE*, L. (?) Perennial, glabrous; stems ascending, 3'-12' high, simple; radical leaves petioled, ovate or obovate, entire or denticulate, cauline ovate-oblong, cordate, clasping; racemes crowded, or usually elongated and loose, ½'-6' long; flowers rather large, petals 1''-3'' long; pods 2''-4'' long, acutely margined but not winged, short-oblong, cuneate at base, emarginate, truncate or rounded at the apex, 4-8 seeded; style ½''-1'' long.—We have followed Watson (in *King's Rep.*, vol. 5, p. 31) in naming this plant, which is usually referred to *T. cochleariforme*, DC.—Alpine and subalpine; frequent. *Hall & Harbour*, 46; *Meehan*; *Brandegee*; *Coulter*. Gray's Peak at 11,500 feet, *Redfield*.

### CAPPARIDACEÆ.

*CLEOME*<sup>1</sup> *INTEGRIFOLIA*, T. & G. Annual, somewhat glaucous, 2°-3° high, widely branching; leaves 3-foliolate; leaflets lanceolate (the lowermost oblong) entire, submucronate; racemes sometimes nearly 1° long; flowers large, showy, reddish purple, rarely white; sepals united to the middle, persistent; segments triangular-acuminate; petals with very short claws; stamens equal; pods oblong-linear, compressed, much longer than the stipe.—On water-courses along the foot-hills and

<sup>1</sup> *CLEOME*, L. Sepals distinct or somewhat united. Stamens 6 or rarely 4. Torus minute. Pod linear or oblong, subsessile or stipitate.—Annual herbs or shrubs, with digitate or simple leaves and racemed or solitary flowers. *Benth. & Hook.*

on the plains. *Dr. Smith; B. H. Smith; Porter; Coulter; Hall & Harbour, 52.*

*CLEOMELLA* <sup>1</sup>*ANGUSTIFOLIA*, Torr. Glabrous, 1° or more high, branching above; leaflets oblong-linear, acutish, very entire; upper bracts simple; ovary many times surpassing the style, shorter than the stipe; capsule dilated-rhomboid, acute; seeds transversely rugulose.—*Hall & Harbour, 53; Parry.* This is *C. tenuifolia*, Torr., 104 of Parry's Rocky Mountain Plants, *Gray's Enumeration, Sill. Jour.*, vol. 33, p. 404.

*POLANISIA UNIGLANDULOSA*, DC. (*P. trachysperma*, T. & G. *Fl. N. Am.* 1, p. 669.) Viscidly pubescent, branching; leaves 3-foliolate; leaflets and bracts oblong-lanceolate; stamens 8–16; filaments deep purple, twice or thrice the length of the petals; style about the length of the ovary; pods linear-oblong, attenuate at base; seeds turgid, rough and warty; capsule short-stipitate.—On the Platte, near Denver, *Dr Smith; Redfield.*

### VIOLACEÆ.

*VIOLA PALUSTRIS*, L.—*Parry, 110.*

*VIOLA CUCULLATA*, Ait.—Bear Creek Cañon, *Coulter.*

*VIOLA DELPHINIFOLIA*, Nutt.—Plains near Denver and on the Saint Vrain River, *Coulter.* Golden City, *Greene.*

*VIOLA BIFLORA*, L. Stem weak, about 2-leaved, 2-flowered; leaves reniform, very obtuse, crenate; stipules ovate, very entire; flowers very small, yellow, petals marked with brown striæ; sepals acute or acutish; spurs short.—*Hall & Harbour, 54.*

*VIOLA CANINA*, L.—Near Mount Lincoln, July, *Coulter.*

*VIOLA CANADENSIS*, L.—Cañon City, *Brandagee.* Near Long's Peak, May, *Coulter.*

*VIOLA NUTTALLII*, Pursh. Stems numerous, short, erect; leaves ovate-lanceolate, somewhat pubescent or nearly glabrous, undivided but sometimes obscurely sinuate-toothed, attenuated into a long petiole; stipules lanceolate, entire, or obscurely ciliate-toothed; flowers small, pale yellow; spur very short; peduncle shorter than the leaves.—*Hall & Harbour, 55.* Near Denver, May, *Coulter.*

*IONIDIUM* <sup>2</sup>*LINEARE*, Torr. *Am. N. Y. Lye.* 2, p. 168. Somewhat pubescent, stem branched; leaves opposite, occasionally alternate, entire or remotely serrulate, the lower varying from lanceolate to oblong or obovate, the upper linear, obtuse or acute, usually 3–4 times the length of the stipules; stipules linear, one-third the length of the leaves; peduncles slender, 2"–6" long, articulated, bibracteolate; flowers small; capsules glabrous; seeds turning black.—*Hall & Harbour, 57.* Cañon City, *Brandagee.*

<sup>1</sup> *CLEOMELLA*, DC. Sepals distinct, short and spreading. Torus short, oblong. Stamens 6, incurved in aestivation. Pod short, obovate-rhomboidal, 4–8 seeded, with reticulate, deltoid, or boat-shaped saccate valves, and upon a filiform stipe. Seeds smooth, pitted, or variously reticulated; embryo conduplicate; radicle elongated.—Annual glabrous herbs with stipulate 3-foliolate leaves, entire leaflets and racemed, leafy-bracted yellow flowers. *Benth. & Hook.*

<sup>2</sup> *IONIDIUM*, Vent. Sepals more or less unequal, not auricled; petals very unequal, the two upper shorter, the lower one very large, unguiculate; the claw dilated, shortly gibbous or concave; stamens approximate, the anterior ones each furnished with a nectariferous gland at the base.—Low herbs or suffruticose plants, leaves alternate or opposite: peduncles axillary, solitary. *Gr. Gen. Ill.* 1, p. 189, t. 82.

FRANKENIACEÆ.<sup>1</sup>

FRANKENIA JAMESII, Torr. *Gr. in Proc. Am. Acad.* v. 8, p. 622. Much branched from a woody base, 6'-10'; branchlets minutely pubescent; leaves opposite, linear, strongly revolute on the margins, somewhat mucronate, 6''-8'' long, with fascicles of shorter ones in their axils; flowers terminal, sessile; petals long-clawed, white, limb oblong-cuneate, erose-denticulate at the tip, 2½''-3'' long, nearly twice the length of the calyx-tube; stamens 6, exerted; stigmas terminal; ovules 3, oblong-linear, pendulous from the apex of a very long subbasilar funiculus.—Cañon City, *Brandegee*. Near Pueblo, *Redfield*.

## CARYOPHYLLACEÆ.

SAPONARIA VACCARIA, L. (*Vaccaria vulgaris*, Host.)—*Hoopes*; *Greene*. Introduced.

SILENE ACAULIS, L. *Gray's Manual*, p. 90.—High alpine, growing in dense mats near the snow-line, at 10,000 to 14,000 feet altitude. July, August. *Hall & Harbour*, 65. *Gray's Peak*, *Dr. Smith*; *B. H. Smith*. *Pike's Peak*, *Porter*. Mount Lincoln, at 14,000 feet altitude, *Coulter*. *Gray's Peak*, 12,000 to 13,000 feet, *Redfield*.

SILENE SCOULERI, Hook. Stem erect; racemes sub-compound, narrow, few-flowered; flowers erect or nodding, longer or shorter than the pedicels; calyx oblong, clavate, somewhat dilating, teeth broad-lanceolate, acutish, slightly ciliate; petals white or pinkish, bifid, the lobes oblong, emarginate, the appendages obtuse; claws with acute auricles, woolly-ciliate as well as the filaments; capsule obovate-oblong, three to four times longer than the stipe.—*Hall & Harbour*, 61; *Hoopes*. In the mountains.

SILENE MENZIESII, Hook. Minutely glandular-pubescent; stems numerous, dichotomously branched, 6'-12' high, weak, ascending, leafy to the summit; leaves crowded, ovate-lanceolate or oblong-ovate, acuminate at both ends; peduncles axillary and terminal, 1-flowered; petals white, bifid, 3'' long, exceeding the obovate, deeply 5-toothed calyx; styles thickened above, conspicuously bearded within.—*Hall & Harbour*, 64.

LYCHNIS APETALA, L. Pubescent; stems simple, 3'-4' high, 1-flowered; calyx ovoid, 10-striate, including the petals; filaments and claws of the petals naked; seeds large and margined.—*Hall & Harbour*, 63. Mount Lincoln at 13,000 feet altitude, July, *Coulter*.

LYCHNIS DRUMMONDII, Watson. (*Silene Drummondii*, Hook. ?) *King's Rep.*, vol. 5, p. 37. Glandular-pubescent and viscid; stems several, 10-30 high, erect, simple; leaves remote, linear-lanceolate; raceme loose, few-flowered, with elongated pedicels, alternate or oppo-

<sup>1</sup> FRANKENIACEÆ. A. St. Hil. Sepals 5, united in a furrowed tube, persistent, equal; petals alternate with the sepals; stamens hypogynous, either equal in number to the petals and alternate with them, or having a tendency to double the number; anthers roundish, versatile; ovary 1-celled, with 2-3 parietal placentæ; styles 2-3, filiform, united for a considerable part of their length; capsule 1-celled, inclosed in the calyx, 2-3, or 4-valved, many seeded; seeds attached to the margins of the valves, very minute, anatropous; embryo straight; erect in the midst of albumen.—Herbaceous plants or undershrubs. Stems very much branched. Leaves opposite, exstipulate, with a membranaceous sheathing base, often revolute at the edges. Flowers sessile in the divisions of the branches, and terminal, embosomed in leaves, usually pink. *Lindl.*

FRANKENIA, L. Styles 3, united below, stigmatic along the inner surface; capsule loculicidal; many-seeded. *Torr. & Gray*.

site; flowers 3-5; calyx oblong, cylindrical, erect; petals white or purplish, the limb 2-lobed or emarginate, scarcely exceeding the calyx, minutely crowned and narrower than the obtusely, strongly auricled claw; seeds reniform, uniformly tuberculated under the microscope, emarginate.—In the mountains at middle elevations. *Hall & Harbour*, 62; *Dr. Smith*; *Canby*; *Brandege*. South Park, *Coulter*.

*CERASTIUM VULGATUM*, L., var. *BEHRINGIANUM*, Gr. Flowers large, petals and capsules half longer than the calyx, shorter than the pedicels; stems few, 2-4 flowered.—*Hall & Harbour*; *Brandege*. Mount Lincoln, *Coulter*.

*CERASTIUM ARVENSE*, L.—In the mountains, at all elevations. *Hall & Harbour*, 75; *Dr. Smith*; *B. H. Smith*; *Meehan*; *Porter*; *Coulter*.

*STELLARIA JAMESIANA*, Torr. *Ann. N. Y. Lyc.*, v. 2, p. 169. Viscidly pubescent; leaves linear-lanceolate, 4' long, acute; stems weak, 1°-2° high; leaves slightly falcate, closely sessile; cyme divaricate; few-flowered; petals two-lobed, twice longer than the oblong, acute sepals; capsule as long as the calyx, deeply valved; seeds few, rugose.—*Hall & Harbour*, 78.

*STELLARIA LONGIPES*, Goldie.—At all elevations. *Hall & Harbour*, 71 and 76; *Canby*; *Brandege*; *Coulter*.

*STELLARIA CRASSIFOLIA*, Ehrh.—*Hall & Harbour*.

*STELLARIA BOREALIS*, Big.—Alpine and subalpine. *Hall & Harbour*, 72; *Dr. Smith*. Mount of the Holy Cross, at 13,000 feet altitude, August, *Coulter*.

*STELLARIA UMBELLATA*, Turcz. Glabrous, stem 6'-1° high, weak; leaves ovate to oblong-lanceolate; peduncles axillary and terminal, divaricate, filiform and elongated, with scarious bracts; petals wanting; sepals short, 1' long, ovate, acute, nerveless or 1-nerved, (rarely 3-nerved;) capsule deeply valved, twice longer than the calyx; seeds smooth.—*Hall & Harbour*, 70. Twin Lakes, *Coulter*.

*ARENARIA CONGESTA*, Nutt. Cæspitose, glabrous; stem simple, 6'-1° high; leaves long; linear-subulate, pungent, over 2' long; flowers in roundish, compact heads or fascicles, with crowded membranaceous bracts; sepals ovate, membranous, obscurely 3-nerved, about half the length of the oblong petals; capsule coriaceous, equaling the calyx; seeds very small, angular, smooth.—White House Mountain, at 13,000 feet altitude, *Coulter*. North Park, *Hayden*.

*ARENARIA FENDLERI*, Gr. Stems numerous, from a perennial caudex, 6'-15' high, glabrous below, more or less glandular, pubescent above, imbricately many-leaved at base; leaves long, 3'-5', erect, setaceous, somewhat flattened; serrulate-scabrous, smooth except on the margins, those of the stem successively shorter; cymes strict and few-flowered; pedicels slender; sepals ovate-lanceolate, cuspidate, acuminate, green, with a broad, scarious margin, 5-nerved, nearly equaling the obovate petals, which are white and 4' long; styles exerted; capsule about equaling the calyx, 6-valved; seeds papillose-scabrous.—*Hall & Harbour*, 79; *Parry*; *Canby*; *Dr. Smith*; *B. H. Smith*; *Meehan*; *Brandege*; *Porter*; *Coulter*.

Var. *SUBCONGESTA*, Watson. Low, 3'-6' high, smooth except the minutely puberulent short pedicels, few-flowered; petals but little exceeding the ovate, acuminate, scarious sepals; leaves short.—Hills around Cañon City, *Brandege*.

Var. *DIFFUSA*. Branches of the cyme elongated, lax and widely spreading; flowers numerous.—Ute Pass, *Porter*.

*ARENARIA VERNA*, L., var. *HIRTA*, Fenzl. Cæspitose, 2'-3' high, minutely hirsute; leaves subulate, 3-nerved, erect, obtuse or acutish; cyme erect, few or many flowered; sepals ovate, acute, strongly 3-nerved, mostly exceeding the petals.—Summit of Pike's Peak, *Canby*. Clear Creek Cañon, *Coulter*. James's Peak, *Greene*.

*ARENARIA ARCTICA*, Stev., var. *OBTUSA*. T. & G. Cæspitose, stems 1'-3' high; leaves linear-subulate, obtuse, carinate, thickish, serrulate-ciliate, obscurely 3-nerved; peduncles glandular-pubescent, 1 (rarely 2-3) flowered; petals about half longer than the oblong sepals.—*Hall & Harbour*, 77; *Dr. Smith*; *B. H. Smith*; *Meehan*; *Brandege*. Mount Lincoln at 13,000 feet altitude, *Coulter*. Gray's Peak, *Redfield*.

*ARENARIA ALPINA*, L. (*Alsine biflora*, Wahl.) Cæspitose, stems creeping, branches erect, 2'-3' high, mostly 1-flowered, minutely pubescent; leaves narrowly linear, 3''-3½'' long, nerveless, subconvex beneath; sepals linear, very obtuse, cucullate at the summit, 3-nerved; petals oblong, cuneate, much longer than the capsule and calyx.—*Hall & Harbour*, 77; *Canby*.

*ARENARIA (ALSINE) ROSSII*, R. Br. Cæspitose; leaves subulate-triquetrous, rather obtuse, nerveless, scarcely equaling the flower or exceeding the calyx, mostly shorter than the internodes, with manifest lateral nerves; peduncles 1-flowered; petals oblong, as long as or a little exceeding the obscurely 3-nerved sepals. Flowers sometimes apetalous.—*Hall & Harbour*, 69. Clear Creek Cañon, *Coulter*.

*ARENARIA LATERIFLORA*, L.—*Hall & Harbour*, 74.

*SAGINA LINNÆI*, Presl. (*S. decumbens*, T. & G.) Mostly glabrous; stems decumbent, branched, ascending, 1'-3' long; leaves linear-subulate, very acute; peduncles much longer than the leaves; petals and sepals 5, equal, obtuse; capsule a little longer than the calyx. Almost wholly apetalous, glabrous, with narrowly linear leaves, which are mostly mucronate; sepals oblong or ovate.—*Hall & Harbour*, 68. Twin Lake Creek, *Coulter*.

### PORTULACACEÆ.

*PORTULACA OLERACEA*, L. (*P. retusa*, Eng.)—Denver, July 31, *Dr. Smith*; *Greene*. Introduced.

*TALINUM TERETIFOLIUM*, Pursh. Found in the mountains with flowers fully as large as in eastern specimens.—*Hall & Harbour*, 81. *Meehan*; *Porter*; *Brandege*. Colorado Springs and Chiann Cañon.

*CALANDRINIA*<sup>1</sup> *PYGMÆA*, Gr. (*Talinum pygmaeum*, Gr.) *Proc. Am. Acad.*, v. 8, p. 623. Acaulescent, glabrous; root thick, fusiform; the linear leaves and 1-3 flowered scapes (1'-2') crowded; sepals orbicular, glandular-dentate or entire; petals rose color, 6-8, unequal; stamens, 4-7; stigmas 3-5; style short, or almost none; ovules, 16-20.—*Parry*, 143. Mount Lincoln at 13,500 feet altitude, *Coulter*. Gray's Peak, *Redfield*. Alpine.

*CLAYTONIA CAROLINIANA*, Mx., var. *LANCEOLATA*, Watson, (*C. lanceolata*, Pursh.) Cauline leaves ovate, lanceolate or linear, sessile or short-petioled; petals more or less emarginate or entire, rose-color or white.—Mount Lincoln at 14,000 feet altitude, July, *Coulter*.

<sup>1</sup> *CALANDRINIA*, H. and B. Calyx 2-parted, persistent. Petals 3-5, distinct or somewhat connate at base. Stamens 4 to 15. Style very short, 3-cleft at the apex, lobes clavate. Capsule oblong-elliptic, 3-valved. Seeds estrophiolate.

CLAYTONIA ARCTICA, Adams., var. MEGARHIZA, Gr. *Sill. Jour.* (N. S.) 33, p. 406. Root fusiform, very large; leaves 1'-6' long, 2"-12" wide, fleshy; radical ones petioled, cauline ones lanceolate or linear-lanceolate, opposite, sessile, racemes secund, subsessile; flowers large; petals obovate, submarginate, 2"-6" long. Flowers from June to August. —High alpine, growing in crevices of the rock, its large, purple tap-root penetrating to a great depth. Flowers profuse, white, with pinkish veins. —*Hall & Harbour*, 83; *Parry*, 142. Gray's Peak at 14,000 feet altitude, *Coulter*; *Redfield*.

CLAYTONIA CHAMISSONIS, Esch. & Ledeb. (*C. aquatica*, Nutt.) Stems erect or decumbent, stoloniferous and rooting at the joints, becoming 1° in length; roots bulbiferous; leaves opposite, spatulate, or oblong-obovate, attenuate below, rather obtuse, 1'-2' long; racemes apparently axillary, peduncled, simple, few-flowered; flowers white, rather large; petals obovate, entire, twice longer than the calyx.—*Hall & Harbour*, 84; *Parry*; *Canby*; *Meehan*; *Brandegee*; *Coulter*. Sangre de Cristo Range, *Redfield*.

### ELATINACEÆ.

ELATINE AMERICANA, Arn.—On the Platte River, *Hall & Harbour*, 59.

### HYPERICACEÆ.

HYPERICUM SCOULERI, Hook. Perennial, herbaceous; stems terete below, 6'-2° high; leaves oblong-obovate, closely sessile or clasping, very obtuse,  $\frac{3}{4}$ ' long, not dotted, under-surface with numerous prominent veins; cyme compound; sepals broadly ovate, rather obtuse,  $\frac{1}{3}$  the length of the petals; sepals, petals, and anthers dotted with black; stamens numerous; styles 3, distinct, erect; capsules tricarpellary; placentæ united to the middle.—Common. *Hall & Harbour*, 58; *Meehan*; *Canby*; *Brandegee*; *Coulter*.

### MALVACEÆ.

CALLIRRHÖE INVOLUCRATA, Gr. Hirsute; stem branching, procumbent, leaves deeply 3-5-parted, covered with stellate hairs, segments linear-lanceolate, laciniately 3-5-toothed; peduncles erect, 1-flowered, longer than the leaves; flowers few in a loose panicle, about 1½' in diameter, axillary, scarlet; bracteoles 3, linear-lanceolate,  $\frac{2}{3}$  the length of the deeply-parted calyx; carpels numerous, hairy, not wrinkled.—Purgatory River, *Dr. Bell*. *Parry*, 148.

SIDALCEA<sup>1</sup> MALVÆFLORA, Gr. Glabrous or hispid, 1°-3° high, simple; lower leaves roundish, more or less deeply 7-9 lobed, cauline more narrowly and deeply 5-7 lobed, segments linear, somewhat toothed; raceme terminal; pedicels at first shorter, at length longer than the subulate bracts; calyx hispid or tomentose, the lobes ovate, acute or acuminate; flowers variable in size, 1'-2' in diameter, purple, occasionally white; styles 7-8, free at the summit; stigma simple; carpels 7, pointless.—Middle elevations in the mountains. North Park, *Hayden*. South Park, *Porter*; *Canby*; *Brandegee*.

<sup>1</sup>SIDALCEA, Gray. Bractlets none. Calyx 5, cleft. Staminal tube double; the outer of 5, the inner of 10 narrower phalanges of stamens. Styles united below, filiform, stigmatose the whole length of the inner face. Ovaries 5-9, united in a circle around a central receptacle. Carpels membranous, beakless, reniform, 1-seeded, indehiscent, separating from the short axis. Seed reniform, ascending.—Perennial herbs, with purple, rose-colored or white flowers in paniculate racemes. *Gr., Gen. Ill.*, 2, p. 57.

*SIDALCEA CANDIDA*, Gr. *Pl. Fendl.*, p. 24. Stems simple, 2°-3° high, from a perennial, creeping rhizoma, leafy, glabrous above, sparsely hairy below; lower leaves orbicular, 2'-8' in diameter, 7-lobed, smooth, ciliate, segments coarsely 3-5 toothed, or incised, rounded; upper leaves 7-lobed or parted, the floral ones 3-5, segments lanceolate, entire; stipules oval, ciliate; raceme usually short, compact, glandular, tomentose; pedicels shorter than the bracts; lobes of the tomentose calyx ovate; corolla white or cream-color; petals 8"-12" long; anthers blue; carpels 9-10, smooth, cochleate-reniform; minutely apiculate at the inner angle, mucronate.—On water-courses. Rare. *Hall & Harbour*, 85; *Parry*, 429; *Meehan*; *Brandegee*. Eagle River, *Coulter*.

*MALVASTRUM COCCINEUM*, Gr.—Common at low elevations, in dry soil. *Hall & Harbour*, 86; *Dr. Smith*; *B. H. Smith*; *Canby*; *Porter*; *Coulter*. Abundant along the Platte. Colorado Springs, *Redfield*.

*SPHÆRALCEA*<sup>1</sup> *ANGUSTIFOLIA*, Spach. (*S. stellata*, T. & G. *Fl. N. Am.* 1, p. 228.) Densely clothed with a grayish, stellate pubescence; stem 1°-3° high, branched; leaves oblong-lanceolate, acute, petioled, 2'-3' long, 4"-9" wide, erosely-serrulate, rugose; petioles 4"-12" in length; peduncles axillary, shorter than the petioles, 2-many-flowered; flowers more or less aggregated; corolla purple; carpels 12-14, with two short, slightly recurved points; 2, rarely 3-seeded; seeds reniform, glabrous; stipules setaceous.—Cañon City, *Brandegee*. Common about Pueblo, *Greene*.

*ABUTILON*<sup>2</sup> *PARVULUM*, Gr. *Pl. Wright*, 1, p. 21. Cinereous-tomentose with a lax minute pubescence; stems slender, spreading, from a perennial woody root, paniculate above; branchlets pilose with spreading hairs; leaves small, 6"-12" broad, cordate, dentate, sometimes 3-lobed, usually obtuse, canescent, tomentose beneath; peduncles axillary, 1-flowered, longer than the leaf; flowers small, yellow; capsule ovoid, somewhat tomentose, 5-lobed at the apex, much longer than the short calyx; carpels erect, 5, rather obtuse, awnless, 2-3-seeded.—Ledges of rock near Cañon City, *Greene*.

## LINACEÆ.

*LINUM PERENNE*, L. Perennial, glabrous; stems 1°-3° high, branching above; branches virgate; leaves alternate, scattered, linear, acute; flowers terminal and nearly opposite the leaves, large; peduncles becoming elongated and nodding in fruit; sepals oval, with membranous margins, a little shorter than the globose capsule; petals free, retuse, blue, 3-4 times the length of the calyx; styles 5, capsule 5-celled, with bearded dissepiments.—Not rare in the mountains, but more common at higher elevations. *Hall & Harbour*, 87; *Dr. Smith*. North Park, *Hayden*; *Coulter*.

*LINUM RIGIDUM*, Pursh. Stems 5'-15' high, angled, much-branched; branches strict, ascending; leaves alternate; linear, pungently-acute, rigid, with scabrous margins; flowers panicled or corymbose; pedicels

<sup>1</sup> *SPHÆRALCEA*, St. Hil. Involucel 2-3 leaved, setaceous, often deciduous. Stigmas capitate. Ovaries many, 15-20. Carpels 1-celled, 2-ovuled, the lower ovule ascending, the other pendulous, compressed, often truncate and pointed above, membranaceous or coriaceous, 2-valved above, hardly separating from each other and from the axis. Radicle inferior, or in the upper seed centripetal-superior. *Gr.*, *Gen. Ill.*, 2, p. 69.

<sup>2</sup> *ABUTILON*, Tourn., Gærtu. Involucel none. Stigmas capitate. Ovules 3 in each carpel, rarely 4-9, all or the lower spreading or resupinate-pendulous. Fruit of 5-many carpels. Carpels, 1-celled, about 2-valved, scarcely separating from the axis. Radicle ascending or centripetal. Leaves cordate. *Gray*, *Gen. Ill.*, 2, p. 65.



thickened at the end, and forming an exterior cup-shaped calyculus; sepals ovate-lanceolate, cuspidate, strongly 3-nerved, glandular spinulose-scabrous on the margins, longer than the globose capsule; petals sulphur-yellow.—Cañon City, *Brandegee*; *Greene*.

### GERANIACEÆ.

*GERANIUM RICHARDSONII*, F. and M. (*G. albiflorum*, Hook.) Stem erect,  $1\frac{1}{2}^{\circ}$ – $3^{\circ}$  high, dichotomously branching, glabrous below, branches slender; leaves deeply 5-parted, lobes sharply incised, sparsely pubescent; petioles smooth; radical ones on long petioles, uppermost opposite, on short petioles, rather acuminate; pedicels and sepals glandular-pilose; petals entire, white or pale rose-color, hirsute at base; filaments pilose at base, equaling the pilose styles, which are connate one-third their length; capsule glandular-pilose.—Growing in damp, shaded spots along water-courses in the mountains, frequent. Taller but less robust in all its parts and less hairy than the following, from which in some forms it can scarcely be distinguished.—*Hall & Harbour*, 88; *Porter*; *Brandegee*; *Coulter*.

*GERANIUM FREMONTII*, Torr. *Plant. Fendl.*, p. 26. Perennial, stems numerous, diffusely branching,  $6'$ – $1^{\circ}$  in height, more or less pubescent throughout, with a short, close, glandular pubescence sparsely intermixed with longer, pilose hairs; upper leaves deeply 3–5-cleft, truncate at base, or the lowest cordate with a broad sinus, radical ones 7-cleft, segments 3-lobed or incised, mucronate-acute; peduncles  $1'$ – $3'$  long, bearing two flowers on pedicels  $1'$ – $2'$  long; sepals short-awned; fruiting pedicels more or less divaricate and declined; petals obovate, emarginate, light or deep purple, villose at the base, sparingly villose-bearded on the veins; filaments pilose-ciliate, equaling the naked styles which are connate below; seeds delicately reticulated; stems numerous and spreading, divaricately branched above, growing in dense tufts, with large purple flowers  $1'$  in diameter.—Very common on dry, open hill-sides, on the plains and in the mountains. *Dr. Smith*; *B. H. Smith*; *Porter*; *Coulter*. The degree of pubescence is variable, some forms being nearly smooth.

*OXALIS VIOLACEA*, L.—Glen Eyrie. *Porter*.

*OXALIS STRICTA*, L.—In the lower foot-hills. *Dr. Smith*; *Brandegee*; *Coulter*.

### ZYGOPHYLLACEÆ.<sup>1</sup>

*KALLSTRÆMIA MAXIMA*, T. & G. (*Tribulus maximus*, L.) Stems diffusely procumbent,  $1^{\circ}$ – $2^{\circ}$  long leaves opposite, abruptly pinnate; leaflets in three, or, rarely, four pairs, oblong or oval; mucronate, slightly falcate, pubescent beneath, terminal ones largest; peduncles  $1'$  long, solitary, axillary, 1-flowered; flowers yellow; petals marcescent; cocci gibbous below, tuberculate.—Fremont County, *Brandegee*.

<sup>1</sup>ZYGOPHYLLACEÆ, R. Br. Flowers perfect, regular, sepals 4–6. Æstivation usually convolute. Petals 4–6, alternate with the sepals, clawed; at first short and scale-like; at length equal to the sepals. Stamens twice as many, hypogonous. Filaments distinct, dilated at base, sometimes placed on the back of a small scale. Anthers fixed near the middle, introrse. Ovary of 4–5 united carpels, opposite the petals, with five scales or glands at base, or surrounded by a sinuate disk. Ovules two or more, attached to the inner angle of the carpel, pendulous or rarely erect. Styles and stigmas united. Fruit capsular, carpels 4–5, which sometimes in fruit split into ten 1-seeded cocci without transverse partitions.—Herbs, shrubs, or trees. Leaves opposite, stipulate, not dotted, rarely simple.

*KALLSTRÆMIA*, Scop. Sepals 5–6, persistent, lanceolate or subulate. Petals 5, obovate. Filaments 10–12, naked. Ovaries 10–12-celled, cells 1-ovuled. Berries separating from the persistent styliferous axis, 1-seeded, indehiscent. Style conical, 10-furrowed. Stigma capitate, 10-ribbed.

## RUTACEÆ.

*PTELEA ANGUSTIFOLIA*, Benth. Distinguished from *P. trifoliata*, L., (*Gray's Manual*, p. 110,) by its much smaller and more emarginate fruit, and its oblong or lanceolate leaves, pubescent or villous, becoming smooth and shining with age.—Fifteen miles west of Cañon City, *Porter*; *Redfield*.

## VITACEÆ.

*VITIS RIPARIA*, Mx. (*V. cordifolia*, Mx., var. *riparia*., Gr.)—Cañon City. *Brandegee*.

*AMPELOPSIS QUINQUEFOLIA*, Mx.—*Meehan*.

## CELASTRINEÆ.

*PACHYSTIMA*<sup>1</sup> *MYRSINITES*, Raf. (*Oreophila myrtifolia*, Nutt.) Stems 1°–2° high, densely branched, very leafy; leaves roundish-oval, or oblong,  $\frac{1}{2}$ "–9" long; flowers somewhat fasciated on short peduncles, small, green or brownish, apparently always perfect (monœcious, *Nuttall*.)—In dense clumps on wooded slopes. *Hall & Harbour*, 92; *Parry*. At middle elevations, rare.

## RHAMNACEÆ.

*CEANOTHUS VELUTINUS*, Dougl., var. *LÆVIGATUS*, T. & G. A densely-branched shrub, usually 2°–4° high; leaves round or ovate-elliptical, 2'–3' long, rather obtuse, sub-cordate, glandularly crenate-serrate, coriaceous, glabrous and shining above, smooth or very slightly pubescent and strongly 3-ribbed beneath; petioles  $\frac{1}{2}$ ' in length; panicles axillary, compound, on rather long peduncles; flowers white.—*Parry*. Mountains west of Denver, *Greene*.

*CEANOTHUS FENDLERI*, Gr. Shrub, 1 $\frac{1}{2}$ ° high, widely and intricately branched; branches and branchlets terete, slender, often spinescent, whitish, puberulent, at length glabrous, smooth; leaves small,  $\frac{1}{3}$ '– $\frac{1}{2}$ ' long, oval or elliptic, obtuse, very entire, not glandular, 3-nerved, silky-canescens beneath, smoothish and green above; flowers in clusters, dense, sessile, glabrous, white.—*Hall & Harbour*, 90. Wet Mountain Valley, *Brandegee*. In the mountains, on the road from Denver to Idaho Springs, *Porter*. Sangre de Cristo Range, *Redfield*.

*CEANOTHUS OVALIS*, Big.—Foot-hills along the Platte, June, *Coulter*.

*CEANOTHUS OVATUS*, Desf., *DC: Prod.*, 2, p. 31. (*C. Americanus*, L., var. *herbaceus*, T. & G. *Fl. N. Am.* 1, p. 264.) Leaves ovate or oval, serrate, 3-nerved, glabrous; thyrus shortened; fruit sub-globose, 6-ribbed.—*Hall & Harbour*, 91. This plant we have not seen.

## SAPINDACEÆ.

*ACER GLABRUM*, Torr. (*A. tripartitum*, Nutt.) Shrub, 6°–10° high; leaves sub-reniform, orbicular in outline, 3-lobed or more usually 3-parted; segments short and broad, acutely incised and toothed, somewhat 3-lobed, middle one cuneate; corymb unbeled, pedunculate, few-

<sup>1</sup> *PACHYSTIMA*, Raf. Petals and stamens 4, inserted on or below the margin of the broad, flat, quadrangular disk that covers the small pyramidal ovary, and adheres to the throat of the short, obconic, 4-lobed calyx. Style very short; stigma obsoletely 2-lobed. Capsule coriaceous, oblong, acute, 2-celled, loculicidally 2-valved; cells 1–2 seeded. Seeds inclosed in a white, membranous, dissected axil.—A low, branched, leafy, glabrous shrub, with opposite, short-petioled, mostly serrate, evergreen leaves and axillary flowers. *Benth. & Hook*.

flowered; sepals about 8, linear-oblong; petals wanting; fruit glabrous, wings broad, diverging.—Along water-courses among the mountains. *Dr. Smith; Coulter.*

NEGUNDO ACEROIDES, Moench.—Cañon City, *Brandegee*. Along the Platte, *Coulter.*

### ANACARDIACEÆ.

RHUS GLABRA, L.—Golden City, *Greene*.

RHUS TOXICODENDRON, L.—Grows on dry slopes. Poisonous. Turkey Creek, *Coulter.*

RHUS AROMATICA, Ait., var. TRILOBATA, Gr. (*R. trilobata* Nutt.) A much-branched shrub, 3°–6° high, smooth or with the leaves and young branches minutely pubescent; leaves trifoliate, paler beneath, lateral leaflets obovate, obtuse, 3-lobed at the apex, or nearly entire; terminal leaflet larger, cuneiform, 3-lobed at the summit, 1'–1½' in length.—Emitting a heavy, disagreeable odor when bruised. Distinguished from the eastern form by its greater size, smaller leaves, and smoother drupes.—*Dr. Smith; B. H. Smith.* Common on the mesas near Colorado Springs, *Porter*. Clear Creek Cañon, *Coulter.*

### POLYGALACEÆ.

POLYGALA VERTICILLATA, L.—Dudley's Ranch, on Clear Creek, *Greene*.

### LEGUMINOSÆ.

THERMOPSIS<sup>1</sup> RHOMBIFOLIA, Nutt. Perennial; stems erect, 8'–12' high, angular, nearly smooth; leaves petioled; leaflets obovate-cuneiform, silky-puberulent, at length nearly glabrous; stipules ovate or cordate, acute, as long as the petioles; flowers yellow, alternate or in pairs, lance-oval, shorter than the pedicels; calyx-short, teeth triangular, acute, the upper lip 2-toothed; legumes elongated, falcate, pendulous, glabrous, about 3' long.—*Hall & Harbour, 107; Canby.*

THERMOPSIS FABACEA, DC., var. MONTANA, Gr. Somewhat pubescent; stems numerous, branched; leaflets 1'–3' long, oblanceolate, obtuse; stipules oblong-ovate, exceeding the petioles; legumes downy, 2'–3' long, linear-oblong, erect, nearly straight, about 10-seeded.—Middle elevations in the mountains and on the plains. *Canby*. Four miles from Denver on Clear Creek, *Coulter*. South Park, *Porter*.

LUPINUS ORNATUS, Dougl. *Watson's Revision*, in *Proc. Amer. Acad.* v. 8, p. 528. Stems decumbent or ascending; pubescence usually short, more or less silky, mostly appressed; stipules setaceous; leaflets 5–7, oblanceolate or cuneate-oblong; ¾'–2' long, acute or acutish; raceme 3'–8' long, usually short-peduncled; bracts short, subulate or ovate; pedicels 2''–3'' long; bractlets setaceous; calyx-lips nearly equal, the upper rather shortly toothed or bifid, the lower subentire; petals blue, equal, 5'–7'' long, the banner acutish sub-silky on the back, keel ciliate; ovules 5–8; pod 1¼' long, 3''–4'' wide.

Var. GLABRATUS, Watson. Leaflets glabrous above, cuneate-oblong, acutish or obtuse; flowers nearly white, with a dark purple spot upon the banner. "Common in the mountains of Colorado."—*Hall & Harbour, 95.*

<sup>1</sup> THERMOPSIS, R. Br. Like *Baptisia* (*Gray's Manual*, p. 142,) but with large, foliaceous stipules, and long, flat legumes.

**LUPINUS PARVIFLORUS**, Nutt. *Watson's Rev.*, l. c., p. 531. Strict, erect, slender, 2°-3° high, at length branching; pubescence scanty, short, appressed, the calyx and pedicels silky; stipules setaceous; leaves rather distant; leaflets 5-11, oblanceolate to obovate, 1'-2' long, acute or obtuse and mucronulate, glabrous above, the lower leaves shorter than the petioles; raceme  $\frac{1}{2}$ °-1° long, slender, bracts linear-subulate, equaling the calyx; flowers subverticillate or scattered, the slender pedicels 1''-2'' long; calyx-lips nearly equal, the upper 2-toothed; petals light-blue, equal, 3''-4'' long, keel ciliate or naked; pod  $\frac{3}{4}$ ' long, 2-4-seeded, pubescent.—Very abundant near the Twin Lakes, *Porter* and *Coulter*.

**LUPINUS ARGENTEUS**, Pursh. *Watson's Rev.*, l. c., p. 532. Erect or ascending, 1°-2° high, slender; pubescence minute, silky, appressed; stipules small; leaflets 5-8, linear-lanceolate,  $\frac{3}{4}$ '-1 $\frac{1}{2}$ ' long, acute, smooth above or nearly so, about equaling the petioles; racemes 3'-6' long, nearly sessile; flowers subverticillate or scattered, pedicels  $\frac{1}{2}$ '-2'' long; calyx campanulate, gibbous but not spurred at base, minutely bracteolate, upper lip broad, 2-toothed, the lower subentire slightly longer; petals blue or cream-colored, equal, 3''-4'' long, the banner very broad, naked or subhairy, keel naked or subciliate; ovules 5-3; pod  $\frac{3}{4}$ '-1' long.

Var. **DECUMBENS**, Watson. (*L. decumbens*, Torr.) Raceme dense and many-flowered; stem usually stouter and more leafy.—*Dr. Smith*; *Brandege*; *Canby*; *Coulter*; *Porter*.

Var. **ARGOPHYLLUS**, Watson. With the habit of var. *decumbens*, but more copiously silky-pubescent, the leaflets nearly or quite equally so upon both sides, longer than the petioles; flowers larger, 5''-6'' long, blue or ochroleucous, the calyx decidedly spurred. Approaching nearly to *D. laxiflorus*.—*Brandege*.

**LUPINUS CÆSPITOSUS**, Nutt. *Watson's Rev.*, l. c., p. 533. Cæspitose dwarf, 2'-4' high, nearly stemless, silky-hirsute; leaflets 5-7, oblong-lanceolate, attenuate at base, much shorter than the petiole; stipules adnate, subulate; spikes sessile; densely flowered, shorter than the leaves; bracts setaceous, deciduous; calyx bracteolate, the upper lip 2-parted, lower obscurely 3-toothed; petals pale-blue, equal, 3''-4'' long; legume villous, 3-4-seeded.—“West of the Snowy Range on Blue River.” *Hall & Harbour*, 96. In the Sierra Madre Range, *Coulter*.

**LUPINUS PUSILLUS**, Pursh. *Watson's Rev.*, l. c., p. 539. Annual, low, very hirsute with long spreading hairs; stems 3'-10' high, branching from the base; leaflets 3-7, more usually 5, cuneate-oblong or oblanceolate,  $\frac{3}{4}$ '-1 $\frac{1}{4}$ ' long, narrowed at the base, acute or obtuse, smoother above, about half as long as the petioles; raceme spicate, usually short-peduncled, 2'-3' long; flowers alternate, wings equaling the keel; bracts persistent; calyx ebracteolate, upper lip 2-cleft, shorter than the subentire lower one; petals purple or rose-color, 4'' long, equal; legumes over  $\frac{1}{2}$ ' long, very hirsute, about 2-seeded; seeds orbicular, flattened.—*Hall & Harbour*, 94; *B. H. Smith*; *Brandege*. Near Denver, *Coulter*; *Porter*.

**TRIFOLIUM LONGIPES**, Nutt. Somewhat pubescent; root creeping; stems erect or ascending, simple, 3'-1° high; petioles slender; leaflets linear-lanceolate, serrulate, silky-pubescent beneath; radical ones often oval or oblong; stipules semi-lanceolate, acuminate; heads of flowers sub-globose, ebracteate, on long peduncles; flowers ochroleucous, rarely purple, frequently deflexed in fruit; calyx-teeth setaceous, longer than the tube, nearly equal; petals lanceolate; ovary 4-5 ovuled.—*Parry*. Mount Lincoln at 12,000 feet altitude, *Coulter*.

**TRIPOLIUM NANUM**, Torr. Glabrous, caespitose, caudex short and thick, branching, 1'-2' high; leaflets ovate-oblong, somewhat acuminate, denticulate, strongly veined, on rather long petioles; stipules membranaceous, ovate, cuspidate; peduncles very short, radical; umbellately about 3-flowered; flowers large,  $\frac{3}{4}$ ' long, dark purple, scarcely unfolding; calyx tubular-campanulate, glabrous, teeth nearly equal, triangular-subulate, shorter than the tube; vexillum broadly obovate, 3-times the length of the calyx; legume 4-5-seeded.—Alpine. *Hall & Harbour*, 99; *Parry*; *Brandege*. Mount Lincoln at 14,000 feet altitude, *Coulter*.

**TRIFOLIUM DASYPHYLLUM**, T. & G. Densely caespitose; caudex short and thick, branching, 2'-4' high; leaves, peduncles, and calyx more or less canescently silky; leaflets linear, oblong-lanceolate, acute or acuminate, entire; stipules membranaceous, lanceolate, subulate-acuminate; head globose, on a long radical peduncle, bracteate, 1' in diameter; bracts lanceolate, scarious-margined, unequal; teeth of the calyx setaceous, nearly equal, exceeding the tube and a little shorter than the corolla; corolla 4''-6'' long, scarcely unfolding; legume 3-4-seeded.—Alpine. *Hall & Harbour*, 97; *Parry*, *Meehan*. Sangre de Cristo Pass, *Brandege*. Mount Lincoln, Mount La Plata and Gray's Peak at 12,000 feet altitude, *Coulter*.

**TRIFOLIUM PARRYI**, Gr. *Sill. Jour. (N. S.)* 33, p. 409. Glabrous, circulose, subcaulescent; scape 3'-4' high, leafy at base; stipules ovate, scarious; leaflets oblong, ( $\frac{1}{2}$ -1 $\frac{1}{2}$ '') sharply dentate; involucre scarious, 5-7-parted, much shorter than the many-flowered head; segments ovate, obtuse; calyx about thrice shorter than the persistent, rose-purple (6''-9'') corolla, teeth broadly-subulate, about equaling the campanulate tube; flowers 20 or more in a head; legumes sessile, 3-4-seeded.—Alpine. *Hall & Harbour*, 98; *Parry*; *Meehan*. Common on the higher mountains, *Coulter*. Gray's Peak at 11,000 feet, *Redfield*.

**TRIFOLIUM INVOLUCRATUM**, Willd. Nearly erect, glabrous; slender, branching from the base, 10'-18' high; leaflets linear-lanceolate, mucronate, spinuosity-serrulate, 1'-1 $\frac{1}{2}$ ' long; stipules membranaceous, oblong-ovate, aristate, the upper ones pectinately dentate with setaceous teeth; the lowermost narrower and nearly entire; involucre laciniately many-cleft, a little shorter than the rather loose subhemispherical heads; heads 1' or more in diameter; flowers purple, tipped with white; teeth of the calyx longer than the tube and much shorter than the corolla, subulate from a very broad base; legume stipitate, 5-6-seeded.—Fremont County, *Brandege*.

**HOSACKIA**<sup>1</sup> **PURSHIANA**, Benth. Much-branched, 6'-2° high, annual, erect, more or less hairy, sometimes softly villous; leaflets 3, (rarely 4,) ovate to lanceolate, rather acute; stipules minute, blackish; peduncles longer than the leaves, 1-flowered; bract simple; calyx deeply parted; corolla 3''-4'' long, scarce exceeding the calyx, keel attenuated upward, falcate; petals rose-colored, the vexillum with deeper minute stripes; legume 1' or more long, straight, not attenuate above.—*Hall & Harbour*, 108.

**PSORALEA LANCEOLATA**, Pursh. Nearly glabrous, with a few scattered hairs and numerous dark-colored glands, erect, 1° high, much

<sup>1</sup> **HOSACKIA**, Dougl. Calyx tubular or somewhat campanulate, 5-cleft or toothed. Vexillum as long as the spreading wings, often distant from those of the other petals. Keel as long as the vexillum. Style subulate, usually somewhat straight. Stigma capitate. Legume somewhat compressed, wingless.—Herbs or suffrutescent plants (all American.) Stipules very minute, sometimes foliaceous. Peduncles axillary or umbellately 1-3 many-flowered; commonly with a 1-3-foliolate bract below the flowers. *Torr. & Gr. Fl. N. Am.*

branched; leaves palmately 3-foliolate; leaflets  $\frac{1}{2}$ '-1' long, linear-lanceolate or elliptical-oblong, rather obtuse, slightly mucronate, sessile; peduncles longer than the leaves; raceme short, 6-15-flowered; calyx-teeth minute, acute; corolla 3" long, bluish; legumes globose, sparingly hirsute, covered with larger dark-brown glands.—*Hall & Harbour*, 101; *Dr. Smith*; *B. H. Smith*. Very abundant on the plains around Denver and Colorado Springs, *Porter*.

PSORALEA DIGITATA, Nutt. Canescent, diffusely branched, branches slender; leaves 5-foliolate; leaflets cuneate-oblong and oblong-linear with an abrupt, rigid point, 1' long, 2"-4" wide, smooth and minutely dotted above, hirsute beneath, longer than the petioles; stipules lanceolate, reflexed; spikes short, interrupted, on very long peduncles, the clusters 3-6 flowered; flowers sessile; bracts obovate or reniform; calyx villous, half as long as the corolla, segments ovate, acuminate, the lowest one produced; vexillum roundish-obovate; legume orbicular-ovate, compressed, hirsute, not wrinkled; seeds ovate.—Purgatory River, *Dr. Bell*.

PSORALEA FLORIBUNDA, Nutt.—*Dr. Smith*; *B. H. Smith*; *Porter*. Abundant on the plains of the Platte, *Coulter*. *Hall & Harbour*, 102.

PSORALEA ARGYOPHYLLA, Pursh.—*Hall & Harbour*, 103; *Porter*.

PSORALEA CUSPIDATA, Pursh. (*P. cryptocarpa*, T. & G.) Stem 1°-2° high, terete, branched, canescent with appressed pubescence; leaves 5-foliolate; leaflets obovate or elliptical-oblong, 1'-1 $\frac{1}{2}$ ' long, obtuse or acutish, mucronate, about as long as the petiole, minutely dotted, pubescent; stipules subulate; peduncles much longer than the leaves; spikes ovate or oblong, flower-clusters crowded; flowers blue; bracts lanceolate, cuspidate, shorter than the flower; calyx large, somewhat inflated, gibbous at the base, conspicuously dotted, teeth triangular lanceolate, acuminate, two upper ones united to the middle, the lower one produced; legume ovate, membranaceous, scarcely pointed, not wrinkled, hid in the large calyx.—Purgatory River, *Dr. Bell*.

PSORALEA HYPOGÆA, Nutt. Acaulescent; root tuberous, oblong, edible, about 1' long; stemless, hirsute with whitish appressed hairs; leaves 5-7 foliolate; leaflets linear-lanceolate or linear-oblong, usually acute, 1'-1 $\frac{1}{2}$ ' long, 2"-3" wide, nearly glabrous above; spikes capitate, on peduncles much shorter than the petioles; bracts lanceolate; calyx cleft below the middle, segments linear, acuminate, the lowest lanceolate, elongated; corolla pale-blue; banner oblong, of the length of the wings and twice as long as the keel.—Sandy plains of Northern Colorado. Rare. *Greene*.

DALEA ALOPECUROIDES, Willd.—*Hall & Harbour*, 104; *Dr. Smith*; *Brandegee*.

DALEA LAXIFLORA, Pursh. Glabrous, 3°-4° high, erect, branched above; branches slender and spreading; leaflets 4-5 pairs, linear-oblong, 2"-3" long,  $\frac{1}{2}$ " wide, strongly dotted; spikes paniced, few-flowered; flowers distant; bracts very broad, almost orbicular, glandular, coriaceous, glabrous, slightly cuspidate, embracing the flower; calyx deeply cleft, teeth long, setaceous, beautifully plumose; corolla white, keel twice as long as the wings, vexillum cordate, very small, sometimes with 4 approximated glands near the middle.—*Hall & Harbour*, 100.

DALEA NANA, Torr., var. ELATIOR Torr. *Pl. Wright*, 1, p. 46. Stems about 1° high, canescent with appressed pubescence, branching; branches leafy to the top; leaves remote; leaflets 2-3 pairs, oblong and obovate, slightly apiculate, clothed with silky, canescent hairs, not dotted, 1 $\frac{1}{2}$ "-4" long; spikes ovate, loosely-flowered, elongated and cylindrical in

fruit, 1' long, on short peduncles or sessile on the ends of the leafy branches; bracts obovate, apiculate, about the length of the yellow flowers; calyx deeply cleft, teeth setaceous, plumose.—Purgatory River, *Dr. Bell*.—Closely allied to *D. aurea*, from which it differs in its diffusely spreading, slender stems, repeatedly branched and leafy to the spikes, which are smaller and much less dense.

*DALEA JAMESII*, Torr. Stems several from one root, 4'-9' high, somewhat woody at the base; whole plant silky-pubescent; leaves palmately tri-foliolate, not dotted with glands; leaflets obovate, very obtuse; stipules setaceous, erect, rigid, 4" long; petioles 6"-9" long; spikes oblong, sessile, dense and broad, about 1' long; bracts ovate, acuminate, longer than the calyx; calyx deeply cleft, segments setaceous, plumose, longer or shorter than the vexillum; flowers golden-yellow.—Cañon City, *Brandegee*.

*PETALOSTEMON VIOLACEUS*, Mx.—*B. H. Smith*. Colorado Springs *Porter*. Plains of the Platte, not as common as the following, *Coulter*.

*PETALOSTEMON CANDIDUS*, Mx.—Common on the plains. *Dr. Smith; Coulter; Porter*.

*PETALOSTEMON MACROSTACHYUS*, Torr. *Ann. N. Y. Lyc.*, 2, p. 176. Glabrous, stem 1<sup>o</sup>-2<sup>o</sup> high, branched, dotted, leaflets 2-3 pairs, lanceolate-oblong, obtuse, dotted beneath,  $\frac{3}{4}$ ' long, upper surface becoming deep verdigris-green in drying; spike cylindrical, elongated, 6 and more when old, the rachis villous; bracts lanceolate, as long as the flower; calyx silky-villous, teeth lanceolate; vexillum cordate; petals linear-oblong, narrowed at the base and nearly white; legume inclosed in the persistent calyx, gibbous, compressed, hairy.—*Hall & Harbour*, 105.

*AMORPHA FRUTICOSA*, L.—On the plains, along the Platte, *Coulter*. Pueblo County, *Redfield*.

*AMORPHA CANESCENS*, Nutt.—Plains, *Porter*.

*ROBINIA NEO-MEXICANA*, Gr. *Pl. Thurb.*, p. 314. Shrub 4<sup>o</sup>-6<sup>o</sup> high; stipular prickles subrecurved, sharp and stout; leaflets elliptical or oblong,  $\frac{1}{2}$ '-1' long; peduncles and the short, crowded racemes hispid with straight glanduliferous hairs; calyx finely hispid, teeth subulate-lanceolate; corolla rose-color; pods glandular-hispid. Resembles in its flowers *R. viscosa*.—Cucharas River, Huerfano County, *Greene*.

*ASTRAGALUS CARYOCARPUS*, Ker.—*Hall & Harbour*, 132 and 133. *Brandegee*. On the plains and in South Park, *Porter*.

*ASTRAGALUS MEXICANUS*, A. DC.

*ASTRAGALUS PLATTENSIS*, Nutt. We have seen no specimens of this nor of the preceding species from Colorado, but from the range ascribed to them by Dr. Gray in his Revision, *Proc. Am. Acad.*, vol. 6, p. 193, they doubtless exist there.

*ASTRAGALUS MOLLISSIMUS*, Torr. *Ann. N. Y. Lyc.*, 2, p. 178. Perennial, subcaulescent, shining with a soft silky-villous, often yellow, pubescence; peduncles long, scape like; spikes dense; flowers rather large, violet; calyx tubular; pod cartilaginous, oblong, turgid, 5"-9" long, very smooth, subdidymous, ovary also glabrous; stipules lanceolate, free, cohering below the petiole; leaflets 11-14 pairs, ovate-oblong or oval, 1" long, obtuse, but slightly mucronate.—*Hall & Harbour*, 122. On the plains, scarce, *Dr. Bell*.

*ASTRAGALUS CANADENSIS*, L.—At the base of the foot-hills and along water-courses of the plains. *B. H. Smith; Porter; Brandegee*.

*ASTRAGALUS ADSURGENS*, Pall. (*A. striatus*, Nutt.) *Gray's Rev.*

*Proc. Am. Acad.*, 7, p. 197. Perennial, cinereous with minute appressed pubescence, or glabrate; stems rather stout, 4'-18' high, ascending or decumbent, sulcate as well as the peduncles; stipules scarious, mostly united at base; leaflets 10 pairs, 6"-9" long, oblong, or linear-oblong; peduncles long, stout, strict, strongly sulcate, often nearly equaling the leaves; spike dense, at length oblong or cylindrical; flowers purplish, medium-sized, ascending; calyx-tube rather long, campanulate, twice longer than the setaceous teeth, subvillous with light or dark hairs; pod coriaceous, pubescent, sessile, ascending, ovate-oblong, 4"-5" long, straight, usually triangular-compressed, with a dorsal sulcus and two-celled by the intruded dorsal suture, many-ovuled.—*Hall & Harbour*, 135; *Canby*; *Brandege*; *Porter*. Plains of the Platte, *Coulter*. Wet Mountain Valley, *Redfield*.

ASTRAGALUS HYPOGLOTTIS, L. *Gray's Rev. l. c.*, p. 197. Perennial, with a rather loose pubescence; stems 6"-2° long, slender, diffusely procumbent or ascending; stipules subfoliaceous, and more or less sheathing; leaflets 7-10 pairs, oblong, obtuse or retuse; heads few to many-flowered; corolla violet,  $\frac{1}{2}$ ' long; legume ovate-triangular, softly, silky-villous with white hairs, very shortly stipitate and but 2-8 seeded.—*Hall & Harbour*, 139; *Canby*; *B. H. Smith*; *Porter*; *Brandege*. Common on the plains and in the mountains, *Coulter*.

ASTRAGALUS BRANDEGII, *Porter (n. sp.)* Canescent with minute appressed hairs; branching from a somewhat woody base, branches assurgent, 6' high; leaflets in 5 rather distant pairs, linear, obtuse, involute, glabrous above, 6"-8" long; stipules lanceolate, acuminate, slightly adnate to the petioles; peduncles much longer than the leaves, slender, erect; flowers about 5, in a loose raceme, very small,  $1\frac{1}{2}$ "-2" long; calyx turbinate, hairy, tube a little shorter than the subulate teeth; corolla white or cream-color, tinged with purple, banner exceeding the keel, reflexed; pod hairy, turgid, obovoid, with a shallow dorsal sulcus, 4"-7" long, coriaceous, abruptly-pointed, short-stipitate, straight, ascending, twice the length of the slender pedicel, 2-celled or nearly so, many-seeded.

This new *Astragalus*, which belongs to Section 9, *Micranthi*, of Gray's Revision, is allied to *A. atratus*, Watson. I have named it in honor of the zealous collector from whom it was received.—Banks of the Arkansas, near Cañon City, *T. S. Brandege*, June 26, 1873.

ASTRAGALUS DRUMMONDII, *Dougl. Gr. Rev. l. c.*, p. 200. Perennial, softly-villous; stem erect, 1°-2° high, stout, sulcate, very leafy; leaflets 10-15 pairs, oblong and linear-oblong, obtuse, narrowed at the base; stipules distinct, free, ovate, acuminate; peduncles longer than the leaves, erect, spikes loosely-flowered; flowers rather large, white or ochroleucous, with the point of the keel purple-tinged, pendulous and somewhat secund; calyx-teeth subulate, shorter than the tube, scarcely gibbous at base, pilose with blackish hairs; pod very smooth, stipitate, exserted from the calyx, pendulous, linear-oblong, coriaceous, straight, terete-biventricose, with a narrow, very deep sulcus, completely or incompletely divided by the intrusion of the dorsal suture.—*Hall & Harbour*, 124. Near Colorado Springs, *Porter*. Wet Mountain Valley, *Brandege*. Plains near Denver, *Coulter*. Ula, Wet Mountain Valley, *Redfield*.

ASTRAGALUS SCOPULORUM, *Porter (n. sp.)* Pubescent with appressed hairs; stems ascending, about 1° high, angled, branching; stipules (especially the lower ones) somewhat coherent; leaflets 9-13 pairs, obovate or oblong, abruptly short-pointed, glabrous above; peduncles



strict, erect, longer than the leaves, loosely many-flowered; bracts scarious, subulate, longer than the pedicels; flowers yellow or ochroleucous, reflexed; corolla rather large, 9'' long; calyx gibbous at base, pilose with blackish hairs, the subulate teeth scarce half as long as the cylindrical tube; pod over 1' in length, stipitate, exerted from the calyx, pendulous, oblong, becoming arcuate with age, sharply 3-angled, chartaceous, the dorsal suture salient, with an acute sulcus on each side, intruded half way to the ventral. This species must be referred to Sect. 11, *Galegiformes*, of Gray's Revision, and seems in many respects to fill an intermediate position between *A. Drummondii* and *A. racemosus*.—South Park, July 24, 1872, *Porter*. Wet Mountain Valley, 1873, *Brandegee*, in flower and fruit.

**ASTRAGALUS RACEMOSUS**, Pursh. *Gr. Rev. l. c.*, p. 200. Appressed-pubescent or glabrate; stem 1°–2° high, rather stout, somewhat sulcate, very leafy; stipules distinct, free; leaflets in about 10 pairs, elliptical-oblong or oval, obtuse, mucronate, 6''–8'' long; peduncles about the length of the leaves, loosely many-flowered; flowers nodding and somewhat secund; calyx strongly gibbous at base, whitish-puberulent, the setaceous teeth slightly shorter than the tube, equaling the stipe; pod lance-oblong, 1' long, three-angled, not 2-celled, cross section somewhat equally tri-radiate, very smooth. Leaflets glabrous above.—*Hall & Harbour*, 113. Wet Mountain Valley, *Brandegee*.

**ASTRAGALUS GRACILIS**, Nutt. *Gr. Rev. l. c.*, p. 202. Erect, slender, pubescent; stems virgate, 1° high or more from a very long, sweet root; leaflets very narrowly linear, almost filiform, 7''–10'' long, obtuse or retuse, 5 to 8 pairs; lower stipules somewhat united, the rest distinct; raceme spike-like, many-flowered, long-peduncled, virgate; flowers 3'' long, pale purple, recurved-spreading; pods spreading, 2''–3'' long, coriaceous, strongly concave on the back, white hairy, at length glabrous, transversely rugose-veined, elliptic-ovate, 1-celled, ventral suture thick and subacute.—Plains of Eastern Colorado, *Dr. Bell*.

**ASTRAGALUS MICROLOBUS**, Gr. *Rev. l. c.*, p. 203. (*A. gracilis*, Torr. in *Ann. N. Y. Lyc.*, p. 179.) Cinereous-pubescent; stems erect and ascending, about 1° high; leaflets linear or oblong-linear, emarginate, 4''–6'' long; racemes rather short and usually loosely flowered; flowers deep purple, 4'' long; pods reflexed, thick, cartilaginous, puberulent, finely rugulose, turgid, a little flattened on the back, the ventral suture very thick.—*Hall & Harbour*, 119; *Brandegee*.

**ASTRAGALUS ABORIGINUM**, Richards. *Gr. Rev. l. c.*, p. 208. Perennial hoary-pubescent or subvillous; stems numerous, rigid, ascending,  $\frac{1}{2}$ °–1° high; stipules triangular, for the most part free; leaflets 3–6 pairs, linear or oblong-lanceolate, acute; peduncles exceeding the leaves; flowers small (3''–5'' long) in a compact raceme, white or tinged with violet; calyx-teeth filiform-subulate, a little shorter than the tube; legume long-stipitate, reflexed, somewhat membranous, glabrous, laterally subcompressed, (cross-section oval,) straight dorsally, the ventral suture arcuate, 1-celled with a very narrow rudimentary septum on the dorsal side, 10–15-ovuled.—Not seen by us, but reported from the Rocky Mountains of Colorado by *Watson* in *King's Rep.*, vol. 5, p. 70.

**ASTRAGALUS IODANTHUS**, Watson. *King's Rep.*, v. 5, p. 70. Perennial, canescent with an appressed hairy pubescence, or nearly glabrous; stems decumbent, 6'–10' long; stipules ovate-lanceolate, free or somewhat adnate to the petiole; leaflets 6–10 pairs, 2''–5'' long, obovate or orbicular, obtuse; peduncles equaling or shorter than the leaves; spikes

short, dense; flowers on short pedicels, deep violet-purple, or ochroleucous tinged with purple, the wings and banner (6''-8'' long) exceeding the obtuse keel, the somewhat nigrescent campanulate calyx-tube twice longer than the subulate teeth; legume 1½' long, 3'' broad, linear-oblong, acuminate, strongly areolate or hamate, sessile, nearly glabrous with a very sparse pubescence, mottled, chartaceous, irregularly folded but usually with a deep dorsal sulcus approximating the suture to the prominent ventral one, dorsal septum none, many-seeded.—Clear Creek Cañon, *Coulter*.

*ASTRAGALUS GALBRIUSCULUS*, Gr. *Rev. l. c.*, p. 204. Glabrous or slightly hairy; stem erect, nearly simple, striate; leaflets 5-6 pairs, narrower than the preceding, green, linear-lanceolate, subacute, or oblong and obtuse at both ends; ovary very smooth; pod lanceolate, subfalcate, attenuate into a stipe 2-3 times exceeding the calyx; otherwise like the last, of which it is probably only a variety.—*Hall & Harbour*, 116. South Park, *Porter*. Rare.

*ASTRAGALUS OROBOIDES*, Hornem., var. *AMERICANUS*, Gr. *Rev. l. c.*, p. 205. Subcinereous-puberulent; stems suberect, 1°-1½° high; leaflets 5-7 pairs, oblong and oval, or often linear-oblong, scarcely retuse; flowers 3''-4'' long, violet or deep purple, the wings exceeding the keel; pod 5''-6'' long, 3 or 4 times longer than the calyx, moderately sulcate, few-seeded; stipe very short.—*Hall & Harbour*, 117. "Along the bank of streams, at middle elevations and subalpine." Mt. Lincoln at 12,000 feet altitude, *Coulter*.

*ASTRAGALUS ALPINUS*, L.—Alpine and subalpine.—*Hall & Harbour* 125; *Dr. Smith*; *Brandege*. South Park, *Porter*. Mt. Lincoln at 13,000 feet altitude, *Coulter*.

*ASTRAGALUS SPARSIFLORUS*, Gr. *Rev. l. c.*, p. 205. Slightly appressed-pilose or glabrate; stems 1° or more in length with many slender branches, diffuse; stipules triangular-subulate, distinct; leaflets 4-6 pairs, obovate or subrounded, often emarginate, 2''-3'' long; peduncles scarcely exceeding the leaves, 3-10 flowered; flowers 3'' long, bluish-white, the emarginate or bifid banner and the wings much exceeding the incurved keel; calyx-teeth equaling the tube; ovary 8-12-ovuled, short-stipitate; pod 3''-6'' long, coriaceous, oblong, incurved, pubescent with short hairs, mottled, 2-celled to the middle, very short stipitate, ventral suture acute.—*Hall & Harbour*, 128. Oak Creek, Fremont County, *Brandege*.

*ASTRAGALUS LOTIFLORUS*, Hook. *Gr. Rev. l. c.*, p. 208. Hoary or cinereous with appressed hairs; stems very short; leaves lance-oblong; peduncles exceeding the leaves or very short; heads few-flowered; flowers yellowish; calyx-teeth subulate, exceeding the tube; pod about 1' long, oblong-ovate, inflated, sub-canescens, the cross-section obovate, retuse or usually broadly obcordate toward the base.—*Hall & Harbour*, 131. Near Denver, *Coulter*.

*ASTRAGALUS PUBENTISSIMUS*, T. & G. *Gr. Rev. l. c.*, p. 209. Dwarf, hirsute-canescens with a loose pubescence, many-stemmed from an annual or biennial root; leaflets oblong or obovate; flowers few, rather small, purplish-white, subracemose upon a short peduncle, calyx-teeth equaling the campanulate tube; pod villous, 9''-10'' long, inflated, membranaceous, ovate-lunate, strongly incurved, sulcate on the back with a slight inflexion of the suture. "Colorado Territory, near the sources of the Colorado of the West. Found only by Nuttall."

*ASTRAGALUS MISSOURIENSIS*, Nutt. *Gr. Rev. l. c.*, p. 210. Subcanlescent, hoary-silky with a short, very closely appressed pubescence; usu-

ally prostrate or matted; peduncles scape-like, capitately few flowered or spicately 8-14 flowered; calyx-teeth about half shorter than the cylindrical tube; leaflets 5-10 pairs, elliptical and obovate-elliptical; corolla bright violet (or rarely white); pod thick, coriaceous, obcompressed, nearly straight, about 1' long, blackish, elliptic, transversely rugulose.—*Hall & Harbour*, 127. Purgatory River, *Dr. Bell*. Cañon City, *Brandegee*.

*ASTRAGALUS SHORTIANUS*, Nutt. *Gr. Rev. l. c.*, p. 210. Usually subcaulescent, silky-canescens with a very closely appressed pubescence; leaflets obovate or ovate, 7"-10" long; peduncles scape-like few-many-flowered, commonly shorter than the leaves; calyx 6" long, cylindrical, teeth shorter than the tube; corolla violet or blue, rather large and showy; pod 1'-2' long, ovate or ovate lanceolate, thick, coriaceous, obcompressed, intruded dorsal suture approaching the ventral, not 2-celled, transversely rugulose, pointed and strongly arcuate, thick, more or less pubescent.—*Hall & Harbour*, 126 (*A. cyaneus*, Gr.) *Brandegee*. Clear Creek Cañon, *Coulter*.

*ASTRAGALUS PARRYI*, Gr. *Rev. l. c.*, p. 211. Stem short, prostrate, villous with loose spreading hairs; leaflets 7-13 pairs, obovate or oblong, 3"-9" long; peduncles rather short; flowers 6-10, loosely subcapitate, 6"-10" long, whitish or yellowish, the keel tinged with purple; calyx-teeth half shorter than the cylindrical tube; pod pubescent, oblong-lanceolate, 1' longer or more, arched or at length circinate, obcompressed, rugulose, both sutures sulcately impressed, contiguous.—*Hall & Harbour*, 123; *Brandegee*. Near Denver, *Coulter*. Specimens from *Brandegee* have the assurgent stems from 8'-10' long, with 2-3 peduncles from the axils of the leaves.

*ASTRAGALUS TRIFLORUS*, Gr. *Rev. l. c.*, p. 214. Annual, cinereous-pubescent, very much branched from the base, branches ascending, 6'-12' high; stipules acuminate, slightly adhering at base; leaflets 5-7 pairs, oblong or linear-oblong often truncate at the apex and retuse, 4"-8" long; peduncles in fruit, exceeding the leaves; flowers 3-15, ochroleucous, tinged with purple, small, about 3" long; calyx-teeth subulate, equaling the tube; pod sessile or on a short pedicel, membranous, inflated, oval, obtuse or acutish 7"-12" long, finely reticulated, pubescent, neither suture inflexed, dorsal sulcus deep and narrow, many-seeded.—Cañon City, *Brandegee*.

*ASTRAGALUS PICTUS*, Gr. *Rev. l. c.*, p. 214. Root filiform; hoary with a loose silky pubescence; stipules rigid, persistent, connate; leaflets 3-7 pairs, narrowly linear or filiform, 6"-18" long, most of them usually abortive; flowers few, rather small; keel with the inflexed apex somewhat produced, pale rose-colored; pod 6"-18" long, mottled with purple blotches, ovoid, short stipitate, stipe equaling the calyx, scarcely pointed, pendent.

Var. *FILIFOLIUS*, Gr. *l. c.*, p. 215. (*A. filifolius*, Gr.) Leaves usually imperfect; leaflets very few, mostly attenuated, 1'-1½' long, terminal one, or the filiform rachis produced, persistent; legume 1'-1½'.—On the plains. *Hall & Harbour*, 138. Denver and Colorado Springs, *Porter*.

*ASTRAGALUS FRIGIDUS*, Gr. *Rev. l. c.*, p. 219. Subglabrous, erect, 10-20" high; stipules ovate-oblong, membranous, hairy; leaflets 7-9 pairs, ovate-oblong or elliptic-oblong, green; peduncles equaling the leaves; calyx-teeth short; corolla white; pod oblong, acute at each end, black-hairy or glabrous, 1-celled, the stipe equaling or exceeding the calyx.—"Subalpine, in wet pine woods." *Hall & Harbour*, 137.

*ASTRAGALUS LONCHOCARPUS*, T. & G. *Gr. Rev. l. c.*, p. 219. (*Phaca*

*macrocarpa*, Gr. *Pl. Fendl.*, p. 36.) Ashy-puberulent, glabrate, perennial; stem fistulous, sulcate, branched, 2° long; stipules distinct, small; leaflets 1-5, linear or filiform-linear, remote, the leaf sometimes reduced to the flattened filiform rachis; racemes loosely many-flowered, on long, strict, stoutish peduncles; bracts one-half shorter than the pedicels; flowers white, pendent; calyx-teeth broad-subulate, much shorter than the tube; pod membranous, lanceolate-cylindrical, straight, 1'-1½' long, very sharply acuminate at each end, exsertly stipitate, glabrous, neither suture intruded.—Wet Mountain Valley, *Brandegee*.

ASTRAGALUS LEPTALEUS, Gr. *Rev. l. c.*, p. 220. Nearly glabrous, stem slender, ascending, a span high; stipules long-subulate, subconnate at base; leaflets 7-11 pairs, lance-linear or oblong, often acute; peduncles 2-4 flowered, shorter than the leaves; calyx with short, black hairs, the campanulate tube slightly exceeding the subulate teeth, about equaling the pedicel and subulate bract; corolla 4" long, white, the emarginate banner a third longer than the violet-tipped keel; pod ovate or oval, 4" long, puberulent, chartaceous.—*Hall & Harbour*, 141; *Brandegee*. Sierra Madre Range, *Coulter*.

ASTRAGALUS BISULCATUS, Gr. *Rev. l. c.*, p. 221. Perennial, strigulose-puberulent; stem erect, over 1° high, stout; stipules distinct, free; leaflets oblong, often narrow, the lowest near the stem; flowers violet, in dense, spike-like racemes, middle sized, pendent or spreading, keel nearly straight; calyx-teeth setaceous, scarcely shorter than the campanulate tube; pod coriaceous, ½' long, shortly exsert-stipitate, straight, oblong, semi-cylindric, the deeply concave ventral surface divided by the salient, obtuse suture.—*Hall & Harbour*, 130. Platte River, *Coulter*.

ASTRAGALUS PECTINATUS, Dougl. *Gr. Rev. l. c.*, p. 221. Perennial, 1° high; stem and leaves rather rigid, ashy-puberulent, glabrate; branches striate, angled; leaflets 4-10 pairs, nearly filiform, not jointed to the rachis, persistent; lower stipules connate; flowers nearly 1' long, white, many, in a rather short raceme; keel nearly straight, banner elongated; pod thick, cartilaginous, subovate or oblong, turgid, sessile or short-pedicelled, neither suture intruded, but both thick and prominent, 6" long, pendulous, glabrous, cuspidate.—*Hall & Harbour*, 134; *Canby*; *Dr. Bell*.

ASTRAGALUS FENDLERI, Gr. *Rev. l. c.*, p. 224. Perennial, glabrous, or appressed-puberulent, erect, over 1° high; leaflets oblong or linear-oblong; racemes long-peduncled, loosely flowered; flowers purple; pod oval, inflated, chartaceous-coriaceous, about 1' long, straight, pointed, minutely puberulent, very shortly stipitate.—In New Mexico and Colorado according to Gray's Revision, but not seen by us.

ASTRAGALUS HALLII, Gr. *Rev. l. c.*, p. 224. Subcinereous-pubescent, glabrate; stems rather stout, ascending; stipules subulate; leaflets 9-12 pairs, narrow, oblong, 4"-7" long, subcuneate, retuse; peduncles exceeding the leaves; flowers violet, 20 or more in a dense head-like raceme; calyx dark-pubescent, broad-campanulate, very gibbous at base, 3" long, the rather obtuse, broad teeth, 3-4 times shorter than the tube; pod oblong, inflated, 7"-10" long, glabrous, straight, pointed, chartaceous-coriaceous; stipe, 1" long.—*Hall & Harbour*, 121; *Canby*. Twin Lakes, *Coulter*. South Park, *Porter*.

ASTRAGALUS FLEXUOSUS, Dougl. *Gr. Rev. l. c.*, p. 224. Ashy-puberulent; stems ascending, 1° high, flexuose; leaflets oblong or cuneate-linear, obtuse or retuse; peduncles exceeding the leaves; racemes mostly elongated, loose; flowers 4" long, white or purplish; calyx hoary-

pubescent, teeth 3 times shorter than the tube; pod cylindric, 8''-11'' long, 2'' broad, puberulent, thinly coriaceous, straight or sub-incurved; stipe very short but evident.—Common at middle elevations. *Hall & Harbour*, 118; *Dr. Smith*; *Canby*; *Porter*; *B. H. Smith*; *Brandege*; *Meehan*; *Coulter*.

*ASTRAGALUS MULTIFLORUS*, Gr. *Rev. l. c.*, p. 226. (*A. nigrescens*, Gr.) Perennial, somewhat glabrous; stems 1° high, numerous, ascending, branched; stipules dark-colored, the lower ones at least sheathing; leaflets 6-10 pairs, 3''-6'' long, linear or narrowly oblong, acute or obtuse; peduncles not exceeding the leaves, loosely few-flowered; flowers ochroleucous, tinged with purple, small, 2''-3'' long, the campanulate calyx-tube rather longer than the setaceous teeth, and about equalling the stipe; pod vetch-shaped, flattened or compressed, straight, margined by the nerve-like sutures, 4''-6'' long, reflexed, 1-celled, 2-4-seeded.—*Hall & Harbour*, 115. South Park, *Porter*. Sierra Madre Range, *Coulter*.

*ASTRAGALUS CAMPESTRIS*, Gr. *Rev. l. c.*, p. 229. Perennial, minutely pubescent or glabrate; stems 3'-15' high, numerous, ascending, slender, simple; stipules, at least the lower ones, membranous and sheathing, large, acuminate; leaflets 5-9 pairs, 3''-15'' long, linear, linear-lanceolate or oblong, usually acute; peduncles slender, exceeding the leaves, 5-10-flowered, flowers sub-capitate or scattered, 4'' long, ochroleucous, tinged with purple, the keel with a purple, long and narrow inflexed tip; pod 6''-12'' long, chartaceous, not stipitate, sub-puberulent, subcompressed, oblong-linear, nearly straight, valves sub-turgid, the pedicels at length reflexed, 1-celled, 10-15-ovuled.—*Meehan*. Ute Pass, and on the Upper Arkansas, *Porter*. Mount Lincoln, *Coulter*.

*ASTRAGALUS DECUMBENS*, Gr. *Rev. l. c.*, p. 229. (*Homalobus decumbens*, Nutt.)—Cinereous or silky-pubescent; stems diffuse or ascending, 6'-10' high; petioles sometimes somewhat flattened, mostly with 7-13 linear-lanceolate, acute leaflets; racemes 5-10-flowered; calyx-teeth attenuate, a little shorter than the tube; corolla 4''-4½'' long, ochroleucous or purplish; keel with a short, inflexed tip; pod broad-linear, straight or falcate, about 1'' long, hoary-puberulent.—*Hall & Harbour*, 142. Idaho Springs, *Redfield*.

*ASTRAGALUS DIVERSIFOLIUS*, Gr. *Rev. l. c.*, p. 230. Ashy-strigulose; stems diffuse, decumbent, elongated, about 1° high; petioles short, flattened, 1-5 foliolate; terminal leaflet or simple leaf linear, elongated, 1'-2', attenuated at each end; peduncle 1-5-flowered; calyx-teeth half shorter than the tube; corolla ochroleucous or lurid, keel falcate-incurved; legume oblong-linear, straight or subfalcate, ¾'' long, canescent-puberulent.—“Gravelly plains of Colorado on both sides of the Rocky Mountains,” *Gray's Revision*.

*ASTRAGALUS JUNCEUS*, Gr. *Rev. l. c.*, p. 230. Perennial, minutely pubescent or subglabrous; stems usually solitary, erect, paniculately-branched, slender; stipules small; petioles slender, sometimes 6' long, usually naked or with 1-5 pairs of linear leaflets; peduncles longer than the leaves, 3-7-flowered; flowers 4'' long, distant, ochroleucous or tinged with violet; calyx-teeth usually small and obtuse, shorter than the campanulate tube; pod 1'-1¼'' long, as in the last species, with which it is probably identical.—“On the head-waters of the Colorado of the West,” *Parry*.

*ASTRAGALUS SIMPLICIFOLIUS*, Gr. *Rev. l. c.*, p. 231. (*Phaca simplicifolia*, Nutt.) Perennial, caespitose, in dense, cushioned mats; leaves 4''-5'' long, hoary with an appressed silky pubescence, simple, linear or

spatulate-lanceolate, acute, frequently involute, crowding the extremities of the usually short ( $\frac{1}{2}$ ') branches; scapes scarcely exceeding the leaves, 2-3-flowered; flowers 3" long, purple, the banner and the wings longer than the strongly arched keel; calyx-teeth nearly equaling the obconical tube; legume 4" long, half included in the calyx, oblong, acute, sub-compressed, glabrous, thick and coriaceous, 1-celled, the ventral suture straight and very acute, the dorsal gibbous, about 12-ovuled.—"Found by Nuttall near the sources of the Platte."

**ASTRAGALUS KENTROPHYTA**, Gr. *Rev. l. c.*, p. 231. Perennial, intricately branched from a long root, broadly-depressed-cæspitose, hoary with a short, silky pubescence; stems 2'-4' long; stipules membranous, mostly connate, often setaceously or spinosely acuminate; leaflets 2-3 pairs, 2'-4" long, linear-subulate, usually rigid and divaricate, pungent, not jointed with the rachis; flowers 1-3, on short pedicels in the axils of the leaves, 2" long, ochroleucous or tinged with violet; calyx-teeth setaceous, equaling the campanulate tube; pods 2''-3" long, sub-chartaceous, compressed, sessile, pubescent, ovate, acuminate, somewhat incurved, 1-celled, 3-4-ovuled, 1-2-seeded, the valves separating at maturity.—*Hall & Harbour*, 106; *Canby*; *B. H. Smith*. South Park, *Porter*; *Brandegee*.

**ASTRAGALUS TRIDACTYLICUS**, Gr. *Proc. Am. Acad.*, v. 6, p. 527. Perennial, cæspitose from a short woody caudex, dwarf, 2'-3' high, silvery-silky; leaves pinnately 3-foliolate, long-petioled, exceeding the sessile, crowded flowers; leaflets oblanceolate, 6" long, acute; flowers 5" long, pale purple; calyx-teeth equaling the tube; pod globose, ovoid, 3''-4" long, very turgid, puberulent, 12-ovuled, 3-4-seeded; calyx deciduous, exposing the pod.—*St. Vrain Cañon*, May 26, *Coulter*.

**ASTRAGALUS SERICOLEUCUS**, Gr. *Rev. l. c.*, p. 232. Very broadly cæspitose, silky-hoary; stems branched, prostrate; branches covered with the villous stipules; leaves all 3-foliolate, not equaling the 2-6-flowered, filiform peduncles; leaflets 3" long, oblanceolate or cuneate-oblong; calyx-teeth about equaling the campanulate tube; corolla purple, 3''-4" long; pod ovate-oblong, 3" long, hoary, half included in the calyx.—*Sand-hills along the Platte*, *Hall & Harbour*, 145.

**OXYTROPIS MULTICEPS**, Nutt. Canescently-silky, 1'-3'-high; stems matted-cæspitose, from a branching caudex; leaflets 3-4 pairs, oval, 3" long; flowers purple, 6" long; fruiting calyx inflated, globose, including the ovate, chartaceous-membranous pod; pod short-stipitate, sometimes half 2-celled by the intrusion of the ventral suture.—"Subalpine and lower." *Hall & Harbour*, 144; *Parry*, 191. *Boulder Cañon*, *Coulter*.

**OXYTROPIS URALENSIS**, L., var. **PUMILA**, Ledeb. Acaulescent, silky-villous; leaflets 4-5 pairs, conjugate, 3" long, oblong-linear, revolute; stipules long-adnate; scapes 1'-2' long, 2-5-flowered; flowers violet-blue; pod oval-oblong or long-oblong, ventral septum extending to the dorsal suture.—High alpine. (*O. arctica*, *R. Br.*) *Hall & Harbour*, 143. *Mount Lincoln* at 14,000 feet elevation, *Coulter*.

**OXYTROPIS CAMPESTRIS**, L.—*Parry*.

**OXYTROPIS LAMBERTI**, Pursh.—Very abundant on the plains and in the mountains. *Hall & Harbour*, 140; *Dr. Smith*; *B. H. Smith*; *Canby*; *Meehan*; *Porter*; *Brandegee*; *Coulter*.

**OXYTROPIS NANA**, Nutt. *Gr. Proc. Am. Acad.* 6, p. 236. Cæspitose, much divided, silky-canescens with a very close, appressed pubescence; leaves very crowded; leaflets 3-4 pairs, obovate, 3" long; scapes 2'-3' high, scarcely exceeding the leaves, 3-12-flowered; flowers capitate,

rather large, blue; pod oblong, somewhat falcate, hairy, the ventral septum extending to the dorsal suture, 6-8-seeded.—Northern Colorado, on the authority of Nuttall. The characters of the fruit are drawn from specimens collected by Mr. Coulter in 1872 on Henry's Fork of Snake River.

*OXYTROPIS SPLENDENS*, Dougl. Acaulescent, silvery, silky-villous throughout, 6'-12' high; leaflets somewhat verticillate, 3-6 together, very numerous, lanceolate, very acute, usually 5''-10'' long; flowers in an oblong spike, erect, spreading, usually deep blue; peduncles exceeding the leaves; flowers not much surpassing the calyx; pod ovate, erect.—*Hall & Harbour*, 135; *Parry*; *Canby*; *Porter*; *Brandege*. St. Vrain Cañon and South Park, *Coulter*.

*OXYTROPIS DEFLEXA*, DC. Caulescent or subcaulescent; more or less silky-villous; stems ascending, 6'-9' long, leaflets ovate-lanceolate, 14-17 pairs; peduncles very much elongated, scape-like; upper stipules, at least, adnate at the base, large, lanceolate, acuminate; flowers bright blue, about 4'' long, rather small, with a short calyx-tube, spreading, spicate or capitate; pods oblong, straight, pointed, 6''-9'' long, pubescent, usually reflexed.—Middle elevations. *Hall & Harbour*, 120; *Parry*, 433; *Canby*; *Meehan*. South Park, *Porter*; *Brandege*. Twin Lakes and Sierra Madre Range, *Coulter*.

Var. (?) Villous with spreading hairs, dwarf, acaulescent; leaves, including the petiole, 1½'; leaflets in about 11 pairs, ovate, 2''-3'' long; peduncles 2' long; flowers 6-8, capitate; fruit not seen.—Horse Shoe Mountains, at 11,000 feet altitude, *Coulter*.

*SOPHORA*<sup>1</sup> *SERICEA*, Pursh. Herbaceous, low, 6'-12' high, more or less silky-canescenscent; stems ascending or decumbent, branching from the base; leaflets about 21, elliptic or cuneate-oval, 2''-3'' long; racemes terminal, short, at first scarce exerted beyond the leaves, short, 1½'-2' long, peduncled; calyx gibbous at base, longer than the pedicels, campanulate, 5-toothed, teeth obtuse half the length of the tube; corolla 4'' long, banner reflexed, petals of the keel nearly distinct, acuminate, mucronate.—*Hall & Harbour*, 146; *Dr. Smith*. Abundant on the plains around Denver, *Porter*. Ute Pass and Clear Creek Cañon, *Coulter*. Lower branches elongated and far exceeding the fruiting racemes. Colorado Springs, *Redfield*.

*GLYCYRRHIZA LEPIDOTA*, Nutt.—*Hall & Harbour*, 147; *B. H. Smith*; *Porter*. Plains of the Platte, *Coulter*.

*HEDYSARUM MACKENZII*, Richards. Stems 2° high, sub-erect, minutely pubescent, simple or branched; stipules, at least the lower ones, connate; leaflets 5-8 (usually 5) pairs, canescenscently pubescent, oblong or lanceolate, nearly glabrous above; racemes loosely 7-30-flowered, elongating in fruit; flowers large, 6''-9'' long, light purple, keel exceeding the banner and wings; calyx-teeth subulate, about the length of the tube; legume 2-4-jointed, minutely pubescent.—Cañon City, *Brandege*. Sierra Madre Range, *Coulter*.

<sup>1</sup>*SOPHORA*, Linn. Calyx broadly-campanulate, obliquely truncate or somewhat 5-toothed at the summit, often somewhat turbinate or obconic at the base. Vexillum obovate or roundish, about the length of the other petals; keel obtuse, nearly straight, the petals somewhat united below the apex. Ovary nearly sessile, linear; ovules numerous; style nearly straight or incurved; stigma minute. Legume moniliform, indelhiscent, (dry or fleshy,) not winged. Radicle usually inflexed or incurved.—Trees, shrubs, or sometimes herbaceous plants, with unequally pinnate leaves. Stipules subulate or none. Racemes axillary or terminal, sometimes paniculate. Bracts subulate, minute, often caducous. *T. & G. Fl. N. Am.*

*VICIA AMERICANA*, Muhl.—Common along mountain streams. *Porter*; *Coulter*.

*VICIA TRUNCATA*, Nutt. *T. & G. Fl. N. Am.* 1, p. 270. Somewhat pubescent. Stem 1°-2° high; leaflets 5-6 pairs, oblong-linear, usually truncate-serrate or tridentate at the apex, apiculate, about 1' long, 1''-2'' wide; stipules lunate, incisely-serrate; peduncles 4-7-flowered, rather shorter than the leaves; lower teeth of the calyx lanceolate, acuminate, upper ones very short; style villous at the apex; legume 1' or more long. Our plant varies from Nuttall's description only in the shorter and broader leaflets; flowers 9'' long.—Cañon City, *Brandegee*.

*VICIA MICRANTHA*, Nutt. Glabrous, stem 2°-3° long, strongly angled, climbing; leaflets 6-12, 6''-9'' long, 2'' wide, oblong-elliptical, obovate or linear-oblong, obtuse or emarginate, mucronate; stipules subulate and simple or semi-sagittate, small; peduncle about 2-flowered, at first much shorter than the leaves; flowers small, rarely solitary, pale, blue at the tip; calyx hairy, teeth subulate, shorter than the tube; legume  $\frac{3}{4}$ ' long, 3'' wide, saber-shaped, glabrous, 5-6-seeded; seeds compressed, dark brown.—Cañon City, *Brandegee*. Golden City, *Greene*.

*LATHYRUS ORNATUS*, Nutt. Erect, glabrous, often glaucous; stem 6'-1° high, sometimes branched, quadrangular; leaflets 3-4 pairs, lanceolate-linear, acute, mucronate, rigid and strongly veined, tendrils scarcely any; stipules linear-lanceolate and slender, semi-sagittate, entire; peduncles about 4-flowered, longer than the leaves; flowers large, purple, 1' long, very showy; calyx-teeth subulate, slightly unequal, rather shorter than the tube; pod smooth, flat, acuminate at each end.—*Hall & Harbour*, 109. On the plains.

*LATHYRUS LINEARIS*, Nutt. Nearly glabrous, low; stem decumbent, slender, angled; leaves nearly sessile; leaflets 5-6 pairs, narrowly-linear, 8''-12'' long,  $\frac{1}{2}$ ''-1'' wide, mostly obtuse, apiculate, rigid; tendril short, simple or bifid; stipules small, lanceolate, semi-sagittate, lacinate with 2-5 very sharp, slender teeth; peduncles 3-4-flowered, shorter than the leaves; flowers rather large, pale-purple; segments of the calyx triangular, shorter than the tubes; legume attenuate at each end.—*Hall & Harbour*, 110. Near Denver, *Dr. Smith*.

*LATHYRUS POLYMORPHUS*, Nutt. Mostly glabrous; stem erect, a little woody at the base, much branched, a little quadrangular, about 1° high; leaflets 2-5 pairs, elliptical-lanceolate, somewhat glaucous, rigid, strongly veined, petioles terminated by a small bristle; stipules lanceolate, subfalcate, semi-sagittate at base; peduncles 3-5-flowered, rather shorter than the leaves; flowers large, purple; segments of the calyx broadly or narrowly subulate, somewhat unequal, shorter than the tube; legume large, glabrous.—*Hall & Harbour*, 111. Sierra Madre Range, *Coulter*.

*LATHYRUS PUBESCENS*, Nutt. (?) (*L. venosus*, Muhl., var.  $\delta$ .? *Torr. & Gr. Fl. N. Am.* 2, p. 174.—“Smaller, finely pubescent; leaflets 3-5 pairs, ovate-elliptical, smaller; stipules linear-lanceolate; peduncles 5-7-flowered.”)—*A. Lathyrus* collected by Mr. Brandegee, on Newlan Creek, S. Colorado, June 13, 1873, accords in the main with the variety or species described above. Its characters are: Erect, 1°-2° high, softly and finely pubescent throughout; leaflets 3-5 pairs, ovate, mucronate, strongly veined; tendrils simple or bifid; stipules semi-sagittate, much smaller than the leaflets; peduncles shorter than the leaves, and bearing 2 rather small, white flowers. Legumes not seen.

*LATHYRUS PALUSTRIS*, L. *Gray's Manual*, p. 139.—*Hall & Harbour*, 112. Plains of the Platte, *Coulter*. Cañon City, *Brandegee*.



HOFFMANSEGGIA<sup>1</sup> JAMESII, T. & G. *Fl. N. Am.*, p. 393. Canescently-pubescent; low, much branched from a shrubby base; stipul s subulate, entire; pinnae 5, abruptly 10-16 foliolate; leaflets oval, obtuse at both ends, nearly glabrous above; racemes elongated, opposite the leaves; flowers nodding or reflexed, rather large; calyx a little oblique, the four upper segments lanceolate, acute, all membranaceous, at length deciduous from the persistent base; petals not glandular at the base, the upper one smallest, marked with reddish spots; filaments declined, hairy below, all fertile; style subulate, dilated above and somewhat gibbous at the apex; legumes about 1' long, broadly oblong, more or less lunate, scabrous, flat, 2-3-seeded, sprinkled, as well as the leaves, calyx, and petals, with sessile black glands.—On the plains of Eastern Colorado, *Dr. Bell*.

HOFFMANSEGGIA DREPANOCARPA, Gr. *Pl. Wright.*, 1, p. 58. Minutely cinereous-puberulent, wholly destitute of glands; stems numerous, 1'-8' high, springing from a thick, ligneous root 6'-8' deep; stipules and bracts ovate-acute, caducous; pinnae 3-5 pairs, besides the terminal one; leaflets 7-10 pairs, about 3'' long, crowded, subfalcate, nerveless; racemes loose-flowered, elongated, on long, slender, axillary peduncles; calyx 3'' long, persistent, its divisions oblong-lanceolate, obtuse or acutish; petals yellow, a little longer than the calyx, broadly obovate, very obtuse, nearly alike, without claws, naked and glabrous; filaments equal, antheriferous, villous-barbate below the middle; ovary smooth; pod broad-linear or oblong, very obtuse at each end, strongly falcate, flat, 1½'-2' long, following the strong curvature, 3''-5'' wide, of exactly the same width throughout, glabrous or minutely puberulent under a lens, 9-10-seeded; valves chartaceous, finely reticulated, transversely impressed between the seeds.—Cañon City, *Brandegee*.

CASSIA CHAMÆCRISTA, L.—Near Denver, *Porter*.

SCHRANKIA UNCINATA, Willd.—On the plains, *Porter*.

### ROSACEÆ.

PRUNUS AMERICANA, Marsh.—Near Denver, *Dr. Smith*.

PRUNUS CHICASA, Mx. ?—Cañon City, *Brandegee*.

PRUNUS PENNSYLVANICA, L.—*Hall & Harbour*, 148; *Porter*.

PRUNUS VIRGINIANA, L.—*Hall & Harbour*; *Brandegee*; *B. H. Smith*. South Park and Mountain of the Holy Cross, *Coulter*.

SPIRÆA OPULIFOLIA, L.—*Meehan*. Platte River, *Coulter*.

Var. PARVIFOLIA, Gr. Much smaller in all its parts.—*Hall & Harbour*, 150; *Brandegee*.

SPIRÆA DUMOSA, Nutt. (*S. ariaefolia*, Smith, var. *discolor*, T. & G.) A branching shrub, 2°-5° high; leaves broadly ovate, cuneate and petioled, obtuse, sublobate and dentate, scarcely mucronate, paler and sericeous beneath, smoother or nearly glabrous above, 6''-12'' long; flowers numerous, in more or less branched terminal panicles; branches

<sup>1</sup>HOFFMANSEGGIA, Cav. Sepals 5, united into a short, obconic base, somewhat equal. Petals 5, obovate, on short claws, somewhat unequal, spreading, the upper one concave, one or more of them often glandular at base. Stamens 10; filaments mostly hairy or glandular, and thickened or dilated towards the base, nearly equal; anthers oval, nearly uniform. Style as long as the stamens, somewhat thickened towards the apex. Legume oblong or linear, often falcate, compressed, dry, 2-valved, 2-10-seeded.—Low, perennial herbs, or suffrutescent plants, often dotted with black glands. Leaves abruptly or unequally bipinnate. Racemes opposite the leaves; flowers yellow. Glands either sessile or pedicellate. *T. & G. Fl. N. Am.*

and calyx tomentose-pubescent; calyx-segments ovate, spreading; carpels hirsute.—Abundant in mountain ravines at middle elevations. *Hall & Harbour*, 149; *Parry*; *Canby*; *B. H. Smith*; *Meehan*. Ute Pass, *Coulter*.

RUBUS NUTKANUS, Moq.—Rare, *Parry*. Near Long's Peak, *Coulter*.

RUBUS DELICIOSUS, Torr. *Ann. N. Y. Lyc.*, 2, p. 196. Shrub, 3°-4° high, branched; branches, young leaves and calyx tomentose-pubescent or puberulent, not glandular; leaves reniform-orbicular, rugose, 1½'-2' in diameter, more or less 3-5 lobed, finely serrate-toothed; stipules lanceolate, scarious, persistent; peduncle 1-7 flowered; flowers 2' in diameter; sepals oval-oblong, with a dilated acumination, shorter than the oblong, white petals; fruit large, smooth, purplish, flavor not agreeable to the human palate, but prized by bears.—*Hall & Harbour*, 163; *Parry*, 210. Chiann Cañon and Glen Eyrie, *Porter*. Clear Creek Cañon, *Coulter*.

RUBUS TRIFLORUS, Richards.—*Hall & Harbour*, 164. Bear Creek, *Coulter*.

RUBUS STRIGOSUS, Michx.—Near Denver, *Dr. Smith*. Chiann Cañon, *Porter*.

PURSHIA<sup>1</sup> TRIDENTATA, DC.—Shrub, 2°-4° high; stipules minute; leaves 3''-12'' long; calyx-lobes ovate, obtuse; petals obovate, exceeding the calyx, 3''-5'' long; fruit 6'' long, tardily dehiscent, 2-valved.—Rare. *Parry*; *Meehan*. Mountain of the Holy Cross, *Coulter*.

CERCOCARPUS<sup>2</sup> PARVIFOLIUS, Nutt. Shrub 2°-10° high, branching from the ground; leaves 6''-8'' long, cuneiform-obovate, silky-pubescent or nearly glabrous above, tomentose-canescens beneath, serrately-toothed towards the apex, strongly nerved; flowers solitary or 2-4 together on slender pedicels; calyx-tube becoming ½' in length; tail of the fruit 4'' long, densely plumose.—*Hall & Harbour*, 165; *Dr. Smith*; *B. H. Smith*. At the base of the foot-hills and extending into the mountains, *Porter*.

AGRIMONIA EUPATORIA, L.—Colorado Springs, *Redfield*.

DRYAS OCTOPETALA, L. Low, suffrutescens; leaves oblong-ovate, coarsely crenate-toothed, obtuse at each end, clothed with a white tomentum beneath, the veins prominent, the margins revolute; stipules adnate to the petiole; peduncles terminal, 1-flowered; sepals linear; flowers white or yellowish. Alpine.—*Hall & Harbour*, 153; *Hoopes*.

<sup>1</sup> PURSHIA, DC. Calyx persistent, tubular-infundibuliform, imbricately 5-lobed. Petals white, unguiculate. Stamens 10-25, in one series, with free filiform filaments and large anthers. Carpels 1-2, free; style short, curved, persistent, stigmatose at the top and on one side; ovule solitary, erect. Fruit coriaceous, ovate-oblong, pubescent, sessile, exceeding the calyx. Seed with a membranous double testa, the two coatings separated from one another by a layer of deep purple, intensely bitter, granular matter; cotyledons flat, obovate; radicle short, inferior.—A diffusely-branched, leafy shrub, tomentose and somewhat glandular-pubescent upon the leaves, calyx, and fruit; leaves small, alternate and fascicled, sub-cuneiform, 3-cleft, the lobes short linear with revolute margins, canescens beneath; flowers yellow, subsessile, solitary, axillary and terminal. *Watson in Cl. King's Rep.*, Vol. V.

<sup>2</sup> CERCOCARPUS, H. B. K. Calyx-tube persistent, cylindrical, long and pedicelliform, terete; lobes of the hemispheric deciduous limb 5, small, valvate. Petals none. Stamens 15-25, in 2-3 series, seated on the limb of the calyx, with short free incurved filaments, and anthers often pubescent. Ovary solitary, with a single sub-erect ovule; style filiform, villous. Achenium linear-oblong, coriaceous, included in the calyx, caudate with the persistent long plumose style; seed linear, with a membranous testa, elongated cotyledons, and inferior radicle.—Shrubs or trees, with alternate simple leaves and axillary or terminal flowers. *Benth. & Hook.*

GEUM MACROPHYLLUM, Willd. *Gray's Manual*, p. 152.—Weston's Pass, *Coulter*. Twin Lakes, *Porter*.

GEUM STRICTUM, Ait.—Colorado Springs, *Redfield*.

GEUM RIVALE, L.—*Hall & Harbour*; *Parry*. Mountains west of Denver, *Greene*.

GEUM TRIFLORUM, Pursh.—*Hall & Harbour*, 152; *B. H. Smith*. Twin Lakes and South Park, *Porter*. Near Long's Peak, *Coulter*.

GEUM ROSSII, Seringe. Scape 1-flowered, 3'-8' high, slightly pubescent above, somewhat 2-3-leaved; radical leaves interruptedly-pinnate, rather glabrous, minutely ciliate; leaflets ovate or cuneiform, 2-3-lobed, incised or entire; flowers erect; calyx-lobes ovate, spreading, shorter than the roundish, yellow petals; carpels in a sessile head, minutely hirsute; styles persistent, glabrous, not exerted in fruit. Alpine.—*Hall & Harbour*, 156. *Gray's Peak*, *Dr. Smith*; *Canby*. James's Peak and the Sierra Madre Range, *Coulter*; *Redfield*.

CHAMÆRHODOS<sup>1</sup> ERECTA, Bunge. Pilose-pubescent, glandular; stem slender, 2'-1° high, paniculately branched above; radical leaves rosulate, ternately or biternately many-cleft, segments very narrow, obtuse, the upper cauline ones 3-5 cleft; petals white, longer than the calyx; ovaries 5-20.—*Hall & Harbour*, 462; *Canby*; *Porter*. South Park, *Coulter*.

FRAGARIA VESCA, L.—*Coulter*. Cañon City, *Brandegee*.

FRAGARIA VIRGINIANA, Ehrh., var. ILLINOIENSIS, Gr.—Denver, *Coulter*; *Dr. Smith*.

FALLUGIA<sup>2</sup> PARADOXA, Torr. *Emory Rep.*, t. 2. (*Sieversia paradoxa*, Don.) Shrub 1°-2° high, very much branched, with a white and shining bark; branchlets minutely pilose; leaves alternate, cuneate or obovate in outline, hirsute, 3-5 parted at the summit, 6" long, divisions linear, obtuse; flowers terminal on the more or less elongated branchlets, subcorymbose; corolla about 9'-12" in diameter, white; achenia numerous, hairy, with long, finely plumose tails  $\frac{1}{2}$ '-3' long.—Cañon City, *Brandegee*. Webster Cañon, *Redfield*. Pueblo County, *Greene*.

SIBBALDIA PROCUMBENS, L. (*Potentilla procumbens*, Clairv.) *Gray's Manual*, p. 153.—*Hall & Harbour*, 151. Sangre de Cristo Pass, *Brandegee*. Sierra Madre Range at 11,000 feet altitude, *Coulter*.

POTENTILLA ARGUTA, Pursh. *Watson's Revision, Proc. Am. Acad.* v. 8, p. 551. *Gray's Manual*, p. 154.—*Porter*; *Brandegee*. Plains of the Platte, *Coulter*. A lower and more slender form, 6'-12' high, smaller in

<sup>1</sup> CHAMÆRHODOS, Bunge. Calyx campanulate, deeply 5-cleft, ebracteolate; the base lined with a membranous disk, which is very densely bearded at the margin. Petals 5, obovate. Stamens 5, opposite the petals; and inserted with them into the sinuses of the calyx above the disk; filaments subulate, short, persistent. Achenia 5-10 or more; styles arising near the base of the ovaries, subulate. Receptacle conical, villous. Seed ascending, nearly orthotropous. Radicle superior.—Small, erect and branching glandular-pubescent herbs; perennial or biennial. Leaves many-cleft; the segments linear. Inflorescence dichotomously cymose. Petals white or purplish. *T. & G. Fl. N. Am.*

<sup>2</sup> FALLUGIA, Endl., *Gen. Pl.* Calyx with a very short-turbinate tube and spreading limb, 5-cleft, very minutely 5-bracteolate, valvate in aestivation, persistent. Petals 5, inserted on the calyx, alternate with its lobes and nearly as long, obovate. Stamens very many, inserted with the petals; filaments free; anthers 2-celled, longitudinally dehiscent. Ovaries very many, sessile in the bottom of the calyx, free, 1-celled, with a single ovule ascending. Styles terminal, continuous, filiform; stigmas papillose. Achenia numerous, included in the tube of the calyx, aristate with the very long exerted, bearded, plumose styles. Seed ascending; radicle inferior.

all its parts, with 11 leaflets and bright yellow flowers, from Ute Pass, Porter. Gray's Peak, Dr. Smith. Saint Vrain Cañon, Coulter.

POTENTILLA GLANDULOSA, Lindl., (*P. fissa*, Nutt.) *Watson's Rev., l. c.*, p. 552. More slender and branched than the former, 1°-2° high, less pubescent; leaflets 5-9, 1' long or less; cyme paniced with elongated branches and more slender pedicels; flowers often smaller; calyx less tomentose; bractlets linear; petals yellow, sometimes white; stamens 20-25.—Colorado, *vide* Watson, *l. c.*

POTENTILLA NORVEGICA, L. *Watson's Rev., l. c.*, p. 552. *Gray's Manual*, p. 154.—Denver, Dr. Smith; B. H. Smith. Cañon City, Brandegee. Monument Park, Coulter.

POTENTILLA RIVALIS, Nutt. *Watson's Rev., l. c.*, p. 552. More slender than the former, diffusely branched even from the base; pubescence softly villous; stipules lanceolate to ovate; leaves pinnate with 2 pairs of closely approximate leaflets, or a single pair and the terminal leaflet 3-parted; the upper leaves ternate; leaflets ovate or oblong-cuneate or lanceolate, 1'-1½' long, more or less incised-serrate; cymes loose, less leafy, with slender pedicels; bractlets and sepals equal, 1½''-3'' long; petals minute; stamens 10-20; achenia usually smooth; receptacle short.

Var. MILLEGRANA, Watson. (*P. millegrana*, Eng.) Leaves all ternate; stems erect or weak and ascending; achenia often small and light-colored.—Colorado, *vide* Watson in *King's Report*.

POTENTILLA PENNSYLVANICA, L., var. STRIGOSA, Pursh. *Watson's Rev., l. c.*, p. 554. Low, 6'-15' high; stems erect, leafy, rather stout; leaves mostly tomentose on both surfaces, paler beneath, deeply pectinate-divided or pinnatifid, segments linear, entire, with revolute margins; stipules laciniate.—*Hall & Harbour*, 162; Porter. Cañon City, Brandegee. Horse Shoe Mountain near Fairplay, Coulter.

POTENTILLA HIPPIANA, Lehm. (*P. Pennsylvanica*, L., var. *Hippiana*, T. & G. *Fl. N. Am.*) *Watson's Rev., l. c.*, p. 555. Densely white—tomentose and silky throughout; the upper surface of the leaves a little darker; stems ascending, 1°-1½° high, slender, branching above into a diffuse cyme; stipules usually entire; leaves pinnate, occasionally digitate; leaflets 5-11, cuneate-oblong, 1'-2' long, obtuse, incised-toothed, at least towards the apex, margins not revolute; pedicels slender; bractlets narrow; petals 2½''-3½'' long, exceeding the calyx; styles filiform, not glandular at base, terminal; carpels 10-30.—*Hall & Harbour*, 158. Near Denver, Dr. Smith; Canby. Colorado Springs, Porter. Cañon City, Brandegee. Ute Pass and Twin Lakes, Coulter.

POTENTILLA EFFUSA, Dougl. *Watson's Rev., l. c.*, p. 555. Canescently tomentose with scattered villous hairs; stems ascending, diffusely branched above, 4'-12' high; stipules lanceolate, entire or incised; leaflets 5-11, interruptedly pinnate, the alternate ones often smaller, cuneate-oblong, coarsely incised-serrate or dentate, the smaller leaflets 3-5 toothed; pedicels slender; sepals and the much smaller bractlets acuminate, 2''-3'' long, equaling or exceeding the obcordate petals; carpels 10.—South Park, Porter.

POTENTILLA PLATTENSIS, Nutt. *Watson's Rev., l. c.*, p. 556. Clothed with a minute appressed pubescence; stems 6' high, weak, decumbent; radical leaves pinnately 7-13 foliolate, cauline 3-5 foliolate; leaflets cuneiform; deeply pinnatifid-incised; the segments 3-7, oblong or linear; stipules large, broadly ovate or lanceolate, entire, panicle few-flowered; pedicels slender, elongated; petals obcordate, 2''-3'' long, a little longer than the acuminate calyx-segments.—Common in wet

grounds. *Hall & Harbour* 161. South Park, *Porter*. Wet Mountain Valley; *Brandegee*.

**POTENTILLA DISSECTA**, Pursh. (*P. diversifolia*, Lehm.) *Watson's Rev.*, l. c., p. 556. Low, alpine, more or less silky-villous with somewhat spreading hairs, or nearly glabrous; stems decumbent or ascending, 3'-12' long; stipules ovate or oblong-lanceolate, entire; leaflets 5-7, or rarely but 3, often glaucous, closely pinnate, or as frequently digitate, the upper one 1' long or less, cuneate-oblong, incisely pinnatifid or serrate, the lowest often but trifid, the segments acute or acutish, and more or less tufted with white hairs; flowers few, on slender pedicels, in an open cyme; calyx more or less villous with spreading hairs, the bractlets short, the lanceolate sepals shorter than the petals, which are 2''-4'' long, obovate and retuse or obcordate; receptacle very villous; carpels 10-20, or more.—Mountains near Denver, and Clear Creek Cañon, *Coulter*. Sangre de Cristo Pass, *Brandegee*. Gray's Peak, *Dr. Smith*.

**VAR. GLAUCOPHYLLA**, Lehm. Glaucous-green; leaves digitate, nearly glabrous on both sides; leaflets silky on the margin, with unequal segments.—*Parry*, 219; *Vasey*.

**POTENTILLA GRACILIS**, Dougl. *Watson's Rev.*, l. c., p. 557. Villous and more or less tomentose; stems 2°-3° high; stipules ovate or lanceolate, entire or subincised; leaflets mostly 7, sometimes 5, very rarely but 3, cuneate-oblong, obtuse, incisely serrate or pinnatifid, tomentose beneath, green above and subvillous or appressed-silky, 1'-2½' long; flowers in a loose subfastigiata cyme, the pedicels at length elongated and slender; calyx with the narrow bractlets shorter than the broad acute or lanceolate sepals; petals broadly obcordate, 3''-4'' long, a little exceeding the calyx; carpels very numerous, (40 or more.)—Gray's Peak, *Dr. Smith*.

**VAR. RIGIDA**, Watson. (*P. rigida*, Nutt., not Wall. *P. Nuttallii*, Lehm.) A mostly stout and tall form, villous but without tomentum; the cyme loose or crowded; the leaves often large, 3'-4' long or more, and prominently veined beneath.—*Hall & Harbour*, 162 in part and 158 in part.

**POTENTILLA HUMIFUSA**, Nutt. (*P. concinna*, Rich.) *Watson's Rev.*, l. c., p. 558. Densely white-tomentose and silky-villous; stems decumbent, 2'-4' long, slender; leaflets 5, cuneate-oblong, 6''-9'' long, green and appressed-silky above, only the rounded or truncate apex serrate with 3-5 teeth; flowers 3-5, on slender pedicels; bractlets narrow, shorter than the acute sepals; petals 2''-3'' long, obcordate, exceeding the calyx; carpels 15-20. Subalpine.—*Hall & Harbour*, 157. Marsh near Long's Peak, *Coulter*.

**POTENTILLA NIVEA**, L. *Watson's Rev.*, l. c., p. 558. Pubescence silky-villous, often abundant, densely white-tomentose on the under side of the leaves and sometimes upon the calyx; stems 2'-12' high; leaflets cuneate-obovate or oblong, 3''-8'' long, coarsely incised-serrate or pinnatifid, the terminal one sessile or petiolulate; flowers few or solitary, on slender pedicels; bractlets acute or acutish, shorter than the sepals; petals 2''-4'' long; carpels few or many.—*Parry*, 214 and 215; *Vasey*.

**POTENTILLA GRAYI**, Watson, in *Rev. l. c.*, p. 560. Pubescence scanty, villous; stems slender, 3'-6' high, 3-6 flowered; stipules ovate or oblong, entire; leaflets very broad and suborbicular, ½' long, the truncate or rounded apex 5-7-toothed, the middle leaflet long-petiolulate; sepals acute, the bractlets but half as long and obtusish; petals 2''-3'' long, orbicular, retuse, exceeding the calyx; carpels 15-20.—Gray's Peak, *Dr. Gray*.

*POTENTILLA FRUTICOSA*, L.—Very common along the foot-hills and among the mountains. *Hall & Harbour*, 155. Near Denver, *B. H. Smith*; *Meehan*. South Park and Sierra Madre Range, *Coulter*.

*POTENTILLA ANSERINA*, L.—Common everywhere on the plains and in the mountains. Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*. South Park, *Coulter*.

*ROSA BLANDA*, Ait.—Common everywhere along streams in the foot-hills. *Dr. Smith*; *Meehan*. *Porter*; *Brandegee*; *Coulter*.

*ROSA ARKANSANA*, *Porter* (*n. sp.*) Stem stout, erect, leafy, 1° high, glabrous and glaucous, armed with weak, deciduous, bristly prickles; leaflets 9-11, ovate and oblong-ovate, 1' or more in length, acute or obtuse, glabrous, sharply serrate; midrib and long stipules somewhat prickly and minutely glandular; flowers numerous, terminal, corymbed, on peduncles about 1' long; fruit globose, smooth, glaucous; calyx-segments ovate, reflexed in fruit, with terminal and sometimes lateral appendages, more or less glandular and tomentose pubescent on the margins; petals broadly obovate or emarginate, longer than the calyx-segments, rose-color; flowers 2' in diameter.—This rose may possibly be an extreme form of *R. blanda*, but it differs in so many points that I have ventured to describe it as new.—Banks of the Arkansas near Cañon City, *Brandegee*. Raton Mountains, *Dr. Bell*. Texas, *Wright*.

*ROSA FRAXINIFOLIA*, *Bork*. Resembles *R. blanda*. Flowers large, 3' in diameter; fruit larger, 6' to 8' in diameter; 2° to 3° high, growing solitary on dry ridges.—In the mountains, *Hon. John Scott*.

*PYRUS SAMBUCIFOLIA*, *Cham. & Schlecht.*—*Meehan*.

*AMELANCHIER CANADENSIS*, *T. & G.*, var. *ALNIFOLIA*, *T. & G.* Mountain of the Holy Cross, *Coulter*.

### SAXIFRAGACEÆ.

*SAXIFRAGA CÆSPITOSA*, L. Perennial, dwarf, caespitose; stems, 1'-2' high; leaves glandular-pubescent, 3-5-cleft, upper linear and entire, segments broadly-linear and obtuse; flowering stems with a few scattered leaves, glandular, 1-4-flowered; petals white, obovate, 3-nerved, scarcely longer or twice the length of the calyx. Alpine.—*Hall & Harbour*; *Parry*.

*SAXIFRAGA RIVULARIS*, L. "Rocky Mountains of Colorado," *Watson* in *King's Rep.*, vol. 5, p. 93.

*SAXIFRAGA ADSCENDENS*, L. (*S. controversa*, *Sternb.*) Annual, glandular-pubescent; stems 1'-3'-high; erect, leafy; leaves cuneate-ovate, 3-5 toothed at the apex, the earlier spatulate and entire, radical ones crowded; branchlets 3-flowered; flowers pinkish or yellowish-white; calyx-lobes ovate, obtuse, shorter than the petals; pedicels bibracteate, about equaling the fruit.—"Alpine region," *Hall & Harbour*, 196.

*SAXIFRAGA CERNUA*, L. Annual, glabrate or glandular-pubescent; stems granulate at base, leafy, weak, simple or branching, 2'-5' high, lower leaves reniform, broadly toothed or lobed, the upper ones bearing little bulbs in their axils; flowers often solitary, terminal, pendulous; sepals oblong or ovate, nearly distinct; petals obovate-oblong or obovate and retuse, white or cream-color, longer than the calyx; styles imperfect or deformed. Alpine.—Mount Lincoln at 12,500 feet altitude, *Coulter*. *Meehan*. Sangre de Cristo Pass, *Brandegee*.

*SAXIFRAGA DEBILIS*, *Eng.* Glabrous or very sparingly glandular pubescent; stems weak, ascending, 2-4-flowered, 2'-4' high; radical

leaves small, crenately lobed, cauline ones 3-lobed or entire; lobes of the calyx ovate, obtusish, at length shorter than the tube; petals ovate, obtuse, twice longer than the calyx, white or pinkish; tube of the calyx obconical, wholly adherent to the ovary; styles very short; stigma capitate. Alpine.—*Hall & Harbour*, 198. Sangre de Cristo Pass, *Brandegee*.

*SAXIFRAGA HIRCULUS*, L. Stem 1-6-flowered, leafy; leaves lanceolate, nerved, not ciliate; pedicels and upper part of the stem more or less hairy, not glandular; sepals usually ciliate, obtuse, much shorter than the obovate, many-nerved petals reflexed; flowers very large, yellow; style very short; stigma spatulate, at first inflexed, at length divaricate.—“South Park, in wet or swampy places.” *Hall & Harbour*, 201; *Canby*.

*SAXIFRAGA SERPYLLIFOLIA*, Pursh. Dwarf, cæspitose, shoots creeping; leaves rosulate, imbricated, somewhat reflexed, oblong-obovate, thick, 3''-4'' long, very smooth; stem filiform, few-leaved, slightly glandular-pubescent, 1'-2' high, 1-3-flowered; calyx not adherent to the ovary, the segments reflexed, obtuse, much shorter than the broadly-obovate, yellow, 3-nerved petals. Alpine.—*Hall & Harbour*, 199. Gray's Peak, *Dr. Smith*. Sangre de Cristo Pass, *Brandegee*. Gray's Peak at 12-1,300 feet, *Redfield*.

*SAXIFRAGA FLAGELLARIS*, Willd. Glandular-pubescent; stems simple, ½'-6' high, leafy, 1-5-flowered; stolons from the axils of the radical leaves long and filiform, naked and rooting at the ends; leaves obovate-spatulate, ciliate, lower much crowded, the upper oblong or linear; flowers large, yellow, 3''-4'' long; sepals very glandular, united at the base and slightly coherent with the ovary; petals persistent, 3''-4'' long, longer than the capsule. Alpine.—*Hall & Harbour*, 200; *Parry*. Mount Lincoln at 13,000 feet altitude, *Coulter*.

*SAXIFRAGA BRONCHIALIS*, L. Perennial; stems ascending, slender, producing short branchlets; leaves linear, 4''-5'' long, rather coriaceous, finely ciliate, mucronate-pointed, crowded below; flowers corymbose on a long, slender, bracted peduncle, 3'-8' high; sepals lanceolate or ovate, obtuse or acutish; petals obovate-oblong, white, marked with numerous purplish spots, much exceeding the sepals; styles and stigmas convergent during flowering.—Rocky places. *Hall & Harbour*, 197; *Parry*; *B. H. Smith*; *Canby*; *Porter*. Mount Lincoln at 10,000 feet altitude and Twin Lakes, *Coulter*.

*SAXIFRAGA PUNCTATA*, L. (*S. æstivalis*, *Fisch.*) Perennial, villous-pubescent or nearly glabrous; leaves radical, 1'-2' in diameter, long-petioled, roundish, reniform or orbicular, equally and deeply dentate, the teeth mostly acute; scape slender, naked, 1°-1½° high, the peduncles and pedicels of the usually open panicle glandular; bracts small, linear; petals white, oval, or orbicular, obtuse, exceeding the obtuse, ovate-oblong, reflexed sepals; filaments often petaloid and abortive; ovaries distinct below the middle.—*Hall & Harbour*, 207. Pike's Peak, *Canby*. Gray's Peak, *Dr. Smith*. Mount Lincoln, at 12-14,000 feet altitude, and Mount La Plata, at 11,000 feet altitude, *Coulter*.

*SAXIFRAGA STELLARIS*, L., var. *COMOSA*, Willd.—Mount Evans, at 13,000 feet altitude, *Greene*.

*SAXIFRAGA NIVALIS*, L. Perennial; leaves all radical, ovate or obovate, attenuate into a broad petiole, unequally crenate-dentate; scape naked, 3'-12' high, capitately or sub-corymbosely several to many-flowered; the half-adherent calyx erect, shorter than the oblong, obtuse,

subunguiculate petals; capsules purple, divergent.—*Hall & Harbour*, 193. South Park, *Porter*. Near Long's Peak and Weston's Pass, *Coulter*.

*SAXIFRAGA INTEGRIFOLIA*, Hook. Very viscidly-pubescent; leaves all radical, ovate or oblong-obovate, very obtuse, entire or slightly sinuate-crenate; scape elongated, 1°-3° high, paniculate at the apex, rather narrow or sometimes expanded, bracteate; petals obovate, twice the length of the glabrous, spreading, or at length reflexed, round-ovate, obtuse segments of the calyx; stamens short, styles free.—*Sierra Madre Range*, at 11,000 feet altitude, *Coulter*.

*SAXIFRAGA JAMESII*, Torr. Glandular-puberulent; stems 2'-6' high from a thick caudex, more or less leafy, 5-10-flowered; radical leaves on rather long petioles, reniform-cordate, smoothish, crenately-toothed or lobed; cauline ones few, the uppermost bract-like, cuneiform; raceme compound; flowers large; calyx-tube campanulate, covering with the base of the ovary, the segments triangular-ovate, rather acute, about as long as the slender claw or the orbicular, purple petals; stamens 10.—*Hall & Harbour*, 203. In clefts of the rocks in Chiann Cañon, *Porter*. Pike's Peak, *Canby*.

*TELLIMA*<sup>1</sup> *PARVIFLORA*, Hook. (*Lithophragma*, Nutt.) Root more or less granulate; stems 6'-15' high, scabrous hirsute, with 1-2 ternately-divided or lobed leaves; segments 3-cleft, 4-8 flowered, occasionally bulb-bearing; leaves ½'-2' in diameter; pedicels sub-erect, usually shorter than the calyx, which is obconic, elongating in fruit and densely glandular-hirsute; petals white, much exerted, deeply 5-cleft, projecting 1"-3" beyond the calyx; ovary adnate above the middle; seeds oblong, minutely roughened.—*Hall & Harbour*, 206.

*MITELLA PENTANDRA*, Hook. Leaves all radical, cordate, slightly lobed, crenately-serrate; scape slender, 1°-1½° high, naked; calyx campanulate with spreading lobes, adherent to the middle of the ovary; petals white, linear or filiform, deeply 3-cleft, longer than the calyx; stamens 5, with very short filaments, alternate with the petals; stigma entire; capsule opening prematurely.—*Hall & Harbour*, 208; *Parry*. *Sierra Madre Range*, at 11,500 feet altitude, *Coulter*.

*CHRYSOSPLENIUM ALTERNIFOLIUM*, L. Flowering stems erect; leaves alternate, reniform-cordate, doubly crenate or somewhat lobed; flowers corymbose.—*Hall & Harbour*, 576.

*HEUCHERA BRACTEATA*, Seringe. Small and nearly glabrous or minutely puberulent; scapes numerous from a thick, ligneous caudex, leafless or bracted; radical leaves roundish-subcordate, about 1' in diameter, incisely lobed, lobes short, crenately toothed, subciliate, teeth setaceous mucronate; flowers crowded in a spicate, somewhat compound raceme 1' to 1½' long; calyx campanulate, oblong, almost 5-cleft to the middle, lobes spatulate-oblong; petals attenuate, acute, scarcely broader than the filaments; styles and stamens at length exerted; thyrus commonly more or less secund; flowers barely 2" in length.—In clefts of the rocks. *Hall & Harbour*, 205. *Parry*, 172; *Dr. Smith*; *B. H. Smith*. On the road from Denver to Idaho Springs, *Porter*.

*HEUCHERA PARVIFOLIA*, Nutt. Scabrous-puberulent; scape naked,

<sup>1</sup> *TELLIMA*, BROWN. Calyx campanulate, dilated, prolonged beyond the ovary and adherent to it at base, 5-toothed or cleft, valvate. Petal 5, entire or divided, inserted on the throat of the calyx with the 10 small, included stamens. Ovary half-superior, conical, 1-celled, with 2-3 parietal, many-ovuled placentæ; styles 2-3, short. Capsule wholly or half inferior, membranous, 2-3-valved, many-seeded.—Erect, simple, pilose or glandular herbs with petioled, rounded-cordate, lobed leaves and terminal racemes. *Benth. and Hook.*



6'-2° high; leaves roundish-cordate, crenately 5-7 lobed, at length glabrous, ciliate, the lobes short and rounded with 1 or 2 crenatures, minutely mucronate; panicle racemose, rather loose; bracts small, laciniate, ciliate; flowers small; calyx adherent to the ovary, obovate at base, limb flat, dilated; petals minute, caducous; stamens shorter than the lobes of the calyx; styles very short, conical; seeds muriccate or hispid under a lens.—Common in the mountains. *Hall & Harbour*, 204; *Parry*, 174; *B. H. Smith*. Chiann Cañon, *Porter*. *Brandegee*. South Park, *Coulter*.

*HEUCHERA HALLII*, Gr. Minutely glandular-puberulent; scape 4'-8' high, naked or with 1-3 minute, subulate bracts; thyrsus raceme-like, rather loosely 12-30 flowered; bracts scarcely longer than the pedicels; flowers white or pinkish, 3" long; calyx broadly-campanulate, 5-lobed, lobes broad-ovate; petals narrowly spatulate, obtuse, exsert; stamens and styles included. Leaves as in *H. bracteata*, considerably variable.—*Hall & Harbour*, rocks, on mountains of medium elevation. On the Upper Arkansas, *Porter*. Grand Cañon of the Arkansas, *Brandegee*.

*PARNASSIA PARVIFLORA*, DC.—*Hall & Harbour*, 578. Wet Mountain Valley, *Brandegee*.

*PARNASSIA FIMBRIATA*, Banks. Scape 6'-18' high; flowers 1' in diameter; radical leaves on very long petioles, biauriculate-reniform; cauline one very small, cordate, sessile, above the middle of the slender scape; petals fimbriate at the base, somewhat unguiculate, longer than the calyx; sterile filaments 5-9 in each set, or reduced to a crenately-toothed, broadly-cuneate, fleshy, carinate scale.—*Hall & Harbour*, 575. In damp places in the Sierra Madre Range at 10-12,000 feet altitude, *Coulter*.

*JAMESIA*<sup>1</sup> *AMERICANA*, T. & G. Cymes often longer than the leaves, 5-10-flowered; petals white, 3"-5" long, glabrous or slightly hairy within; calyx-lobes shorter than the petals, enlarged and foliaceous in fruit.—*Hall & Harbour*, 568; *Parry*. Georgetown, *Dr. Smith*; *Canby*. Chiann Cañon and Glen Eyrie, *Porter*. James's Peak and Clear Creek Cañon, *Coulter*; *Redfield*.

*PHILADELPHUS MICROPHYLLUS*, Gr. *Pl. Fendl.*, p. 54. Branches slender, erect; leaves small, 6"-9" long, ovate-lanceolate or oblong, very entire, obsolete 3-nerved, shining above, pale, and minutely pilose beneath, narrowed at base into a very short petiole; flowers terminal, 1-3; calyx 4-cleft, glabrous without, lobes ovate-lanceolate, tomentulose within; styles connate to the apex, shorter than the stamens; stigmas 4, oblong; capsules subglobose.—Cañon City, *Brandegee*. The specimens received from Mr. Brandegee exhibit some of the characters of *P. serpyllifolius*, Gr. (*Pl. Wright*, 1, p. 77.) The leaves are pubescent above, some of them plainly 3-nerved and the lobes of the calyx silky-pubescent without. But it is clearly distinguished by the size of the leaves and the oblong stigmas. The hairs on the under side of the leaves are appressed and covered with tubercles under the microscope,

<sup>1</sup>*JAMESIA*, T. & G. Calyx-tube very short, turbinate, adnate to the base of the ovary; lobes triangular-ovate, sometimes bifid. Petals 5, obovate, convolute. Stamens 10, the alternate ones shorter; filaments linear, flattened, acuminate. Ovary conical, 1-celled, with 3-5 parietal, many-ovuled placentæ; styles 3-5, equaling the stamens. Capsule included, incompletely 3-5-celled, dehiscent between the persistent, diverging styles. Seeds horizontal, ovate, shining, striate-reticulate, the embryo in the axis of the fleshy albumen.—A low, diffusely-branching shrub, 2°-3° high; leaves opposite, petioled, ovate, mucronately serrate, canescent beneath, as well as on the petioles, calyx, and branchlets, with a soft, hairy pubescence; flowers cymose, in terminal panicles. *Benth. and Hook.*

as Dr. Gray has observed in those of *P. serpyllifolius*.—Webster Cañon, *Redfield*.

*RIBES HIRTELLUM*, Mx.—*Hall & Harbour*, 187. Cañon City, *Brandegee*. Clear Creek Cañon, *Coulter*. Ute Pass, *Porter*.

*RIBES IRRIGUUM*, Dougl. Stems 6° high, branches red, naked or prickly; subaxillary spines 3 or sometimes more, stout, rarely reflexed; leaves roundish, 5-lobed, 1'-1½' in diameter, cuneate, truncate or subcordate at base, crenately-serrate, nearly glabrous, somewhat hairy between the veins beneath and somewhat ciliate; peduncles slender and usually elongated, 3-flowered, glabrous or minutely glandular-pubescent; the bracts somewhat glandular-ciliate; calyx cylindrical and narrow (with the ovary often ½' long), glabrous, the segments linear-oblong, exceeding the tube, sometimes reflexed; petals short, oblong-spatulate, purplish-white; the stamens usually exceeding the calyx, but shorter than the deeply cleft style; filaments and style hairy; fruit rather large, smooth, deep-purple, edible.—Wilson's Creek, *Brandegee*.

*RIBES LEPTANTHUM*, Gr. *Pl. Fendl.*, p. 53. Shrub 2°-4° high, diffusely branched, without prickles; subaxillary spines solitary, stout, rarely two or three; the dense, minute pubescence glandular or often mixed with resinous dots, or the whole plant glabrous; leaves small, 4''-6'' broad, numerous, 5-cleft, lobes incised; peduncles short, deflexed; flowers 1-2, nearly sessile, yellow, 2''-4'' long; bracts rounded, shorter than the ovary; calyx tubular or somewhat campanulate, more or less silky-pubescent, the lobes subspatulate, more or less reflexed, equaling the tube and about twice longer than the stamens and petals; style glabrous, undivided; stigmas 2; fruit unarmed, glabrous.—Cañon City, *Brandegee*. Webster Cañon, *Redfield*.

*RIBES LACUSTRE*, Poir.—*Hall & Harbour*, 184. Weston's Pass, *Coulter*.

*RIBES PROSTRATUM*, L' Her.—*Hall & Harbour*.

*RIBES CEREUM*, Dougl. Diffusely branching shrub, 1° 6° high, unarmed; leaves roundish, ½'-1' broad, mostly cordate, 3-5-lobed, incisely crenate, viscid-puberulent or nearly glabrous, resinous-dotted; racemes nodding on short peduncles, crowded, 3-5-flowered; bracts ovate, appressed to the nearly-sessile ovary; calyx tubular, 3''-4'' long, glandular, segments very short, recurved, pinkish-white; petals minute, orbicular; stamens included; style undivided; stigmas 2; fruit globose, glandular, light red.—*Hall & Harbour*, 186. Glen Eyrie, *Porter*. Cañon City, *Brandegee*. Clear Creek Cañon, and common through the mountains, *Coulter*.

*RIBES FLORIDUM*, L' Her.—On the Platte near Denver, *Dr. Smith*.

*RIBES AUREUM*, Pursh. Shrub, neither prickly nor spiny, with long slender drooping branches, glabrous; leaves convolute in vernation, rather thick, 3-lobed, lobes divaricate, incisely few toothed, ciliate when young; petioles and peduncles minutely puberulent; raceme many-flowered, with foliaceous bracts exceeding the pedicels; calyx tubular, very slender, segments spreading, shorter than the tube, twice the length of the petals, yellow; style undivided; fruit yellowish or black, glabrous, edible.—*Hall & Harbour*, 188. Plains near Denver, May, *Coulter*. Cultivated for the fragrance of its flowers, under the name of "Missouri Currant."

#### CRASSULACEÆ.

*SEDUM RHODIOLA*, DC.—*Hall & Harbour*, 191; *Dr. Smith*; *Porter*. Mount Lincoln at 13,000 feet altitude, July, *Coulter*. Gray's Peak, *Redfield*.

**SEDUM RHODANTHUM**, Gr. *Sill. Jour. (N. S.)* 33, p. 405. Stems numerous, 6''–12'' high from a thick root, erect simple, leaves flat, scattered, glabrous, oblong or oblanceolate, entire, 1'–2' long; corymb 1'–2' long, terminal, simple; flowers large, 4''–5'', perfect, mostly tetramerous, more than twice the length of the pedicels; sepals linear; petals rose-color or nearly white, lanceolate, acuminate, twice exceeding the sepals and a little longer than the stamens which are adnate to them below the middle; ovary straight; styles filiform.—On the banks of rivulets, alpine and subalpine. *Hall & Harbour*, 189; *Parry*; *Dr. Smith*. Mount Lincoln at 13,000 feet altitude, *Coulter*.

**SEDUM STENOPETALUM**, Pursh. Glabrous; stems 3'–6' high, erect, several from a decumbent base, simple or somewhat branched; leaves crowded on the barren shoots, fleshy, compressed, subulate, sessile, acute, 2''–4'' long; flowers bright-yellow, nearly sessile, pentamerous, 3''–4'' long; petals linear, lanceolate, acuminate, twice longer than the subulate sepals.—Common everywhere at the base of the foothills and through the mountains to 12,000 feet altitude. *Hall & Harbour*, 190; *Canby*; *Dr. Smith*; *B. H. Smith*; *Meehan*; *Porter*; *Coulter*.

### HALORAGÆÆ.

**HIPPURIS VULGARIS**, L.—Common in streams. *Hall & Harbour*, 132; *Parry*; *Brandegge*. Clear Creek Cañon, *Coulter*.

### ONAGRACEÆ.

**EPILOBIUM ALPINUM**, L.—*Hall & Harbour*, 167. Chicago Lakes at 12,000 feet altitude, *Coulter*.

**EPILOBIUM TETRAGONUM**, L. Stems erect, 6'–2° high, usually branching, 4-sided, nearly glabrous; leaves opposite, oblong-lanceolate, denticulate, the middle ones more or less decurrent along the angles of the stem, the lower slightly petioled; flowers small; petals emarginate; stigma clavate; capsules pediceled, minutely pubescent.—*Dr. Smith*; *B. H. Smith*; *Porter*. Along the Platte and near Mount Lincoln at 10,000 feet altitude, *Coulter*.

**EPILOBIUM PALUSTRE**, L.—*Hall & Harbour*, 166.

**EPILOBIUM PANICULATUM**, L. Stems 6'–3° high, glabrous or glandular-pubescent above, erect, slender, terete, dichotomous above; leaves narrowly linear, obscurely serrulate, acute, attenuate at base, mostly alternate and fascicled; flowers few, 1''–4'' long, light rose-color, terminating the spreading filiform and almost leafless branches; calyx-tube infundibuliform, petals obovate, nearly twice exceeding the calyx lobes; capsule short, acute at each end, straight or a little curved, erect or spreading.—*Hall & Harbour*, 168. Mountains of Colorado, *Canby*.

**EPILOBIUM ANGUSTIFOLIUM**, L.—*Hall & Harbor*, 170; *Dr. Smith*, *B. H. Smith*. Ute Pass and Twin Lakes, *Coulter*.

**EPILOBIUM LATIFOLIUM**, L. Stem ascending, often branched, 9'–18' high, glabrous or very minutely puberulent; leaves ovate or ovate-lanceolate, sessile, entire or nearly so, rather thick and rigid, 1'–1½' long, the veins not apparent; flowers axillary and terminal, on short pedicels; style somewhat erect, glabrous, shorter than the stamens.—*Hall & Harbour*, 169; *Parry*. Twin Lakes, *Coulter*.

**GAYOPHYTUM<sup>1</sup> RAMOSISSIMUM**, T. & G. Stems 6'-18' high, becoming very much branched; flowers very minute; calyx-lobes lanceolate-oblong, equaling the rose-colored petals and exceeding the longer stamens; flowers  $\frac{1}{2}$ " long; capsules oblong, 3-5-seeded, 2"-3" long, rather shorter than the filiform, deflexed, pedicels.—*Hall & Harbour*, 172. Buffalo Peaks, *Coulter*.

**GAYOPHYTUM RACEMOSUM**, T. & G. Glabrous or nearly so; stems 6'-18' high, branched, branches elongated, mostly simple; leaves linear-spatulate, short, 6'-12" long; flowers axillary throughout the branches; segments of the calyx about the length of the petals; longer stamens one-third shorter than the petals; capsule linear, 8"-10" long, tapering at base into a very short pedicel or sessile, many-seeded.—*Hall & Harbour*, 171; *Parry*; *Brandegee*; *Canby*. Gray's Peak, *Redfield*.

**GENOTHERA BIENNIS**, L.—Along the Platte and in Ute Pass, *Coulter*; *Porter*.

**GENOTHERA PINNATIFIDA**, Nutt. Annual, decumbent, pubescent or puberulent; stem low, branches sometimes 1°-2° long; leaves deeply pinnatifid, with linear and acute segments, radical ones often nearly entire; flowers axillary, large, 2'-3' in diameter; segments of the calyx rather shorter than the tube and much shorter than the broadly obovate petals; style filiform, shorter than the petals, but exceeding the stamens; stigmas filiform, divaricate, as long as the slender anthers; capsules prismatic-cylindrical, striate-grooved, somewhat tapering towards the apex, about 1' long; seeds 1-rowed in each cell, terete, ascending.—*Hall & Harbour*, 177; *Brandegee*. Clear Creek, *Coulter*. On the Platte near Denver, *Dr. Smith*. Wet Mountain Valley, *Redfield*.

**GENOTHERA CORONOPIFOLIA**, T. & G. Perennial, with horizontal root-stocks; stems simple, often numerous from a branching base, erect or ascending, slender, canescently puberulent, strigose or hispid; basal leaves linear-spatulate, the rest pectinately-pinnatifid; throat of the calyx-tube densely villous; petals somewhat orbicular, entire, equaling the stamens, shorter than the pistil, nearly white, turning red,  $\frac{1}{2}$ " long; capsule ovate or linear-oblong, torulose at base, sometimes attenuated into a very short peduncle, sub-erect; seeds large, ovate, turgid, somewhat obtuse or obliquely truncate.—*Hall & Harbour*, 178; *Dr. Smith*; *B. H. Smith*; *Canby*; *Brandegee*. Plains around Denver and Colorado Springs, *Porter*. Plains of the Platte and Pleasant Park, *Coulter*.

**GENOTHERA ALBICAULIS**, Nutt. Perennial, puberulent or hirsute; stems usually 1°-3° high, erect or ascending, with a white, membranous, shining bark; leaves very variable, linear or lanceolate, attenuate at the base, entire or more or less dentate; petals round-ovate, more or less unguiculate, entire, exceeding the stamens and equaling the pistil, often nearly white; capsule thickened at base, sessile, linear, divaricate, often flexuous or deflexed; seeds rather small, linear-lanceolate, smooth.—*Dr. Smith*; *B. H. Smith*; *Canby*. Cañon City, *Brandegee*. Plains near Denver and Pleasant Park, *Coulter*. Colorado Springs, *Porter*.

**GENOTHERA TRILOBA**, Nutt. Biennial, acaulescent, nearly glabrous;

<sup>1</sup> **GAYOPHYTUM**, A. Juss. Calyx-tube not produced beyond the ovary, linear, subterete; lobes 4, spreading, deciduous; petals 4, obovate, very shortly unguiculate; stamens 8, or 4, alternate, with as many staminodia; filaments short, filiform; anthers globose; style rather short, with a capitate or clavate stigma; capsule small, membranous, linear, 2-celled, 4-valved, two opposite valves bearing a narrow dissepiment; seeds few-many, in a single series in each cell, ascending.—Annual, slender, branching herbs, with alternate, linear, entire, nerveless leaves and small axillary, solitary flowers.—*Benth & Hook*.

leaves runcinate-pinnatifid, petioled, segments linear-lanceolate, often toothed; flowers large, sessile, 2'-3' in diameter, yellowish becoming rose-color; calyx-tube very long, filiform, dilated above; capsules oval or obovate, 1' in length, persistent and crowding at the base, cartilaginous or somewhat woody, reticulated, 4-winged, apiculate or 4-toothed at the apex; seeds horizontal, angled, densely tuberculate.—*Hall & Harbour*, 175. South Park, *Coulter*.

*CENOTHERA CÆSPITOSA*, Nutt. (Watson's *Rev. in Proc. Am. Ac.*, v. 8, pp. 585 and 605. Including *C. montana* and *C. marginata*, Nutt.; also *C. eximia*, Gr.) Acaulescent, or with a short, sub-erect stem, 2'-6' high, more or less villous-pubescent or nearly glabrous; leaves petioled, lanceolate, acute, variable in section, runcinate, lyrate, repandly-toothed or nearly entire; calyx-tube elongated, 3'-5' long; petals large, 1'-2' long, obovate, nearly white, becoming rose-color; capsules sessile or upon short peduncles, coriaceous, oblong, somewhat attenuate above, straight or curved, sub 4-angled, more or less ribbed, with the ridges tuberculate or smooth, dehiscence loculicidal; seeds, two rows in each cell, nearly horizontal, obovate, smooth, sulcate.—*Hall & Harbour*, 173; *Parry*. North Park, *Hayden*. *B. H. Smith*. Near Denver, *Canby*. Plains of the Platte, *Coulter*. South Park, *Porter*.

A remarkably stout, canescent form of this very variable species, collected by Mr. Brandegee near Cañon City, corresponds very nearly to *C. eximia*, Gray, *Pl. Fendl.*, p. 45. The robust, ascending stems are more than a span high and the capsules sessile, conical, 1'-1½' long, tapering upward from a broad base, with 2 wing-crested ribs on each valve.

*CENOTHERA MISSOURIENSIS*, Sims. Stems low, simple, decumbent; leaves coriaceous, lanceolate, acute, tapering into a short petiole, obscurely denticulate, somewhat canescent when young; flowers axillary, very large, diurnal; tube of the calyx 4'-7' in length, segments acuminate, often spotted with purple, much shorter than the tube, about the length of the roundish, flabelliform, mucronulate petals; corolla 4'-6' in diameter; petals very broad, light-yellow, with orange veins; capsule pediceled, very large, somewhat compressed, with 4 broad wings, 2' in length and about the same in breadth including the wings, without the wings 3' in diameter; seeds large, the undulate crest conspicuous.—*Hall & Harbour*, 174.

*CENOTHERA HARTWEGII*, Benth., var. *LAVANDULÆFOLIA*, Gr. Suffruticose, low, hoary-canescens; stems simple, decumbent, 6' long; leaves crowded, linear, or oblong-linear, entire, obtuse or acutish, somewhat revolute; tube of the calyx 2' long, tubular-infundibuliform, many times longer than the ovary and the ovate-lanceolate, slightly acuminate segments; petals rhombic-ovate, crenulate, longer than the stamens; stigma discoid; capsule sessile, cylindrical, canescent; seeds in a double series, horizontal.—Cañon City, *Brandegee*. Bluffs at Pueblo, *Greene*.

*CENOTHERA CANESCENS*, Torr. & Frem. *Frem. 2d. Exp.*, p. 315. Gray in *Pl. Fendl.*, p. 44. (*C. guttulata*, Hook.) Stems ascending, 6'-8' high, branching, very leafy to the top; leaves minutely strigose-canescens, 6'' long, oblong-lanceolate or linear, entire or obscurely toothed; calyx-tube slender, 9'' long, purplish, thrice the length of the ovoid, canescent ovary; petals broadly obovate, entire, ⅔' long, white, with some of each flower conspicuously spotted or blotched with rose-purple; anthers linear; divisions of the stigma linear, slender; capsule slender, canescent, 3'' long and almost as broad, turgid-ovate, apiculate, with 4 strongly carinate and almost winged angles, the intermediate ribs

scarcely prominent; seeds numerous in each cell, obovate, with a smooth and thin testa.—Purgatory River, *Dr. Bell*.

*ŒNOTHERA SERRULATA*, Nutt.—*Hall & Harbour*, 179; *B. H. Smith*. Plains of the Platte and Monument Park, *Coulter*. On the plains between Denver and Colorado Springs, *Porter*.

*ŒNOTHERA BREVIFLORA*, T. & G. (*Œ. Nuttallii*, T. & G.) Perennial, acaulescent; leaves petioled, 2'-6' long, lanceolate, acuminate, interruptedly pinnately-parted, the segments lanceolate, acuminate, toothed or entire; calyx-tube marcescent, much shorter than the leaves, filiform, dilated at the summit, segments lanceolate, shorter than the obovate, yellow petals, scarcely exceeding the style; stigma capitate, entire; capsules large, sessile, submembranous, oblong and attenuate above, sub-tetragonal and sulcate on the sides, very-many-seeded; seeds smooth, somewhat ascending, terete, oblong, slightly reniform, 2 series in each cell.—*Hall & Harbour*, 176.

*STENOSIPHON*<sup>1</sup> *VIRGATUS*, Spach. Spikes in fruit sometimes nearly 1° long; bracts subulate, longer than the ovary, rather persistent; calyx pubescent, tube exceedingly slender, 4''-5'' long; petals rather large in proportion; ovary tomentose-pubescent.—*Parry*; *Canby*.

*GAURA PARVIFLORA*, Dougl. Stem tall, erect, more or less branched, 2°-5° high, clothed, besides the long, soft-villous hairs, with a minute, slightly glandular pubescence; leaves ovate-lanceolate, 1'-3' long, acute or acuminate, repand-denticulate, clothed on both sides with a soft, velvety pubescence; spikes virgate, dense, strict, in fruit often elongating 1° or more; bracts lanceolate-subulate; flowers very small, rose-colored; calyx-tube shorter than the glabrous ovary and longer than the segments; petals spatulate-oblong; anthers oval, retuse, attached by the middle; lobes of the stigma very short; fruit sessile, oblong-clavate, 4-nerved, obtusely angled above, 3''-4'' long.—On the plains near Denver, *Dr. Smith*. *Hall & Harbour*, 180; *Parry*, 181; *Canby*. Cañon City, *Redfield*.

*GAURA COCCINEA*, Nutt. Canescent, puberulent or glabrate; stems suffruticose and fastigiately branched from the base, 6'-12' high, very leafy, ascending; leaves lanceolate, linear-oblong or linear, repand-denticulate or entire, 6''-12'' long, closely sessile; flowers in simple spikes terminating the leafy branches, rose-color, turning to scarlet; bracts linear, rather persistent, longer than the ovaries; calyx-segments linear-oblong, shorter than the narrow infundibuliform tube, as long as the roundish, unguiculate petals; fruit elliptical, sessile, short, terete, 4-sided above.—*Hall & Harbour*, 181; *Dr. Smith*; *B. H. Smith*; *Canby*. Plains around Denver and Colorado Springs, *Porter*. Plains of the Platte, *Coulter*.

*CIRCÆA ALPINA*, L.—*Hall & Harbour*.

## LYTHRACEÆ.

*LYTHRUM ALATUM*, Pursh.—Plains near Denver, *Dr. Smith*.

<sup>1</sup> *STENOSIPHON*, Spach. Tube of the calyx filiform or almost capillary, much prolonged beyond the ovary, recurved or declined after flowering, at length deciduous; the limb 4-parted, much shorter than the tube. Petals 4, unguiculate, unequal. Stamens 8, erect, the alternate ones a little shorter; filaments capillary; anthers oblong, fixed by the middle. Ovary oval, 1-celled, with 4 suspended ovules; style erect, filiform, dilated at the apex; stigma 4-lobed. Fruit (very small) coriaceous and indehiscent, ovate, convex externally, flattish within, about 8-ribbed, 1-seeded.—A tall, perennial herb, with virgate branches, and scattered linear-lanceolate, sessile, acute, nerveless, entire leaves, gradually reduced to bracts. Flowers (white) sessile, crowded, in long and strict, virgate spikes. *T. & G. Fl. N. Am.*

## LOASACEÆ.

*MENTZELIA NUDA*, T. & G. Rough with a minute, barbed pubescence; stems 1°-3° high, white, often widely branching; leaves lanceolate or oblong-lanceolate, sessile, toothed or pinnatifid, with sharp or obtuse spreading teeth, very rough; flowers large, terminating the branches, vespertine, bracteolate, (not bracteolate, T. & G.); petals 10, lanceolate, tapering at the base, acute, yellowish-white with numerous darker veins, 1' to 1½' long; stamens very numerous, the exterior filaments petaloid and often sterile, the others filiform, capsule-cylindrical, 1' or more long, 4" wide, 3-valved at the summit; seeds numerous, ovoid, with a broad, membranous wing.—*Hall & Harbour*, 569; *Dr. Smith*; *B. H. Smith*. On the plains near Denver and Colorado Springs, *Porter*. Cañon City, *Brandegee*. Plains of the Platte, *Coulter*.

*MENTZELIA ALBICAULIS*, Dougl. Stem 6'-18' high, usually branching from the base, white and polished and nearly glabrous below, rather weak; leaves lanceolate, remote, more or less deeply pinnatifid, sometimes repand or nearly entire, scabrous, sessile; flowers solitary or somewhat clustered, not bracteolate; petals obovate, 2" long, light-yellow, scarcely exceeding the short, subulate-lanceolate calyx-segments; filaments 15-30, subulate-filiform or occasionally somewhat dilated; capsules cylindric, narrow, elongated, attenuate at base, 6" to 9" long, 1" to 1½" wide, minutely hispid; seeds 20-40.—*Hall & Harbour*, 571. Near Denver, *Canby*. Cañon City, *Brandegee*. Plains of the Platte, *Coulter*. Frequent on the plains and among the foot-hills.

*MENTZELIA MULTIFLORA*, Nutt. *Pl. Gamb. in Jour. Proc. Acad. Phil. Feb.* 1848, under *Bartonia*. Stems scabrous, pubescent,  $\frac{3}{4}$ °-1° high, slender, corymbosely branched above, rough, pubescent or becoming smooth and white with age; leaves lanceolate or narrowly lanceolate, sinuate-pinnatifid, attenuate below and sessile; flowers subtended by 1 or 2 ovate or linear, entire bracts; petals 10, deep or golden-yellow, oblong-oval, obtuse or acute, 6"-9" long, abruptly pointed, much longer than the subulate calyx-segments; capsules cylindrical-oblong, about 6"-8" long, 3"-4" wide, a little longer than the calyx-segments; seeds in a double series, winged.—*Hall & Harbour*, 570; *Canby*. Wet Mountain Valley, *Brandegee*.

*MENTZELIA OLIGOSPERMA*, Nutt.—Wet Mountain Valley, *Brandegee*.

*MENTZELIA WRIGHTII*, Gr. *Pl. Fendl.*, p. 48. Annual, rough-scabrous; stems simple or paniculate, 2° high; leaves oblong-lanceolate, coarsely sinuate-dentate, lowest attenuate into a petiole, upper ones truncate at base or somewhat broadly auriculate, closely sessile; bracteoles 1-2, linear, entire, equaling the ovary; flowers small, ochroleucous; petals 10, lanceolate-spatulate, scarcely surpassing the lobes of the calyx, shorter than the cylindrical ovary; filaments all linear-subulate, outer ones a little dilated; placentæ 3-many seeded; seeds winged.—Purgatory River, *Dr. Bell*.

## CACTACEÆ.

*MAMILLARIA*<sup>1</sup> *NUTTALLII*, Eng., var. *CÆSPITOSA*, Eng. *Syn. Proc. Am. Ac.*, v. 3, p. 9. Cæspitose; radial spines 12-15, setaceous, straight, puberulent, white, central one often wanting; fimbriate sepals and yellow pe-

<sup>1</sup>*MAMILLARIA*, Haw. Sepals and petals united beyond the naked ovary into a short tube. Berry juicy, oval or club-shaped. Seeds brown or black; embryo straight, without albumen; cotyledons very short, globose.—Low, globose or oval plants, simple or branched, covered with spine-bearing tubercles; flowers rising from the axils of the tubercles, usually small, about as wide as long, opening in sunshine only.

tals often sparingly denticulate at the apex, lanceolate or linear-lanceolate, acute; stigmas 5, spreading; berry subglobose, shorter than the tubercles, red; seeds globose, scrobiculate, black.—Golden City, *Greene*.

*MAMILLARIA VIVIPARA*, Haw. *Eng. Syn. l. c.*, p. 13. Simple, oval, the almost terete tubercles bearing fascicles of 5–8 reddish-brown spines, surrounded by 15–20 grayish ones in a single series; all straight and very rigid; the latter 5''–8'' long; the former even 10'' long; flowers purple, often 2' or more in diameter, with numerous lance-subulate petals and fringed sepals; berry oval, green; seed pitted, light-brown.—Foot-hills near Long's Peak, *Coulter*. *Redfield*.

*ECHINOCACTUS*<sup>1</sup> *SIMPSONI*, Eng. Simple, globose or depressed, with ovate tubercles like a *Mamillaria*, bearing 20 outer ash-colored spines and 5–10 stouter, darker, inner ones, all straight and rigid; flowers from the top of the just-developing tubercles, small, 9''–12'' broad, yellowish-green to purplish; scales on the ovary very few; berry small, dry, with few black, tuberculated seeds.—Near Cañon City, *Brandegee*; *Greene*.

*CEREUS*<sup>2</sup> *VIRIDIFLORUS*, Eng. *Syn. l. c.* p. 22. Ovate or at length cylindrical, simple or sparingly branched, 1'–2' high; ribs about 13; areolæ ovate-lanceolate; spines strictly radiating, 12–18, with 2–6 superior, setaceous ones, the rest lateral, longer, the lower frequently purplish-brown, the others white; central one often wanting, when present, stouter, solitary, variegated; flowers lateral towards the apex, yellow, becoming green; berries elliptical, small; seeds tuberculated.—Cañon City, *Brandegee*; *Coulter*.

*CEREUS FENDLERI*, Eng. *Syn. l. c.* p. 25. Stems 3'–8' high, not many from the same base, ovate-cylindrical; ribs 9–12; areolæ rather crowded; spines very variable, always bulbous at base, radial ones 7–10, straight or curved, 6''–12'' long, white and brown, lower ones stronger, central one stout, curved above, dark-brown, often elongated, 1'–2' long; the flowers lateral below the top, large, 2'–3' in diameter, of a deep purple color, diurnal; berry 1'–1½' long, edible; seed oblique, deeply and irregularly pitted by the confluence of many of the tubercles.—Canon City, *Brandegee*; *Greene*.

*CEREUS GONACANTHUS*, Eng. & Big. *Pac. R. R.*, 4, p. 33. Ovate, simple or sparingly branched from the base, 7-ribbed; areolæ large, orbicular, distant; spines robust, angled, straight or variously curved; radial ones 8, yellowish, often blackish at base and apex, 8''–15'' long, the upper one much larger than the others, 1¼'–2½' long, nearly equaling the central one, which is remarkably stout, angular, and channeled; flowers scarlet, open day and night.—Cañon City, *Brandegee*. Pueblo, *Greene*.

<sup>1</sup> *ECHINOCACTUS*, Link & Otto. Sepals and petals united beyond the sepal-bearing ovary into a short tube. Berry globose or oval, juicy or dry, covered with scales and sometimes with wool. Seeds brown or black; embryo usually curved over a small albumen; cotyledons short, foliaceous, parallel to the sides of the seed. Globose or oval, mostly simple, generally many ribbed with bunches of spines on the ribs, rarely tuberculated; flowers near the top, just above and close to the spines of the same season, usually large, as wide as long, open only in sunshine.

<sup>2</sup> *CEREUS*, Haw. Sepals and petals united above the sepal-bearing ovary into a short, or, usually, long tube. Berry juicy, globose or oval, beset with scales (sometimes rather indistinct) or spines. Seeds brown or black; embryo straight or usually curved, without albumen; cotyledons short or foliaceous, commonly contrary to the sides of the seed. Globose or oval, or mostly cylindrical or columnar, few or many ribbed, usually branched, bearing bunches of spines on the ribs; flowers lateral, just above and close to the spines of previous seasons, usually large, fully open in sunlight or at night, or rarely, permanently.

The above species belong to § *Echinocereus*, Eng. Heads commonly many, low, oval or cylindrical; flowers short, mostly as wide as long; ovary covered with bunches of spines; stigmas green; seeds small, tuberculated; cotyledons short, straight.



*CEREUS PHENICEUS*, Eng. *Syn. l. c.*, p. 28. Heads 2'-3' high, 2' thick, generally forming dense hemispherical masses 1° or more in diameter, ovate or subglobose, 9-11 ribbed; areolæ ovate-orbiculate, somewhat crowded; spines setaceous, straight, radial ones 3-12, upper ones a little shorter, central ones 1-3, bulbous at base, terete, a little stronger, 5'-10" long, lowest one longest; stamens shorter than the petals; stigmas 6-8.—Cañon City, *Brandegee*; *Greene*.

*CEREUS CONOIDEUS*, Eng. & Big. *P. R. R.*, vol. 4, p. 35. Heads 3'-4' high, few from one base, of unequal height, ovate, acutish towards the apex, conoid, 9-11 ribbed; radial spines 10-12, slender, rigid; upper ones 2''-5'' long, lateral ones 6''-15''; upper central spines hardly longer than the lateral ones, lower one 1'-3' long, angular and often compressed.—Cañon City, *Brandegee*.

*CEREUS PAUCISPINUS*, Eng. *Syn. l. c.*, p. 29. Stem 5'-9' high, 2'-3' in diameter, ovate-cylindrical, sparingly branching or simple, 5-7 ribbed; areolæ remote; spines strong, 9''-16'' long, dark-colored, radial 3-6, central wanting or rare, stout, subangled.—Cañon City, *Brandegee*.

*OPUNTIA CAMANCHICA*, Eng. & Big. *Syn. l. c.*, p. 37. Large, prostrate, extensively spreading, joints ascending, 6'-7' long, suborbiculate; pulvillæ remote, numerous, armed; setæ straw-colored or brownish, few; spines 1-3, compressed, brownish, paler at the apex, 1½'-3' long, upper ones elongated, suberect, the others deflexed; berry large, juicy, ovate, widely umbilicate; seeds 2''-3'' in diameter, angled, deeply notched at the hilum.—Cañon City, *Brandegee*.

*OPUNTIA RAFINESQUII*, Eng. *Syn. l. c.*, p. 39. Very variable.—Cañon City, *Brandegee*.

*OPUNTIA MISSOURIENSIS*, DC. *Eng. Syn. l. c.*, p. 43. *Gray's Manual*, p. 185. Presenting a great variety of forms.—Cañon City, *Brandegee*. Foot-hills near Denver, *Coulter*. Colorado Springs, *Porter*. Frequent in broad patches on the plains and in the mountains.

*OPUNTIA ARBORESCENS*, Eng. *Syn. l. c.*, p. 51. Arborescent, 5°-6° high, (but further south 10°-20° or more;) branches numerous, verticillate, horizontal, or pendulous; joints verticillate, cylindrical; tubercles cristate, prominent; spines 8-30, divaricately stellate; berry sub-hemispherical, tuberculate-cristate, yellow, unarmed; seeds regular.—The woody portion of the stems, deprived of the parenchyma, is often manufactured into canes. Abundant along the Arkansas east of the mountains, *Porter*. Cañon City, *Brandegee*.

### CUCURBITACEÆ.

*CUCURBITA PERENNIS*, Gr. *Pl. Lindh. Pt. 2*, p. 193. Root fleshy, very large, 6'-3° thick, fusiform, yellow inside; stems trailing on the ground; leaves strigose-canescens, cordate-ovate or triangular, narrowed above, undivided or subsinuate-repand, margin denticulate; lobes of the calyx subulate, equal to the tube; fruit globose, yellow, 2'-3' in diameter.—Plains and prairies east of the mountains, *Porter*. Near Cañon City, *Brandegee*; *Redfield*.

*ECHINOCYSTIS LOBATA*, T. & G. *Gray's Manual*, p. 187.—Near Denver, *Dr. Smith*.

### UMBELLIFERÆ.

*CICUTA MACULATA*, L.—Plains of the Platte, June, *Coulter*.

*SIMUM LINEARE*, Mx.—Weston's Pass and White House Mountain at 11,000 feet altitude, *Coulter*.

*SIUM ANGUSTIFOLIUM*, L.—Near Cañon City, *Brandegee*. Denver, *Porter*.

*OSMORRHIZA NUDA*, Torr. *P. R. R.*, 4, p. 93. Petioles and lower part of the stems strigosely pubescent; leaflets broadly ovate, often deeply 3-lobed, coarsely dentate-serrate; peduncles elongated; involucre and involucels none, or occasionally present though small; umbel 4-rayed, rays 4-6 flowered; styles very short, fruit obtuse, shorter than the pedicels. Too near *O. brevistyla* of the Eastern States.—*Hall & Harbour*. Sierra Mojado, *Brandegee*.

*CYOPTERUS* <sup>1</sup>*GLOMERATUS*, DC. Root thick and fusiform; plant 3'-8' high; caudex about 1' high, sometimes divided, bearing the leaves and peduncles at the summit; leaves on long petioles, ternately-divided and bipinnatifid, segments oblong-linear; rays of the umbel 4-6, very short; peduncles much shorter than leaves, 6"-12" long; flowers white, those of the center abortive, pedicellate; leaflets of the palmately 5-7 parted involucre coherent at base and partly adnate to the rays of the umbellets; calyx-teeth subulate; fruit elliptical, 4" long, wings thickened and somewhat spongy, more or less obsolete; vittæ in each interval 3-4, in the commissure about 8.—*Hall & Harbour*, 210. Cañon City, *Brandegee*. Clear Creek Cañon, *Coulter*.

*CYOPTERUS MONTANUS*, Nutt. Root long and fleshy; stem 2'-6' high; caudex 6"-18" long, erect, sheathed at base; leaves glaucous, ovate in outline, bipinnately divided, segments rather few and distant, about 3-4 pairs, oblong-linear, rather obtuse; peduncles shorter or longer than the leaves; involucre and involucel somewhat campanulate, scarious, about 5-parted, segments oblong, obtuse, entire or 5-cleft, with greenish ribs; flowers white, polygamous; calyx-teeth minute, ovate; fruit about 3" long, the integuments thick and opaque so as to conceal the vittæ, commissure with 4 vittæ; carpophore persistent, 2-parted; wings 6-10, broad and membranous, often unequal; seed more or less involute.—*Hall & Harbour*, 211. Cañon City, *Brandegee*. Plains near Denver, *Coulter*.

*CYOPTERUS ALPINUS*, Gr. *Sill. Jour.*, (*N. S.*) 32, p. 408. Caudex cæspitose; leaves pinnatisect, pinnæ 3-5, approximate, 3-7 parted, segments linear-lanceolate, acutish or mucronate, very entire, or the lower 2-3 cleft; scape 2'-4' high, bearing a subcapitate umbel, a little longer than the leaves; involucels somewhat one-sided, 5-7 parted, segments linear or lanceolate, green, equaling the golden flowers; teeth of the calyx lanceolate, subulate, persistent; wings of the fruit equal, somewhat erose, scarcely undulate; vittæ 1-2 in the intervals, 4 in the commissure; carpophore none; fruit 2"-3" long. High alpine.—*Hall & Harbour*, 213; *Parry*, 158; *Canby*. Summit of Pike's Peak, *Porter*. Mount Lincoln at 13,000 feet altitude, *Coulter*.

*CYOPTERUS*? *ANISATUS*, Gr. *Proc. Ac. Phil.*, *March*, 1863, p. 33. Acaulescent, cæspitose from the much-branched caudex, glabrous; leaves

<sup>1</sup>*CYOPTERUS*, Raf. Calyx-teeth rather prominent and setaceous or lanceolate, minute or obsolete. Petals ovate, oblong or oblanceolate, inflexed, quasi-emarginate. Disk flattened around the styles, undulate-margined. Fruit ovate or elliptical, obtuse or retuse, subterete or slightly compressed dorsally; carpels semi-terete; ribs thick and elevated, all or only the lateral ones or those opposite to the calyx-teeth expanded into wings; vittæ numerous, narrow. Carpophore 2-parted, free or attached to the carpels. Seeds much compressed dorsally and more or less concave on the face.—Perennial and subcaespitose, with a thickened caudex; leaves pinnately decomposed, with narrow, small or incisely pinnatifid segments; umbels compound, usually few-rayed; involucral bracts 1-2 or none; of the involucels several, very narrow or broad and membranous; flowers white or yellow. *Benth. & Hook.*

4'-6' long, erect, narrow, on long petioles, somewhat rigid, pinnate, the leaflets 6-10 pairs, pinnately parted, segments entire or laciniately lobed; linear, pungently acute; scapes equaling or exceeding the leaves, 6'-12' high; rays 6-12, unequal; involucre usually none; involucels of 6-8 linear, subulate leaflets, equaling the white flowers; calyx-teeth conspicuous, linear-subulate, foliaceous; fruit 2" long, irregularly winged, the lateral ribs and the dorsal one usually broader, rather thick, and not membranous; vittæ obscure, 1 in each narrow interval, 2-4 in the commissure; seeds slightly concave, somewhat crenately sulcate under the dorsal intervals.—In the mountains. *Hall & Harbour*, 222; *Canby*.

MUSENIUM<sup>1</sup> TRACHYSPERMUM, Nutt. Decumbent; leaves bipinnatifid, segments pinnatifid, rather obtuse, lobes often 2-3 cleft and very short, rachis wide; involucre about 8-leaved, short; fruit short, oval, pulverulently-scabrous. Near *M. divaricatum*, Nutt., but smaller. Fruit only half as large, nearly as broad as long.—*Hall & Harbour*, 214.

MUSENIUM GREENII, Gr. *Proc. Am. Acad.*, Feb., 1872, v. 8, p. 387. Stemless; leaves all from a caudex squamose at the summit, almost simply pinnate, narrow; leaflets 7-9, on a rachis margined only above, sessile, subovate in outline, pinnately 5-7 lobed and few-toothed, teeth and lobes sharp; scapes more than a span high, wholly naked; umbels short-rayed; involucels of 3 or 4 subulate bracts, nearly equaling the subsessile, yellow flowers; fruit 2" long, oblong, very obtuse, truncate, smooth, crowned with the ovate, subulate calyx-teeth; ribs rather prominent, very narrow; vittæ between, 1-2, large; beneath, solitary, small.—Mountains above Golden City, *Greene*.

LIGUSTICUM APIIFOLIUM, Benth. & Hook., *Proc. Am. Acad.*, 7, p. 347. (*Cynapium*, Nutt.) Stems 2°-4° high, terete, leafy or naked, branching towards the summit, with 2-4 umbels on long peduncles; leaves pinnately decomposed, the segments incisely lobed, acute; cauline leaves ternate, upon a short dilated sheath; involucre none; involucel few-leaved, lateral; calyx-teeth obsolete; the stylopodia rather prominent, with a somewhat dilated crenate margin; fruit 2½" long, oval, with acutely carinate ribs; seeds concave on the face, with a central longitudinal ridge.—Platte River and in the Sierra Madre Range, *Coulter*. Wet Mountain Valley, *Brandegee*. *Hall & Harbour*, 218.

LIGUSTICUM SCOPULORUM, Gr. *Proc. Am. Acad.*, 7, p. 347. Rather stout, 2°-4° high; leaves pinnately decomposed, segments ovate, deeply incised, teeth very acute; fruit elliptical-oblong, 4" long; wings narrow, thickened, intermediate and dorsal 1-2, often obsolete; vittæ marked, rather large, in all the intervals 3, in the lateral ones sometimes 4; section of the seed almost reniform. Alpine and subalpine.—*Hall & Harbour*, 216. Cañon City, *Brandegee*. Near Denver, *Canby*.

LIGUSTICUM MONTANUM, Gr. (*Thaspium montanum*, Gr. *Pl. Fendl.*, p. 57,) *Proc. Am. Acad.*, 7, p. 347. Very smooth; stem erect, slender, from a thick fusiform root, 1°-2° high; leaves twice ternately divided; leaflets cuneiform, trifid, lobes oblong or lanceolate, sometimes linear, entire, or the

<sup>1</sup>MUSENIUM, Nutt. Margin of the calyx 5-toothed; the teeth persistent. Petals obovate; the point inflexed. Styles slender, reflexed, rather long. Fruit ovate or ovate-oblong, laterally compressed. Carpels more or less minutely scabrous, with 5 filiform, acute, slightly prominent ribs. Intervals with 2-3 vittæ. Commissure with 4 vittæ. Carpophore 2-cleft. Seed with the sides moderately incurved.—Perennial, dwarf, rather fetid, resiniferous (North American) herbs, with fusiform roots and a short caudex, or branching dichotomously from the base. Leaves 2-3 pinnatifid. Involucre none. Involucels unilateral, of a few rather rigid narrow leaflets. Flowers yellow or white. *T. & G. Fl. N. Am.*

larger ones incised; petioles with a long dilated, spathaceous base; involucre none; involucre of about 9 setaceous, unequal leaflets, equaling the pedicels; flowers bright-yellow; fruit  $1\frac{1}{2}$ "-2" long, oblong-oval or nearly orbicular, marginal wings broad; the strong vittæ single or double. Foliage variable.—*Hall & Harbour*, 217; *Porter*; *Hoopes*. Sierra Madre Range, at 11,500 feet altitude, and Twin Lakes, *Coulter*.

*THASPIUM TRIFOLIATUM*, Gr.—Near Cañon City and Wet Mountain Valley, *Brandegee*.

*THASPIUM TRACHYPLEURUM*, Gr.—*Proc. Acad. Phil. March*, 1863, p. 63. Glabrous; stem 1° or more high, striate, 1-3 leaved, bearing 2-3 umbels on long peduncles; leaves ternately decomposed, segments filiform, mucronulate; petioles dilated at base, not scarious-margined; involucre and involucre of 1-3 small, subulate leaflets; flowers yellow; fruit twin-ovate, laterally compressed, transverse section of the mericarps almost orbicular; ridges or wings 5, similar, thick, suberose, very obtuse, scabrous, one strong vitta in each of the intervals.—*Hall & Harbour*, 215; *Meehan*. South Park, *Porter*. Saint Vrain Cañon, Bear Creek and Boulder Cañon, *Coulter*. Grand Cañon of the Arkansas, *Brandegee*.

*SESELI*<sup>1</sup> *HALLII*, Gr. *Proc. Am. Ac.*, June, 1870, v. 8, p. 288. Acaulescent from a stout caudex branching at the summit; leaves pinnatisect, 3-5 pairs, segments cuneate or oblong, incised or pinnatifid, lobes 3-7, short, mucronate, sometimes sparingly toothed; scape very simple, naked, surpassing the leaves, slender, 10' high; rays of the umbel 4-8, short, elongated after flowering; involucre deeply parted, divisions ovate, 3-cleft at the summit, longer than the yellow flowers; fruit narrowly oblong, very smooth, much longer than the very short pedicel; teeth of the calyx short, not persistent; vittæ in the intervals large, often with very small accessory ones in each rib; section of the seed transverse, subquadrate.—*Hall & Harbour*, 221. Bear Creek, 17 miles west of Denver, *Vasey*. Near Denver, *Coulter*.

*ARCHANGELICA GMELINI*, DC.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. Weston's Pass and Mount Lincoln, at 12,500 feet altitude, *Coulter*. *Hall & Harbour*, 219.

*ARCHEMORA FENDLERI*, Gr., *Pl. Fendl.*, p. 56. Root fasciculate-tuberose; tubers 3-4, oblong, about 1'; stem simple, slender, 1°-2° high; leaves pinnate 5-7 foliolate, leaflets  $\frac{3}{4}$ "-1 $\frac{1}{2}$ " long, those of the radical and lower cauline ones ovate or oblong, all incisely serrate throughout; petioles spathaceous at base; involucre none; umbels small; fruit small, hardly 2" in length; oval, the wing-like margins narrower than the disk; vittæ of the commissure 4, of which 2 are shorter; flowers white.—*Hall & Harbour*, 220. "In subalpine woods," near Cañon City, *Brandegee*. Mount Lincoln, at 12,500 feet altitude, *Coulter*.

*PEUCEDANUM* (?) *NUDICAULE*, Nutt. (?) Caulescent or sometimes scarcely so, minutely pruinose-pubescent, 3'-15' high; leafy only at base; leaves bipinnate or ternate-bipinnate, the segments incisely lobed with usually rather broad and subacute divisions; umbel somewhat capitate in flower, with 8-12 rays; involucre none; involucre unilateral,

<sup>1</sup>*SESELI*, L. Margin of the calyx 5-toothed, teeth short, somewhat thickened. Petals obovate, coarctate in an inflexed point, emarginate or subentire. Fruit oval or oblong, subterete in the transverse section, crowned by the reflexed styles. Ribs of the mericarp 5, slightly prominent or elevated, thickened and corky; lateral ones marginal and often a little broader. Intervals with a single vittæ, rarely 2-3 vittæ. Carpophore 2-cleft. Albumen sub-semiterete.—*Koch, Fl. Germ.*

of 6-10 membranously margined, more or less united bracts; petals white, with an attenuated apex and quasi-obcordate; calyx-teeth short; fruit pubescent, broadly oval, 3"-4" long and 3" broad, the thickish wing more than half as wide as the seed; vittæ 3 in the intervals, 6 upon the commissure, conspicuous; seed flattened.—*Hall & Harbour*, 212.

*SANICULA MARILANDICA*, L.—Cañon City, *Brandegee*. Ute Pass, at 9,000 feet altitude, *Coulter*.

*DAUCUS CAROTA*, L.—Near Cañon City, *Brandegee*. Introduced.

*HERACLEUM LANATUM*, Mx.—Cañon City, *Brandegee*. Plains of the Platte and Twin Lakes, *Coulter*.

### ARALIACÆ.

*ADOXA*<sup>1</sup> *MOSCHATELLINA*, L. Perennial, small and slender, herbaceous, 3' high; root tuberous; radical leaves 2-3 ternately compound, on long petioles, the cauline solitary, 1-2 ternate or incised; flowers 4-6, greenish, in a terminal capitulum, the lateral ones mostly pentamerous, the terminal tetramerous.—An alpine plant found also in the north of Europe and Asia. It exhales the odor of musk.—“Subalpine; common;” *Hall & Harbour*, 223; *Meehan*. Mount Lincoln, at 13,000 feet altitude, *Coulter*.

### CORNACEÆ.

*CORNUS CANADENSIS*, L.—*Hall & Harbour*; *Parry*, 437.

*CORNUS PUBESCENS*, Nutt. (*C. sericea*,  $\beta$ . (?) *occidentalis*, T. and G.) Shrub 6° 8° high; branches sub-erect, branchlets spreading, more or less reddish, puberulent when young; leaves 1½'-4' long, ovate or elliptical, acute or acuminate, slightly pubescent, pale beneath, obtuse or acute at base; cymes crowded, pubescent, 1½'-2' in diameter; calyx-teeth minute; petals white, oblong-lanceolate, rather obtuse; stigma small, capitate; drupe subglobose, white, becoming lead-color.—“Without the calyx-teeth, enlarged stigma, and woolly pubescence of *C. sericea*, and nearer to *C. stolonifera*.” *Watson*.—Platte River, *Coulter*.

### CAPRIFOLIACÆ.

*LINNÆA BOREALIS*, Gronov.—*Hall & Harbour*, 224; *Dr. Smith*. Mount Lincoln at 10,000 feet altitude, *Coulter*.

*SYMPHORICARPUS MONTANUS*, H. B. K. Shrub, 2°-4° high, branching widely; leaves very variable, orbicular, ovate, or ovate-lanceolate, acute or obtuse, entire or sharply cleft and lobed, soft-pubescent and ciliate or wholly glabrous and often glaucous, ½'-1½' long; flowers axillary, solitary on the ends of the short, leafy branches; bracts much shorter than the ovary; teeth of the calyx obtuse, glabrous or ciliate; corolla tubular or funnel-form, 2"-6", nearly glabrous within, usually light pink; stamens and style included; fruit globular or oblong, white.—*Hall & Harbour*, 225. Cañon City, *Brandegee*; *Canby*. Upper Arkansas, *Porter*. Weston's Pass, at 11,000 feet altitude, *Coulter*.

<sup>1</sup> *ADOXA*, L. Flowers perfect. Tube of the calyx coherent with the lower part of the ovary; the limb slightly 2-3 cleft. Petals 4-5 inserted on the limb of the calyx, united at the base, spreading. Stamens 4-5, each filament 2-parted; the divisions bearing each a single-celled peltate anther. Styles 4-5, subulate. Fruit an herbaceous and juicy berry, 4-5 celled, each cell with a single suspended seed. Seeds compressed, with a membranaceous margin.—*T. & G. Fl. N. Am.*

*SYMPHORICARPUS OCCIDENTALIS*, R. Br.—*Hall & Harbour*, 227. Cañon City, *Brandegee*. *B. H. Smith*. Near Denver and Colorado Springs, *Porter*.

*LONICERA INVOLUCRATA*, Banks.—*Hall & Harbour*, 226. Near Denver, *Dr. Smith*. Along streams in the foot-hills and among the mountains, *Porter*. Mount Lincoln, at 13,000 feet altitude, *Coulter*.

*SAMBUCUS RACEMOSA*, L., var. *PUBENS*, Watson. (*S. pubens*, Mx.)—Wet Mountain Valley, *Brandegee*. Chicago Lakes, at 10,000 feet altitude, Mount Lincoln, at 12,000 feet, and Mount of the Holy Cross, *Coulter*.

*VIBURNUM PAUCIFLORUM*, Pylaie.—*Hall & Harbour*, 228.

### RUBIACEÆ.

*GALIUM APARINE*, L.—Near Cañon City, *Brandegee*. Plains of the Platte, *Coulter*.

*GALIUM ASPERRIMUM*, Gr. *Pl. Fendl.*, p. 60. Stems diffuse, prickly backward on the angles; leaves all in sixes, lanceolate, attenuate at base, or the lower obovate-lanceolate and  $\frac{3}{4}$ ' long, bristly-acuminate, glabrous, shining, very rough-prickly backwards on the margins and keel beneath, those of the branches small, much shorter than the peduncle; cymes paniculate, several-flowered, dichotomous; corolla 2" in diameter; petals 3-nerved, ovate, acuminate, white, rather large; ovary densely covered with short uncinuate hairs.—Cucharas River, Huerfano County, *Greene*.

*GALIUM TRIFIDUM*, L.—*Hall & Harbour*, 230.

*GALIUM TRIFLORUM*, Mx.—Plains of the Platte, *Coulter*.

*GALIUM BOREALE*, L. Very common everywhere among the mountains and exhibiting a great diversity of forms.—*Hall & Harbour*, 229; *B. H. Smith*; *Coulter*.

### VALERIANACEÆ.

*VALERIANA DIOICA*, L., var. *SYLVATICA*, Watson. (*V. sylvatica*, Richards.)—*Hall & Harbour*, 231; *Parry*; *Brandegee*; *Dr. Smith*; *Meehan*. Twin Lakes and Clear Creek Cañon, *Coulter*.

*VALERIANA EDULIS*, Nutt.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. Clear Creek Cañon and Bear Creek, *Coulter*.

### COMPOSITÆ.

*LIATRIS PUNCTATA*, Hook. Stems 8'-3<sup>o</sup> high from a thick, knotted, fusiform root, glabrate, leafy to the top; leaves linear, rigid, strongly punctate on both sides, glabrous or their margins sometimes ciliate, lower ones 3'-5' long, slightly 3-nerved, 1''-3'' wide, pungently acute; heads in a dense spike, 4'-10' long, 4-6 flowered; flowers reddish-purple; scales of the cylindraceous involucre oblong, strongly punctate, imbricated, appressed, with mucronate, acuminate, rather spreading tips, margins woolly-ciliate; bristles of the pappus about 30, purplish or white, very plumose; achenia hairy.—*Hall & Harbour*, 315; *Dr. Smith*; *B. H. Smith*. North Park, *Dr. Hayden*. Rather common on the plains around Denver and Colorado Springs, *Porter*.

*LIATRIS SCARIOSA*, Willd.—South Park, *Canby*; *Porter*. Cañon City, *Brandegee*. Plains near Denver, *Coulter*.

*PECTIS*<sup>1</sup> (*Pectidopsis*) *ANGUSTIFOLIA*, Torr., *Ann. N. Y. Lyc.* 2, p. 214. Annual, very low, more or less branching from the base, nearly glabrous; leaves opposite, narrowly linear, punctate with large pellucid glands, somewhat connate at base, margins below fringed with a few bristles; heads on short peduncles on the ends of the branches; flowers yellow, those of the ray 7-8.—“Gravelly banks of streams.” *Hall & Harbour*, 297. Near Grand Cañon of the Arkansas, *Redfield*.

*KUHNIA EUPATORIODES*, L., var. *GRACILIS*, T. & G. Leaves numerous, shorter, linear and mostly entire, minutely pubescent, revolute on the margins; corymbs loose, paniculate.—Cañon City, *Brandegee*. Near Denver, *Dr. Smith*.

*EUPATORIUM PURPUREUM*, L.—Near Cañon City, *Brandegee*.

*EUPATORIUM BERLANDIERI*, DC. (*E. ageratifolium*, DC., var. *Texense*, T. & G.) *DC. Prod.* 5, p. 167. *Bot. Mex. Bound.* 2, p. 76; also var. *herbaceum*, Gr. *Pl. Wright.*, 2, p. 74. “Shrubby, glabrous; branches terete, striate; leaves opposite, petioled, ovate, acuminate, entire at base and apex with a few crenate teeth between, not glandular; branches opposite, corymbose at the apex; heads pedicellate, about 25-flowered; scales of the involucre in about 2 series, linear, acuminate; achenium angled, slightly scabrous on the angles; pappus almost twice shorter than the corolla.”

Var. Stem suffruticose only at base, minutely puberulent above but not glandular; leaves cordate or triangular-cordate, larger ones 2' long, 1½' broad, 3-nerved; scales of the involucre lanceolate or lance-linear; pedicels somewhat glandular; pappus nearly equaling the corolla; achenia slightly scabrous on the angles.—Wet Mountain Valley, *Brandegee*.

*BRICKELLIA*<sup>2</sup> *CALIFORNICA*, Gr. Scurfy-puberulent; stems numerous from a woody base, 1½° high, branching; leaves 9"-20" long, thickish, alternate, petioled, deltoid-ovate or subcordate, acutish, dentate, obscurely 3-nerved from the base, the under surface reticulated; heads medium-sized, nearly sessile in short axillary racemes, 10-12 flowered; involucre scales imbricated, obtuse, the outer ones appressed, very short, inner ones erect, elongated; achenia minute, finely pubescent, obscurely striate; pappus scabrous.—Cañon City, *Brandegee*.

*BRICKELLIA GRANDIFLORA*, Nutt. Stem 2°-2½° high, rather stout, paniculate at summit; leaves cordate-triangular, about 2' long, opposite or alternate, long-petioled, coarsely serrate, glabrous or slightly pubescent, dotted with resinous globules beneath; heads middle-sized or very large, glomerate at the ends of the panicled branches, about 30-flowered; involucre scales in several series, imbricated, outer ones

<sup>1</sup>*PECTIS*, L. Heads many-flowered; the flowers of the ray in a single series, ligulate pistillate; those of the disk perfect, tubular. Involucre cylindrical-campanulate; the scales about 8, in a single series, somewhat conduplicate. Receptacle naked. Corolla of the disk 5-toothed, regular. Branches of the style semi-cylindrical; short. Achenia crowded with a very short scarious minutely about 5-toothed and somewhat lacerate pappus. *T. & G. Fl. N. Am.*

<sup>2</sup>*BRICKELLIA*, Ell., Gray, in *Pl. Wright*, 1, p. 84. Heads 4-50 flowered. Involucre imbricated; the scales striated, outer ones shorter. Receptacle flat, naked. Flowers all tubular; the corolla white or yellowish, cylindrical, scarcely expanded towards the summit; the teeth very short. Base of the style bulbous and often villous. Achenia with ten striae, sometimes obscurely 5-angled. Pappus of scabrous-barbellate or slightly plumose bristles.—Perennial herbs or suffruticose plants, with opposite or alternate leaves, and frequently the habit of *Eupatorium*.

herbaceous, ovate, with long subulate spreading tips, inner ones elliptical, acute or acutish, with scarious margins; achenia sparsely hairy above or glabrous; pappus deciduous.—*Hall & Harbour*, 313; *Parry*, 423; *Brandegee*; *Dr. Smith*; *B. H. Smith*; *Porter*. Sierra Madre Range, Twin Lakes, *Coulter*. Throughout the mountains, at all elevations.

*NARDOSMIA SAGITTATA*, Hook. *Fl. Bor. Am.* 1, p. 307. Leaves oblong, acute (or obtuse,) entire, sagittate, the lobes obtuse, DC., (leaves cordate or reniform-sinuate, sinuate-toothed, tomentose beneath).—"Near Pike's Peak," *Hall & Harbour*, 314.

*ASTER ADSCENDENS*, Lindl. *T. & G., Fl. N. Am.*, 2, p. 111. Stems low, ascending; branches simply racemose or somewhat corymbose; radical and lower leaves oblong-linear or narrowly spatulate, glabrous, entire, with ciliate-scabrous margins, the cauline linear-lanceolate, partly clasping; scales of the hemispherical involucre numerous, closely imbricated, unequal, nearly glabrous, the exterior linear-oblong, obtuse, the innermost acute; achenia minutely hairy.—*Meehan*. Cañon City, *Brandegee*. Twin Lakes, *Coulter*.

Var. *CILIATIFOLIUS*, T. & G. Low; stem not denuded and scapiform, pubescent above; leaves more proportionate, distinctly ciliated; scales of the involucre somewhat acute.—*Hall & Harbour*, 252; *Parry*, 419.

Var. *FREMONTII*, T. & G., *Fl. N. Am.*, 2, p. 503. Stem leafy, 4'-6' high, simple, bearing 1-2 heads, sometimes more, more or less woolly pubescent; leaves thin, cauline ones oblanceolate; scales of the involucre loose, exterior herbaceous, inner ones narrowly linear, acute; pappus white.—"Alpine and subalpine, in low grounds." Gray's Peak, *Dr. Smith*. Sierra Madre Range, *Coulter*.

Var. *PARRYI*, Watson. Stem 1°-2° high, often corymbosely much branched; leaves large, broadly oblanceolate, 5'-12' long, 1'-2' wide, narrowed into winged petioles, the upper ones gradually smaller and sessile, partly clasping; heads large; involucre scales finely ciliate, the outer ones broadly lanceolate with herbaceous tips, scarious below, loose; peduncles not glandular.—Sierra Madre Range, *Coulter*.

*ASTER LÆVIS*, L.—Cañon City, *Brandegee*. Near Denver, *Dr. Smith*; *Hoopes*.

*ASTER ERICOIDES*, L., var. *STRICTUS*, Porter. Low,  $\frac{3}{4}$ °-1° high, glabrous, except the scabrous margins and ciliate bases of the leaves, erect, slender, paniculately branched above, branches short; scales of the involucre narrowly linear, lax, outer ones very acute, often entirely green, inner ones scarious with a central green line; radical leaves narrowly oblanceolate.—"In the mountains at middle elevations," *Hall & Harbour*, 254. Near Denver, *Coulter*. Foot-hills west of Denver, *Porter*; *Meehan*; *Hoopes*.

*ASTER MULTIFLORUS*, Ait.—Near Denver, *Dr. Smith*. North Park, *Hayden*; *Coulter*.

*ASTER FALCATUS*, Lindl. Stem minutely pubescent with appressed hairs, 1°-1 $\frac{1}{2}$ ° high, leafy to the top; leaves rigid, minutely appressed-pubescent or smoothish except on the edges, the lower ones spatulate-lanceolate, obtuse or acute; 2'-3' long, 4'-6'' wide, short-stalked, the upper ones oblong-linear, sessile, often slightly clasping, those of the erect branches linear, often slightly falcate; heads terminal on the branchlets, flattened hemispherical, 4''-8'' in diameter; scales much imbricated, the outer smaller with greenish, appressed or slightly spread-



ing tips and whitish chartaceous margins; achenia pubescent.—Twin Lakes, *Coulter*.

ASTER CARNEUS, Nees.—Wet Mountain Valley, *Brandegee*. On the Platte, near Denver, *Dr. Smith*.

ASTER ÆSTIVUS, Ait., var. LÆTIFLORUS, Gr. Varies in its smoother stem, which is slightly pubescent above, and the spreading tips of the involueral scales.—Cañon City, *Brandegee*.

ASTER OBLONGIFOLIUS, Nutt.—Huerfano County, *Greene*.

ASTER NUTTALLII, T. & G., var. FENDLERI, Torr. *Pac. R. R.*, 4, p. 97. (*A. Fendleri*, Gr. *Pl. Fendl.*, p. 66.) Stems many, from a subligneous caudex, erect or ascending, 9'-12', high, rigid, rough-scabrous; branches corymbose-paniculate, bearing one or rarely 2-3 heads; leaves sessile, rigid, coriaceous, small, linear, 6''-9'' long, mucronulate, very entire, glabrous, 1-nerved, hispid-ciliate on the margins; lowest subspatulate, those of the branches very short; scales of the campanulate involucre in 3 series, linear-oblong, glandulose-scabrous, mucronulate, outer ones herbaceous, obtuse, lax; inner ones acute, a little longer; achenia pubescent.—Pueblo, *Greene*. *Hall & Harbour*. Fremont County, *Brandegee*.

ASTER GLACIALIS, Nutt. Rhizoma thickish, not creeping; stems 2'-4' high, erect, minutely pubescent above, bearing a single head, leafy or nearly leafless; leaves thickish, glabrous, spatulate-oblong and lanceolate, radical ones 1'-2' long, 2''-4'' wide, narrowed into a long petiole, obtuse or even emarginate, cauline ones oblong or oblanceolate, partly clasping; scales of the involucre nearly equal, linear-spatulate, more or less acuminate, glandular-puberulent or nearly glabrous, commonly blackish-purple; rays numerous, white or purplish.—“In the high alpine region,” *Hall & Harbour*, 242. Mount Lincoln and White House Mountain, at 12,000 feet altitude, August, *Coulter*.

ASTER SALSUGINOSUS, Richards. Stem erect, simple, 6'-8' high, leafy, bearing 1-3 heads, pubescent above with appressed hairs; radical leaves broadly spatulate or linear-obovate, with the margined petiole 2'-9' long, wide, obtuse, glabrous, ciliolate, cauline ones lanceolate and ovate, sessile and partly clasping, very acute, often minutely downy; heads very large, single, or 3-5 on long peduncles thickened at the summit; scales of the involucre nearly equal, narrowly linear, glandular-pubescent, lax, with mostly squarrose-spreading or recurved, blackish tips, much shorter than the disk; rays long, bright purple; achenia somewhat hairy.—Gray's Peak, *Dr. Smith*. Twin Lakes, Weston's Pass, and Horse Shoe Mountain, at 11,000 feet altitude, *Coulter*.

ASTER ELEGANS, T. & G., var. ENGELMANNI, D. C. Eaton. (*A. Engelmanni*, Gr. *Sill. Jour. (N. S.)* 33, p. 9.) Stems several from a short creeping root-stock, 2°-3° high, very leafy; leaves sessile, lower ones oblong, obtuse, the upper ones larger, lanceolate and lance-ovate, often 3' long, nearly 2' wide, entire, scabrous on the margins, minutely puberulent like the stem and roughened, obscurely 3-nerved and feather-veined; inflorescence corymbose, heads peduncled; involucre turbinate-campanulate, 6''-10'' wide; the scales ovate or oblong, acute, puberulent, the scarious margins densely lacerate-fringed; rays 8-12 in number.—Sierra Madre Range, August, *Coulter*.

ASTER GLAUCUS, T. & G. Stems 1°-2° high, branching, leafy, erect; lowest leaves scale-form, the others oblong-linear, closely sessile,

1-nerved, 1'-3' long, 3''-6'' wide, pointed, smooth and glaucous, veins prominently reticulated; heads in contracted corymbs; scales of the involucre in 3 or 4 series, lacerate-fringed, outer ones oval, obtuse, glabrous, inner ones lanceolate, membranous, acute, purple-tinged, as long as the disk; rays 14-17, purple or pinkish-white; achenia smooth or slightly pubescent.—North Park, *Hayden*. Eagle River, *Coulter*.

ASTER PTARMICOIDES, T. & G.—South Park, *Canby*. Garden of the Gods, *Porter*.

ASTER ANGUSTUS, T. & G.—*Hall & Harbour*, 291.

TOWNSENDIA<sup>1</sup> SERICEA, Hook. Stemless, from a simple or much branched caudex, 1'-2' high; leaves spatulate-linear, silky-canescant, acute, 1-nerved, 12''-15'' long, erect, surrounding and partly concealing the heads (8'' long) which are sessile or on very short peduncles; scales of the involucre subulate-lanceolate, pubescent, green in the center, purplish towards the tip; margins scarious, lacerate-ciliate; rays long; narrow, not spreading; pappus of the disk white, about as long as the corolla, pappus of the ray of several unequal subulate bristles, much shorter than the achenium and 1 or 2 long ones (sometimes 9 or 10) similar to those of the disk flowers; achenium hairy, hairs minutely capitate.—*Hall & Harbour*, 290. Cañon City, *Brandeggee*.

TOWNSENDIA GRANDIFLORA, Nutt. Strigose-canescant; stems many, from an annual root thickened at the summit, divaricately branched from the base, central ones short, erect, the lateral decumbent 5'-10' long, often proliferous; leaves 1'-2' long, somewhat succulent, linear-lanceolate, acute, scattered, the uppermost bracteate at the base of the heads; scales of the involucre lanceolate, subulate-acuminate, with fimbriate-ciliolate margins, rays 25-30, pale lilac, with a short pappus composed of lacerate-denticulate squamellæ, very short; achenium minutely hairy.—*Hall & Harbour*, 289. Plains of the Platte, *Coulter*. Colorado Springs, *Porter*; *Redfield*.

MACHÆRANTHERA<sup>2</sup> (DIETERIA) PULVERULENTA, Nees. Canescently puberulent; stems 3'-6' high, much branched from the base, branches spreading, bearing few heads on rather naked branchlets; lower leaves lanceolate, spinulose-serrate, upper ones linear, becoming entire; scales of the hemispherical involucre linear or lance-linear, very acute, imbric-

<sup>1</sup>TOWNSENDIA, Hook. Heads large; the rose-colored or whitish rays in one series, rather long, pistillate, sometimes infertile; disk-flowers perfect, with tubular obconic 5-toothed corollas. Branches of the style lanceolate, acutish, hairy towards the ends. Involucres hemispherical or subglobose, of numerous rather large, imbricated and appressed, scarious-margined, lacerate-fringed and often tinted scales. Achenia flattened, pubescent or hairy, 2-3 nerved. Pappus of numerous stout barbellate bristles, that of the ray commonly shorter, or reduced in part or wholly to short subulate bristles or little scales.—Dwarf, stemless or branching, annual or perennial herbs, with crowded, linear or spatulate, entire radical leaves.—Natives of the mountainous regions east of the Sierras, from the Saskatchewan to New Mexico.

<sup>2</sup>MACHÆRANTHERA, Nees. Heads many-flowered; the rays conspicuous, pistillate, fertile, in one species neutral; disk-flowers perfect, the corolla tubular, 5-toothed. Involucres ovoid-hemispherical, the scales imbricated in several series, oblong or linear, with spreading or recurved herbaceous points. Receptacle flat, honeycombed, the cells with toothed edges. Appendages of the style narrowly lanceolate, minutely hirsute. Anthers said to have "cultriform appendages." Pappus of numerous very unequal scabrous and rather rigid bristles; that of the ray flowers somewhat shorter. Achenia obovate-fusiform, slightly compressed, indistinctly striate, pubescent or silky.—Herbs annual, biennial, or perennial, with branching stems and pinnatifid, toothed, or even entire leaves. Genus very near to *Aster*, but may be easiest distinguished from it by the unequal pappus of disk and ray. Consists of four species found in the region extending from Oregon to Colorado and southward to Mexico.

cated in about 3 series; rays numerous, pale purple or rose-color; appendages of the style subulate; achenia densely villose.—South Park, *Canby*; *Porter*.

*MACHÆRANTHERA CANESCENS*, Gr. Minutely canescent with a soft pubescence; stem low, much branched, corymbose; leaves linear, entire or sparsely toothed towards the apex; scales of the obovoid involucre lanceolate, acute, imbricated in about 4 series, with slightly squarrose tips; rays 18–20, rather large, purplish-blue; appendages of the style subulate-lanceolate. T. & G., *Fl. N. Am.* 2, p. 101, under *Dieteria*, Nutt. —Exceedingly variable in its pubescence, inflorescence, size of the heads, toothing of the leaves, and involucre.—Georgetown, *Dr. Smith*.

Var. *LATIFOLIA*, Gr., *Pl. Wright.* 2, p. 75. (*Dieteria asteroides*, Torr., in *Em. Rep.*, p. 142.) Scabrous pubescent or puberulent; stems 18'–2° high; leaves oblong or lanceolate, sharply and rather coarsely toothed, broader leaves 6''–8'' wide; involucre hemispherical, scales linear, in several series, with rather short, subulate, green, squarrose tips; heads large, variable in size.—Foot-hills, near Denver, *Porter*. Georgetown, *Dr. Smith*. Sierra Madre Range, *Coulter*.

Var. *ALPINA*, *Porter*. Dwarf, 2'–3' high, puberulent; radical leaves cuneate-spatulate, obtuse; stems short, bearing 1–2 large heads, 1' in diameter; scales of the involucre lance-linear, tips long, squarrose-spreading, glandular-pubescent.—Alpine. *Parry*, 1872.

*MACHÆRANTHERA TANACETIFOLIA*, Nees. (*Dieteria coronopifolia*, Nutt. T. & G. *Fl. N. Am.* 2, p. 101.) Pubescent and somewhat viscid, diffusely branched below, branches 6'–12' long, branchlets terminated by single showy heads; radical and lower leaves bi-pinnatifid, petioled, the upper pinnatifid with the segments toothed or incised; scales of the involucre nearly equal, in about 3 series, linear, with a short, appressed, somewhat cartilaginous base, and very long, acute, loose, spreading, herbaceous tips; rays about 20, large, reddish-purple; appendages of the style subulate; pappus pale reddish-brown, copious, rather rigid; achenia obovate, many-striate, villous.—*Hall & Harbour*, 285. Cañon City, *Brandegee*. *Canby*. Georgetown, *Dr. Smith*. Denver, *Redfield*.

*DIPLOPAPPUS ERICOIDES*, T. & G. *Fl. N. Am.* 2, p. 182. Strigosely canescent; stems 2'–6' high, branching from a suffrutescent base; leaves narrowly spatulate or linear, 2''–6'' long, crowded, appressed or spreading, rigid, mucronate, often bristle tipped, conspicuously ciliate; heads terminal on the ends of the strict branches, rather small; scales of the involucre lanceolate-linear, in about 3 series, acute, 1-nerved, with scarios margins; rays rather short, white; exterior pappus very minute; achenia pubescent.—*Hall & Harbour*, 233. Cañon City, *Brandegee*.

*ERIGERON CANADENSE*, L.—Near Cañon City, *Brandegee*. Denver, *Dr. Smith*; *Coulter*.

*ERIGERON DIVARICATUM*, Mx.—Near Denver, *Dr. Smith*.

*ERIGERON COMPOSITUM*, Pursh. More or less canescently hirsute; stems 2'–6' high, several from a perennial root-stock, scape-like or with a few leaves near the base, and one or two linear bracts higher up; leaves on long petioles, 1–3 times ternately divided or parted, lobes oblong-linear, obtuse; scales of the involucre linear, in 2 rows, outer ones herbaceous, inner ones scarios with narrow margins and long slender tips; rays many, twice the length of the involucre; white, pale-pink, or blue; achenia hirsute; pappus of 12–15 bristles, with a few minute setæ intermixed.—*Hall & Harbour*, 234. Gray's Peak, *B. H. Smith*.

Summit of Pike's Peak, *Porter*. Snow Mass Mountain, at 13,000 feet altitude, Mount Lincoln at 12,000 feet, and Long's Peak, *Coulter*. Sangre de Cristo Pass, *Brandegee*. Gray's Peak, *Redfield*.

**ERIGERON TRIFIDUM**, Hook. *Fl. Bor.-Am.* 2, p. 17, t. 120. Hirsute; stems 2'-3' high, leafy below, naked or scape-like with 1-2 linear bracts, bearing a single head; leaves on long petioles, deeply 3-cleft or lobed, segments short, very obtuse, the middle one orbicular, the lateral occasionally 2-lobed; scales of the involucre lance-linear, hirsute, about the length of the disk; rays twice as long, white or blue, rather broad; achenium minutely hairy; pappus hispid-scabrous, as long as the disk of the corolla. Alpine.—White House Mountain, at 13,000 feet altitude, *Coulter*.

**ERIGERON UNIFLORUM**, L. Sparsely pubescent, becoming somewhat glabrous; stem 3'-6' high, bearing a single head; lower leaves spatulate, cauline lanceolate or linear, obtuse or acute, entire; pistillate flowers nearly all ligulate; rays somewhat erect, scarcely twice the length of the very woolly involucre; wool deep-purple or sometimes light-colored, or white.—*Hall & Harbour*, 243. Snow Mass Mountain, at 13,000 feet altitude, and Mount Lincoln, at 12,000 feet, *Coulter*.

**ERIGERON GRANDIFLORUM**, Hook. Perennial, hirsute and somewhat woolly; caudex thick; stems 1-5, 3'-8' high, rather leafy, bearing a single head; radical leaves oblong-spatulate, 1'-2' long, 2''-3'' wide, those of the stem smaller and linear-lanceolate; heads solitary, large; involucre very woolly; scales herbaceous, elongated, with naked purple tips; rays numerous, long, white or purple; achenia sparingly hirsute; pappus of barbellate setæ rather shorter than the disk corollas, and with a few very short ones intermixed.—Mount Lincoln, at 12,000 feet altitude, July, *Coulter*.

Var. **ELATIUS**, Gr. *Sill. Jour. (N. S.)* 33, p. 8. 1°-2° high, very leafy, pilose; lower leaves oblong-lanceolate, tapering to the base; all the leaves scabrous-pubescent, mucronate-apiculate; upper ones ovate and ovate-lanceolate, or sometimes narrowly lanceolate, sessile by a somewhat clasping base; heads solitary or corymbose, 2-6, large; involucre often 1' broad, densely woolly; rays numerous, narrow, pale-pink.—Differs so much from the typical form that it might well constitute a distinct species.—*Hall & Harbour*, 238; *Dr. Smith*. Weston's Pass and Sierra Madre Range, *Coulter*.

**ERIGERON GLANDULOSUM**, *Porter*, (*n. sp.*) Minutely glandular-puberulent, and hirsute with long, scattered, spreading, jointed hairs; stems simple, one or several from a thick, woody, often branched caudex, bearing single heads; leaves narrowly spatulate, radical ones 2'-4' long; heads, including the numerous purple or blue rays, 9''-15'' broad; scales of the involucre in about 3 series, equaling the disk, lance-linear, inner ones scarious, more or less purplish; achenia sparingly hirsute; pappus with shorter bristles intermixed with the longer ones.—Near *E. ursinum*, Eaton, in *King's Rep.*, v. 5, p. 148.—*Hall & Harbour*, 235. Clear Creek Cañon, Boulder Cañon, and Twin Lakes, *Coulter*.

**ERIGERON ARMERLÆFOLIUM**, Turcz. Gray, *Proc. Am. Acad.* v. 8, p. 648.—*Hall & Harbour*, 232, (as *E. acre*, L.) South Park, *Porter*. Twin Lakes and on the Upper Arkansas, *Coulter*.

**ERIGERON BELLIDIASTRUM**, Nutt. Annual, hirsute-pubescent, 1° or more high; stem corymbose much branched, leafy throughout; branches elongated and divaricately spreading; lower leaves on slender

petioles, entire and oblanceolate, cauline ones sessile, smaller, oblong-linear or linear-spatulate; heads few or many, rather small, terminating the branches, pedunculate; involucre hirsute-canescens; rays very many (60-70,) white or pale-red, narrowly linear, twice as long as the involucre; achenium minutely pubescent; pappus simple and wholly deciduous from a broad and white epigynous disk.—Plains and mountains. South Park, *Canby*. Colorado Springs, *Porter*.

*ERIGERON MACRANTHUM*, Nutt. Pubescent or nearly smooth; stems 9'-30' high, several from a creeping rhizoma, leafy to the summit; leaves smooth or hairy, ciliate on the margins, obtuse, acute or acuminate, mucronulate, entire, the lowest oblong-spatulate, tapering into a petiole, 2'-4' long, 6''-8'' wide, the upper oblong or broadly ovate lanceolate, 3-nerved, the lateral nerves starting from the base, partly clasping; heads several, 3-13, corymbose, sometimes very large; involucre of many very narrow-linear, acuminate, herbaceous, glabrous or glandular scales, which are sometimes pubescent; rays blue or purple, numerous; achenia 2-3 nerved, slightly hairy; outer pappus of short, slender setæ.—Varies greatly as to the amount of pubescence.—South Park and Chianu Cañon, *Porter*. Pike's Peak and mountains west of Denver, *Canby*. Twin Lakes and in the Sierra Madre Range, *Coulter*.

*ERIGERON GLABELLUM*, Nutt. Pubescent or nearly glabrous; stems 9'-20' high, single or few from a short erect caudex, simple or sparingly corymbose at the summit; radical leaves narrowly or broadly spatulate, tapering into a long or short petiole, sometimes serrate or incisely toothed; lower cauline ones oblong, lanceolate, tapering into long, margined petioles, the upper ones scattered, lanceolate or linear, sessile and partly clasping; heads few, large, 10''-15'' broad, on long, strict peduncles which are enlarged above; rays very narrow and numerous; involucre hirsute or nearly smooth; achenium and pappus as in the last.—*Hall & Harbour*, 240. Cañon City, *Brandegee*. Gray's Peak, *Dr. Smith*.

*ERIGERON COULTERI*, *Porter*, (*n. sp.*) Stem simple from a slender root, 6'-12' high, bearing a single head, smooth below, pilose-pubescent above, leafy to the top; leaves thinnish, pubescent with ciliate margins, all more or less serrate-denticulate, mucronate, erect, gradually diminishing in size upward; lower ones oblong-spatulate or elliptical, tapering into a margined, ciliate petiole, upper ones oblong or lanceolate, acute or acuminate, sessile and partly clasping; head large, 1'-2' broad including the numerous white rays; involucre about 9'' broad, hemispherical, densely pilose but scarcely woolly; scales lance-linear, with scarious margins, tips elongated, subulate, spreading, glandular; achenia pubescent; bristles of the pappus minutely scabrous, outer ones short and few; alveoli of the receptacle rough, with lacerate margins.—Weston's Pass, at 10,000 feet altitude, July 19, *Coulter*.

*ERIGERON PUMILUM*, Nutt. Very hirsute with spreading hairs, stems 6'-10' high, rather stout, numerous from an erect, branching caudex, simple or sparingly branched, bearing 1-3 peduncled heads, leafy; lower leaves linear-spatulate, 2'-2½' long, 1''-3'' wide, upper ones narrowly linear, passing into subulate bracts; heads 9''-12'' broad; scales of the involucre numerous, nearly linear, hirsute; rays white, 30 of them, 1' wide, twice or nearly three times as long as the involucre; achenia slightly hairy; outer pappus of minute subulate bristles.—Upper Arkansas, *Porter*. Saint Vrain River, *Coulter*.

*ERIGERON DIVERGENS*, T. & G. Somewhat hoary with a minute hirsute pubescence, diffusely branched from the base, branches ascending,

4'-12' long; leaves small, entire, acute, the radical somewhat spatulate, narrowed into a short petiole, the cauline scattered, sessile, linear, narrowed at the base; heads small, mostly solitary, terminating the naked branchlets or peduncles; rays very narrow and numerous, twice the length of the hirsute involucre, purplish; inner pappus of few, very slender and deciduous bristles.—*Hall & Harbour*, 237 and 246; *Hoopes*. Chicago Lakes, at 12,000 feet altitude, *Coulter*. *Brandegge*; *Dr. Smith*. Colorado Springs, *Porter*.

ERIGERON CANUM, Gr., *Pl. Fendl.*, p. 67. Stems 3'-4' high, simple, leafy to the summit, from a thick root, caespitose, bearing single heads, silky-canescens as well as the very entire, linear-spatulate leaves; rays white, in about one series, twice longer than the white-hirsute involucre; achenia very glabrous, narrow, with about 10 conspicuous ribs; pappus of the ray and disk similar, double, the outer of very short subulate setaceous bristles.—“Common on low mountains,” *Hall & Harbour*, 244 (as *E. caespitosum*, Nutt.)

GUTIERREZIA<sup>1</sup> EUTHAMLE, T. & G. Stems woody and much branched at the base, numerous, 6'-15' high, angled, leaves crowded, narrowly linear, acute, attenuate at the base, 1'-2' long,  $\frac{1}{4}$ "-1" wide, 1-nerved, scabrous, punctate, resinous and sometimes varnished; corymb compound, fastigiate, contracted; heads small, glomerate, turbinate-cylindrical; involucre scarcely 2" long and 1" broad, narrowly obovate; flowers of the ray 2-5, the disk 3-6; pappus of 9-10 obtuse, unequal, erose-denticulate, chaffy scales, a little shorter than the achenium.—*Hall & Harbour*, 294. Cañon City, *Brandegge*. Near Denver, *Dr. Smith*. *Canby*.

SOLIDAGO VIRGA-AUREA, L., var. MULTIRADIATA, T. & G. Stems villose-pubescent especially towards the summit, mostly simple, 8'-15' high; leaves ciliate, oblong-lanceolate; radical ones obovate and narrowed into a petiole; heads large, in a dense compound raceme or loosely corymbose; scales of the involucre ciliolate, acute; rays 8-18.—*Hall & Harbour*, 251. Sierra Madre Range and Twin Lakes, *Coulter*. Georgetown, *Dr. Smith*.

Var. ALPINA, Big.—Gray's Peak, *Dr. Smith*. South Park, Twin Lake Creek and Horse Shoe Mountain, at 11,000 feet altitude, *Coulter*.

Var. HUMILIS, Gr. (*S. humilis*, Pursh.)—Sierra Madre Range, *Coulter*.

SOLIDAGO GUIRADONIS, Gr., *Proc. Am. Ac.*, v. 6, p. 543. Smooth, stem slender, erect,  $2\frac{1}{2}$ °-3° high, from a woody rhizoma; lowest leaves lanceolate, 6' long, 3"-5" broad, tapering into a margined petiole, the cauline ones very narrowly linear, 2'-3' long, 3"-5" broad; panicle erect, not one-sided, very narrow and composed of few and rather small heads; involucre scales, linear, acuminate, the midvein broad and

<sup>1</sup> GUTIERREZIA, Lagasca. Heads small or middle-sized, 6-90 flowered; the rays pistillate, fertile; the disk-flowers tubular, perfect and fertile. Involucre varying from narrowly-obconic to broadly-hemispherical; the scales closely imbricated in several series, rigid, and with greenish herbaceous tips. Receptacle naked. Corollas yellow; of the ray oval, oblong or linear; of the disk funnel-shaped, 5-toothed, the teeth erect or recurved. Branches of the style in the ray-flower, linear, smooth; the stigmatic lines extending to the top; in the disk with the hairy appendages shorter or several times longer than the stigmatic portion. Achenia oblong or obovate, terete or somewhat compressed. Pappus of the disk composed of several oblong or linear chaffy scales, or reduced to a lacerate coroniform border; of the ray similar to that of the disk, but commonly smaller or sometimes obsolete.—Mostly perennial and suffruticose plants of North and South America, with glabrous and often resinous-dotted or varnished linear and entire, or broader and denticulate leaves.

prominent; rays 8-9, scarcely longer than the 10-12 flowers of the disk; achenia puberulent.

Var. *SPECTABILIS*, D. C. Eaton, *King's Rep.*, v. 5, p. 154. Stem stout, 3°-4° high; lower and radical leaves broadly oblanceolate, 8'-12' long, ½'-1½' wide, the petiole dilated at the base, upper ones sessile, lanceolate; panicle oblong, densely many-flowered; heads rather large, involueral scales oblong-linear, mostly obtuse; flowers of the ray 12-15, of the disk about 20.—The affinities of this plant seem to us to connect it rather with *S. speciosa* than *S. Guiradonis*.—Glen Eyrie, Porter. Cañon City, Brandegee.

*SOLIDAGO PUMILA*, T. & G. Cæspitose, glabrous and somewhat resinous; stems 4'-9' high, very many from a stout underground woody caudex; leaves crowded, narrowly lanceolate, strongly 3-nerved, very acute and somewhat mucronate, the radical ones 2'-3' long, 2''-3'' wide, narrowed into a short petiole; heads sessile in little clusters, which are arranged in a dense fastigiata corymb; involucre cylindrical-oblong, the closely imbricated scales carinate, ovate or oblong, obtuse, with scarious margins and appressed, scarcely herbaceous tips, rather obtuse; rays 1-3; disk flowers 3-4; achenia glabrous.—Colorado, Vasey.

*SOLIDAGO RIGIDA*, L., var. *HUMILIS*, Porter. Stems 12'-18' high, slender; cauline leaves oblong-lanceolate, mostly acute, very scabrous; heads of flowers smaller; scales of the involucre narrower.—Rather frequent. Wet Mountain Valley, Brandegee. Porter; Coulter. Near Denver, Dr. Smith.

*SOLIDAGO NEMORALIS*, Ait. Very variable, presenting in the Rocky Mountain region a great diversity of forms, among which the most conspicuous is

Var. *MOLLIS*, Bartl. (?) *Fl. N. Am.*, v. 1, p. 229. Stem-leaves obovate or oval, crowded, often 2'-2½' long, 1'-1¼' broad; low, about 1° high, rather stout; branches of the panicle much contracted or somewhat spreading; heads rather larger.—Platte River near Denver, Dr. Smith. Twin Lakes, Coulter.

*SOLIDAGO MISSOURIENSIS*, Nutt.—Hall & Harbour, 249. Eastern plains of Colorado, Dr. Smith. Near Denver, Porter.

*SOLIDAGO CANADENSIS*, L.—Wet Mountain Valley, Brandegee. Eagle River, Coulter.

*SOLIDAGO LANCEOLATA*, T. & G.—Hall & Harbour, 247. Cañon City, Brandegee. On the Platte, Dr. Smith.

*SOLIDAGO OCCIDENTALIS*, T. & G. Very near the last, but differs in its more paniculate and less corymbose inflorescence; flowering branches more strict, with the upper leaves becoming very small and linear; heads of flowers pedicellate; scales of the involucre loosely imbricated. Some of its forms, however, appear to approach *S. lanceolata* too closely.—Georgetown, Dr. Smith.

*BIGELOVIA*<sup>1</sup> HOWARDII, Gr., *Proc. Am. Acad.*, v. 8, p. 641 (*Linosyris* How-

<sup>1</sup>*BIGELOVIA*, DC. (*Linosyris*, Lobel., *Chrysothamnus*, Nutt.) Heads 5-many-flowered, the (yellow) flowers all tubular and perfect. Involucre obconic or campanulate; the somewhat rigid and carinate scales imbricated in several series; the innermost elongated; the outer ones shorter and passing into the leaves. Receptacle alveolate-toothed, the teeth lacerate, or sometimes becoming cuspidate processes. Corollas slender, the expanding limb 5-cleft. Style with flattened branches; the stigmatic portion oblong or linear; the pubescent appendages lanceolate or often elongated. Achenia oblong, villous or pubescent, sometimes glabrous. Pappus of copious unequal scabrous capillary bristles. Perennial herbs or suffruticose plants, branched from the base and corymbose or sub-paniculate at the summit, often resinous and having a strong balsamic but unpleasant odor; leaves linear or lanceolate, sessile.

*ardii*, Parry, *Proc. Amer. Acad.*, v. 6, p. 541.) Shrubby, 6'-18' high; younger branches white-woolly; leaves linear, 1-nerved, from webby becoming smooth, 1'-2' long, the uppermost about as long as or exceeding the corymbose, crowded heads; involucre cylindrical, 5-6 flowered; scales rather loose, all of them finely acuminate; tube of the pale yellow corolla sparingly villous; achenia linear, pubescent.—Parry. Wet Mountain Valley, *Brandegee*.

BIGELOVIA PARRYI, Gr., *Proc. Am. Acad.*, v. 8, p. 642. (*Linosyris Parryi*, Gr. *Proc. Acad. Phil. March 1863*, p. 66.) Shrubby, 9'-18' high; branches virgate, white woolly, becoming smooth; leaves 2'-4' long, linear, almost glabrous, sub-viscous, 3-nerved, acute, plane, larger ones 2'' wide and tapering to the base; floral leaves similar, far surpassing the heads which are crowded in a narrow thyrsus; heads about 9'' long, foliose-bracteate; involucre 10-15 flowered, cylindraceous, series few, scales sublaev, imbricate, whitish, lanceolate, all attenuate-acuminate; tube of the corolla hirsutulous; achenia linear, hoary-pubescent.—Hall & Harbour, 293; Parry, 413; Canby. Mount Elbert near Twin Lakes, at 10,000 feet altitude, Coulter.

BIGELOVIA BIGELOVII, Gr., *Proc. Am. Ac.*, v. 8, p. 642. (*Linosyris Bigelovii*, Gr., in *Bot. Whipl.* 42, t. 12.) Subcinereous, woody, very much branched, 2° high and more; branches rigid, slender, broom-like, younger ones whitened; leaves revolute on the margins, filiform; involucre 5-flowered, narrow, scales chartaceous, of the same color, moderately carinate, appressed, outer ones oblong-lanceolate, woolly-ciliate, rather acute, inner ones narrower, often acuminate; limb of the corolla narrow, shortly 5-lobed; bristles of the pappus scarcely rigid, longer than the corolla; appendages of the style elongate-subulate or filiform, hispidulous, mostly longer than the linear stigmatic portion; achenia very glabrous, linear, 4-6 angled, with a broad epigynous disk.—Wet Mountain Valley, *Brandegee*. The specimens vary from the typical form in their smaller heads and more spreading scales of the involucre.

BIGELOVIA DEPRESSA, Gr., *Proc. Am. Acad.*, v. 8, p. 643. (*Chrysothamnus depressus*, Nutt; *Pl. Gamb.*, p. 171. *Linosyris depressa*, Torr., *Sitgreaves' Rep.*, p. 161.) Glabrous, woody; branches a span high from a decumbent base; leaves lanceolate or oblanceolate, mucronate-acute, short, 6'' long, rigid; scales of the involucre elongated-lanceolate, gradually acuminate, smooth, chartaceous, of the same color; lobes of the corolla short; bristles of the pappus rigid, longer than the corolla; achenia very smooth, 4-6 angled, with a broad epigynous disk.—Collected by Parry in the Sangre de Cristo Range.

BIGELOVIA GRAVEOLENS, Gr., *Proc. Am. Acad.*, v. 8, p. 644. (*Linosyris graveolens*, T. & G., *Fl. N. Am.*, 2, p. 234.) Shrubby, very much branched, 1°-4° high, branches pulverulent-tomentose, whitish, sometimes smooth and greenish; leaves narrowly linear, not punctate, broader ones 3-nerved, narrower ones 1-nerved, 1'-2' long,  $\frac{1}{2}$ ''-1'' wide; heads large, 5-flowered, clustered, corymbose or paniced; involucre oblong, 4'' long, 1'' wide, scales few, imbricated in about 3-series, glabrous, 5-ranked, carinate, outer ones very short, innermost linear, half as long as the brilliant yellow flowers; appendages of the style linear-subulate, longer than the stigmatic portion; pappus of very fine soft bristles nearly as long as the corolla; achenia hairy.—Hall & Harbour, 292. Cañon City, *Brandegee*. Canby. Denver, Dr. Smith. On the Platte, Coulter.

BIGELOVIA DOUGLASII, Gr., *l. c.*, p. 645. (*Linosyris viscidiflora*, T. & G. *l. c.*) Shrubby, densely branching, 1° high, older branches with gray bark, younger ones smooth, slightly angled; leaves narrowly or broadly



linear or lanceolate, rigid, 8"-12" long, glabrous, or slightly scabrous on the margins; heads small, 5-6-flowered, clustered in dense flat corymbs; involucre 2½"-3" long, obconic, of loosely imbricated, glabrous, sometimes resinous or glutinous, oblong-linear, obtuse scales, the outer ones very short; corolla at first scarcely exerted, but as the achenium grows it considerably exceeds the involucre; style as in the last; achenia hairy; pappus of rather rigid and scabrous setæ.

Var. *STENOPHYLLA*, Gr., *l. c.*, p. 646. Leaves very narrowly linear or filiform; heads 3-5-flowered.—Wet Mountain Valley, *Brandegee*.

Var. *LATIFOLIA*, Gr., *l. c.*, p. 646. (*Linosyris viscidiflora*, var. *latifolia*, Eaton in *King's Rep.* 5, p. 157.) Leaves oblong, 1'-1½' long, 3"-6" wide.—North Park, *Dr. Hayden*.

Var. *SERRULATA*, Gr., *l. c.*, p. 646. (*Linosyris serrulata*, Torr. in *Stansb. Rep.*, p. 389.) Margins of the leaves ciliate or minutely serrulate, with very short rigid bristles, otherwise nearly glabrous.—*Hall & Harbour*, 295. South Park, *Canby*; *Porter*. Upper Arkansas, *Coulter*. Wet Mountain Valley, *Brandegee*.

Var. *TORTIFOLIA*, Gr., *l. c.*, p. 646. Like the preceding, but the leaves spirally twisted.—Rather common. Upper Arkansas, *Porter*. South Park, *Coulter*. Wet Mountain Valley, *Brandegee*.

*APLOPAPPUS*<sup>1</sup> *RUBIGINOSUS*, T. & G. Viscidly pubescent and cinereous; stems erect or decumbent, corymbosely branched, 10'-18' high; leaves lanceolate or narrowly oblong, laciniate-incised, the divaricate teeth produced into pellucid bristles; heads subglobose, few or many, corymbose, terminating the leafy branches, often bracteate; scales of the involucre linear, acute, bristle tipped, viscidly-puberulent, in about 2 series, nearly equal, loose, at length spreading; alveoli of the receptacle pilose-fimbriate; achenia turbinate, densely silky-villous; pappus reddish brown.—Platte River, near Denver, *Dr. Smith*. *Hall & Harbour*, 287.

*APLOPAPPUS SPINULOSUS*, DC. Herbaceous, canescent with a soft, minute, woolly pubescence; stems many, 1°-2° high, corymbosely branched above; leaves small, 9"-12" long, rigid, pinnately or somewhat bi-pinnately parted, segments short, linear-subulate, mucronate with a short bristle; heads small, subglobose, terminating the numerous branchlets; involucre shorter than the disk, scales subulate-lanceolate, mucronulate, imbricated in 3-4 series, appressed, canescent; rays 20-30; corolla of the disk with very short teeth; pappus pale or tawny, short, very unequal; achenia turbinate, villous.—Cañon City, *Brandegee*. Plains near Denver, *Dr. Smith*. *Hall & Harbour*, 288; *Canby*. Colorado Springs, *Redfield*.

<sup>1</sup> *APLOPAPPUS*, Cass. (*Macronema*, *Ericameria*, *Stenotus*, *Isopappus*, *Aplopappus*, *Pyrröcoma* and *Prionopsis* of Torrey & Gray's *Flora*.) Heads few-many-flowered; ray-flowers 3-many, pistillate, fertile; those of the disk tubular, perfect, generally fertile, involucre cylindrical, turbinate, campanulate, or hemispherical; the scales imbricated in few-several series, from linear-subulate varying to broadly oval, with or without foliaceous tips; the outer ones sometimes smallest, sometimes very large and leaf-like. Receptacle flat, alveolate. Corolla of the disk funnel-shaped, or slightly dilated upward, 5-toothed. Style of the disk flowers with the branches flattened, sometimes broadly lanceolate, but more frequently much elongated, the subulate hispid appendages much longer than the stigmatic portion: Achenia oblong or linear, mostly terete or turbinate, villous or pubescent, rarely glabrous. Pappus simple, white or brownish; of copious, mostly unequal scabrous, somewhat rigid or soft capillary bristles.—Perennial herbs or suffruticose plants, with entire or pinnately-toothed or serrate leaves; the heads often large and solitary, but sometimes smaller and corymbose or somewhat panicle. Natives of Western North America and parts of South America; the flowers always yellow, but showing great diversity in the size of the heads and in the rays, styles, pappus, etc. The few rayless species are not easily separated from *Linosyris*.

APLOPAPPUS MACRONEMA, Gr., *Proc. Am. Acad.*, v. 6, p. 542. (*Macronema discoides*, Nutt.) Branches erect from a woody base, 6'-9' high, ferete, white-tomentose; leaves spatulate-oblong, obtuse, apiculate, 8"-12" long, 2"-3" wide, obscurely 3-nerved, minutely glandular and scabrous; heads single or few in a corymb, turbinate; scales of the involucre few, sub-equal, broadly lanceolate, glandular, the outer ones more or less herbaceous; heads about 25-flowered; rays none; branches of the style very long, filiform, much exserted, the hispid portion twice as long as the stigmatic; achenia pubescent.—*Hall & Harbour*, 296. Twin Lakes and Sierra Madre Range, *Coulter*.

APLOPAPPUS PYGMEUS, Gr. (*Stenotus pygmeus*, T. & G. *Fl. N. Am.* 2, p. 237.) Stems 1'-2' high from a branching caudex, 1-flowered; radical leaves oblong-spatulate, 1'-1½' long, obtuse, somewhat 3-nerved, fimbriate-ciliate; cauline leaves 3-4; head bracteate; outer scales of the involucre foliaceous, oblong, or broadly obovate, very obtuse, pubescent, inner ones oblong, rather acute, tinged with purple; rays 12-16, shorter than the scales of the involucre; achenium pubescent. Alpine.—*Hall & Harbour*, 256. La Plata Mountain, at 14,000 feet altitude, *Coulter*. Sangre de Cristo Pass, *Brandegee*. Gray's Peak, *Dr. Smith*; *Meehan*.

APLOPAPPUS LYALLI, Gr., *Proc. Am. Acad.*, March, 1863, p. 64. *Note*. Pruinose-glandular throughout; stems 2'-3' high, leafy, monocephalous; leaves very entire, sub-membranous, generally mucronate; radical and lower ones oblong-spatulate or oblanceolate, attenuate at the base, uppermost lanceolate; scales of the involucre loosely imbricated in about 3 series, lanceolate, of nearly equal length, inner ones acuminate with red tips, glandulose-puberulent; ligules 16-20, linear, rather long; achenia almost linear, very glabrous; hairs of the pappus white, rather rigid, equaling the corolla of the disk. Alpine.—*Parry*, 1873.

APLOPAPPUS INULOIDES, T. & G. Tomentose-woolly throughout, the pubescence mostly persistent; stems branching from a woody caudex, ascending, 4'-7' long; radical leaves lanceolate, acute, tapering to the base, entire, cauline ones lanceolate or oblong-lanceolate, sessile, partly clasping; heads solitary, large; involucre about 1' in diameter, scales in several series, oblong, obtuse or acute, pubescent or woolly; rays very numerous, scarcely twice the length of the involucre scales, deep yellow; achenia hairy. Subalpine.—*Hall & Harbour*, 155. Sierra Madre Range, *Coulter*.

APLOPAPPUS CROCEUS, Gr., *Proc. Am. Acad.*, Mar., 1863, p. 65. *Note*. Stem 1°-1½° high, sparingly leaved, monocephalous, at first woolly; leaves coriaceous, glabrous, very entire, not conspicuously reticulated; radical ones oblong-lanceolate, with the petiole 6'-1° long, cauline lanceolate or oblong, partly clasping at base; head naked, very large; involucre hemispherical, 1' in diameter; scales oval, very obtuse, inner ones somewhat erose-scabrous on the margin; rays 50 or more, much exserted, nearly 1' long, saffron-colored above; ovaries short, very smooth; pappus whitish, equaling the corolla of the disk. Subalpine.—*Hall & Harbour*, 257. Middle Park and Sierra Madre Range, *Coulter*.

APLOPAPPUS FREMONTII, Gr., *Jour. Bost. Nat. Hist. Soc.*, v. 5. Glabrous; stems erect or ascending from a woody base, 6'-12' high, corymbosely branched above, leafy; leaves oblong, or linear-oblong, sessile, partly clasping at the base, acute with a mucronate tip, entire or occasionally somewhat denticulate; lower ones 2'-2½' long, 6"-7" wide, tapering to the base; upper ones clasping by a broad base; heads terminating the leafy branches, globose, about 1' in diameter; scales of the

involucre in 3-4 series, lance-ovate, with acuminate, spiny tips, somewhat villous-pubescent, with narrow, scarious margins; rays 6"-8" long, lance-ovate, yellow; pappus a little shorter than the corolla and rather longer than the very smooth achenium.—“Low Mountains, lat. 39°,” *Hall & Harbour*, 258. Cañon City, *Brandegee*. *Meehan*.

APLOPAPPUS PARRYI, Gr. Stems 1-3 from a branching caudex, subviscous-puberulent above, 12'-16' high; leaves almost glabrous, very entire, lower ones oblanceolate or spatulate, tapering to the base, obtuse, the others acute, upper ones broader at the base, partly clasping; heads numerous, corymbed, on short pedicels; scales of the campanulate involucre broad lanceolate, somewhat coriaceous, with somewhat leafy tips, loose; rays 15-20, small, yellow, narrowly-linear, but little longer than the disk flowers; pappus white, not rigid.—*Hall & Harbour*, 259; *Parry*; *Canby*. Chiann Cañon, *Porter*. Twin Lakes and Sierra Madre Range, *Coulter*.

GRINDELIA<sup>1</sup> SQUARROSA, Dunal. Glabrous and viscidly resinous; stems herbaceous from a perennial caudex, 1° to 2° high, corymbosely branched above; leaves somewhat rigid, glaucous and punctate, radical ones spatulate-lanceolate, narrowed into a petiole, dentate or incised, cauline mostly oblong, sessile and partly clasping, rather obtuse, finely toothed or spinulose-serrate; heads numerous, subglobose, 6" broad; the scales very rigid, close-appressed, but with very long reflexed, squarrose, subulate points, resinous; rays numerous, rather narrow; pappus of 2-4 very rigid, deciduous bristles or awns.—Very common on the plains. *Hall & Harbour*, 286. Denver, *Dr. Smith*. Colorado Springs, *Porter*. *B. H. Smith*. On the Platte, *Coulter*.

CHRYSOPSIS VILLOSA, Nutt. Extremely variable in the size and shape of the leaves, in the number of the flower-heads, and in the kind and amount of pubescence. It includes several nominal species.—Common everywhere at all elevations. *Hall & Harbour*, 260; *Dr. Smith*; *B. H. Smith*; *Canby*; *Porter*; *Brandegee*; *Coulter*.

CONYZA<sup>2</sup> COULTERI, Gr., *Proc. Am. Acad.*, v. 7, p. 355. (*C. subdecurrens*, Gr., *Pl. Fendl.*, p. 78, and *Pl. Wright*, 1, p. 102; non DC.) Softly viscous-pubescent; stem 1° to 2° high, with strict branches, leafy to the top; leaves adnate, sessile, linear-oblong or the lower spatulate, numerous, pinnatifid-dentate or incised; panicle crowded, virgate; heads small, 1½" long; involucre shorter than the disk, scales hairy-viscous, linear, acute.—Cañon City, *Brandegee*.

BACCHARIS SALICINA, T. & G. *Fl. N. Am.* 2, p. 258. Shrubby, smooth, branches angular; leaves mostly oblong-lanceolate, about 1'

<sup>1</sup>GRINDELIA, Willd. Heads many-flowered; the ray-flowers generally present, pistillate, the ligule elongated; disk-flowers perfect, the corolla tubular-funnel-shaped, 5-toothed. Involucre subglobose or hemispherical, the scales imbricated in many rows, often with squarrose tips. Receptacle naked, flat, foveolate. Style with lanceolate, hispid appendages as long as the stigmatic portion. Achenium smooth, oblong, or ovate, somewhat angled. Pappus of 2-8 smooth rigid, deciduous awns, shorter than the disk-corollas.—Biennial (?) perennial or suffruticose, often resiniferous, Mexican and North American plants. Leaves entire or serrate, often punctate, the cauline ones sessile. Heads corymbed at the ends of the branches, or solitary, mostly rather large.

<sup>2</sup>CONYZA. Heads many-flowered, monœcious; the exterior pistillate and fertile, in many series, with a filiform truncate or 2-3 toothed corolla; a few of the central flowers staminate, sterile, but often styliiferous or even fertile, with a tubular 5-toothed corolla. Scales of the involucre in several series. Receptacle flat or convex, punctate or fimbriate. Achenia compressed, attenuate at base, usually glabrous. Pappus a single series of capillary scarcely scabrous bristles.—Chiefly tropical herbs, with branching stems, and variously incised leaves. Heads peduncled, corymbose or paniculate. Flowers yellow.—*T. and G. Fl. N. Am.*

long, the uppermost nearly linear, entire, viscid, more or less resinously punctate; heads clustered, mostly sessile; scales of the involucre ovate, with scarious margins, imbricated in about 3 series; achenia glabrous.—Near Cañon City, *Brandegee*. Near Pueblo, *Greene*.

PERICOME<sup>1</sup> CAUDATA, Gr., *Pl. Wright.*, 2, p. 82. Herb 3<sup>o</sup>–4<sup>o</sup> high, much branched, growing in large bunches; branches terete, striate, sparingly puberulent or smooth; leaves on long petioles, membranaceous, 3-nerved at base, dilated-triangular, or the upper hastate, long-acuminate, often angulate-toothed below the middle, larger ones 3' broad and 4' long including the acumination, which is 1½'–2' in length; heads in terminal cymes or corymbs, on slender pedicels ½' long; involucre not bracteate, 3' long; scales narrowly-linear, 1-nerved, coalescent to near the apex, free tips lanuginous-ciliate; corolla yellow, the slender tube viscoso-glandular; achenia 2'' long, much compressed, margined all around with a strong, callous nerve, bearded with hispid hairs.—Grand Cañon of the Arkansas, *Brandegee*. Chiann Cañon, *Meehan*. Ute Pass, *Porter*.

DIAPERIA<sup>2</sup> PROLIFERA, Nutt. Annual, erect, woolly; stems stout, rigid, 2'–5' high, terminated by a capitate cluster ½'–¾' in diameter including a large number of small heads; some of the branches when numerous arise from below and overtop this compressed head; leaves spatulate-oblong or linear-spatulate, numerous sessile, entire.—*Hall*.

MELAMPODIUM<sup>3</sup> CINEREUM, D C. *Prod.*, 5, p. 518. (*M. leucanthum*, T. & G. *Fl. N. Am.* 2, p. 271.) Suffruticose, much branched at the base, 6'–10' high, cinereous-pubescent; leaves very numerous, linear, the lower linear-spatulate, obtuse, entire or obtusely sinuate-repand, about 1' long,

<sup>1</sup>PERICOME, Gray, in *Pl. Wright.*, 2. Heads many flowered discoid; involucre shorter than the disk, campanulate. Scales in 1 series, about 20, linear, united among themselves by the very narrow hyaline margins. Receptacle flattish, naked. Flowers all hermaphrodite. Corolla astubular; the tube slender, viscoso-glandular; throat cylindrical; teeth 4, ovate, spreading. Anthers exsert, sub-sagittate at base. Branches of the style filiform, slightly flattened, obtusish, minutely hairy on the outside above and at the apex. Achenia linear-oblong, compressed, very smooth on the faces, bearded-ciliate on the nerve-like margins. Pappus squamelle-coroniform, fimbriate-lacerate; the fimbria similar to the strong hairs of the achenium.—Tall, smooth, branching herbs, with opposite leaves or the uppermost subalternate, triangular or hastate, very long acuminate, slightly resinose-punctate, not glandular. Heads cymose. Flowers yellow.

<sup>2</sup>DIAPERIA, Nutt. Heads fusiform-oblong, disposed in sessile glomerules of 4–5 together, which are collected in large capitate and bracteate compound clusters terminating the stem and simple or mostly proliferous branches; the fertile flowers 8–12, pistillate, in the axils of the chaff of the receptacle, with a much attenuated filiform truncate corolla; the 2–3 central staminate, with a tubular-infundibuliform minutely 4-toothed corolla, destitute of ovaries, each supported by a filiform stipe and inclosed in a chaff of the receptacle. Scales of the involucre and the chaff of the small convex receptacle scarious, oval, broad and large for the size of the head, closely and somewhat distichously imbricated and wrapped around each other, the inner successively longer; the 2–3 innermost chartaceous, attenuate at the base, woolly toward the apex, each convolute and separately inclosing a sterile flower. Style in the sterile flowers undivided; in the fertile with 2-filiform branches. Achenia obovoid-oblong, obcompressed, glabrous, destitute of pappus.—*T. & G. Fl. N. Am.*

<sup>3</sup>MELAMPODIUM, L. Heads many-flowered; the ray-flowers 5–10, in a single series; those of the disk sterile by the abortion of the style. Involucre double; the exterior of 3–5 flat and spreading foliaceous scales; the inner as many as the ray-flowers and inclosing their achenia. Receptacle convex or subulate-conical, chaffy; the chaff membranaceous, deciduous. Style in the sterile flowers undivided and hairy above. Achenia of the disk abortive; of the ray obovoid, smooth, slightly curved, invested by the inner scales of the involucre, which are often rugose or tuberculate, or eucullate at the summit, and either truncate or produced into 1–3 teeth or awns.—Herbaceous or suffruticose (chiefly Mexican) plants, with dichotomous stems, opposite sessile leaves, and terminal or alar peduncles bearing a single head. Flowers yellow or white. *T. & G. Fl. N. Am.*

strigose-hispid above, younger ones silky-hirsute beneath; peduncles elongated, bearing single heads; rays 10, oval-oblong, emarginate or 2-3 toothed, white, thrice the length of the ovate and hairy exterior scales of the involucre, the inner inclosing the achenia, tuberculate-scabrous toward the base, dilated above into a short, smooth hood, truncate at the summit with the margin entire and involute.—Purgatory River, *Dr. Bell*. Near Cañon City, *Redfield*.

*IVA AXILLARIS*, Pursh. Stem 6'-15' high, much branched from a somewhat slender, woody base, very leafy; leaves 9"-15" long, 3"-8" wide, obovate or oblong, obtuse, narrowed at the base, minutely appressed-pubescent, sessile; heads solitary in the axils of the leaves on short, recurved pedicels; scales of the campanulate involucre 4-5, distinct or united to the middle; fertile flowers 4-5; chaff of the receptacle filiform-linear.—*Hall & Harbour*, 261.

*IVA CILIATA*, Willd.—*Hall & Harbour*, 262.

*IVA* (*EUPHROSYNE*) *XANTHIFOLIA*, Gr.—*Hall & Harbour*, 263. Denver, *Dr. Smith*.

*AMBROSIA TRIFIDA*, L.—Plains around Denver, *Coulter*.

*AMBROSIA PSILOSTACHYA*, DC.—On the Platte, near Denver, *Dr. Smith*.

*FRANSERIA*<sup>1</sup> *TOMENTOSA*, Gr., *Pl. Fendl.*, p. 80. Herbaceous, pubescent throughout, with a soft, silky, and silvery pubescence; stem erect, about 1° high, paniculate, bearing numerous paniced branches; leaves pinnately 3-5 parted, very white, especially beneath, decurrent into a short, narrowly-margined petiole; lowest apparently bipinnatifid, lobes of the upper ones oblong or lanceolate, dentate or very entire except the large 3-lobed terminal one; sterile involucre 3" in diameter crowded in a dense raceme, 6-toothed, 18-20 flowered, fertile involucre  $\frac{1}{4}$  the size, clustered in the upper axils, ovoid, viscoso-puberulent, beset with strong, subulate spines somewhat hooked at the apex, two of them thicker and beaked, two-flowered.—*Hall & Harbour*, 264.

*FRANSERIA HOOKERIANA*, Nutt. Annual, much branched, 1°-2° high; leaves ovate in outline, 1'-1 $\frac{1}{2}$ ' long, minutely strigose, bipinnatifid, segments oblong or linear; heads in paniced racemes, fertile ones with several strong, flattened prickles, sterile ones with a 5-8 cleft involucre and 10-20 flowers; chaff of the sterile receptacle small and inconspicuous.—*Hall & Harbour*, 265. Wet Mountain Valley, *Brandegee*. Near Denver, *Dr. Smith*.

*FRANSERIA TENUIFOLIA*, Gr., *Pl. Fendl.*, p. 80. Stem erect, hispid; branches diffuse, slender; leaves bipinnatisect, strigose, hirsute, somewhat cinereous, pinnae and segments 3-7, linear, entire or 1-2 toothed, sometimes with a few separate lobes on the narrow rachis, terminal lobe very long; raceme spike-form, slender, disposed in a leafy panicle; involucre of the male flowers equaling the pedicel, 7-8 toothed, 6-12 flowered, of the female clustered below, armed with a few very short uncinat spines, 2-celled within, 2-flowered.—Near Pueblo, *Greene*.

*FRANSERIA DISCOLOR*, Nutt. Stems a span high from a creeping

<sup>1</sup> *FRANSERIA*, Cav. Heads of two sorts, the fertile ones at the base, and the sterile ones composing the upper portion of the racemes or spikes. Fertile heads with an ovoid or oblong closed involucre, composed of numerous united scales, the tips free and spinose or hooked; corolla none or rudimentary; style with filiform, obtuse branches; achenia oblong; pappus none. Sterile heads hemispherical; the 12-20 flowered, cup-shaped involucre of 8-12 united scales; receptacle flattish, with filiform chaff; corolla funnel-shaped, 4-5 toothed, anthers tipped with a slender inflexed appendage; ovary none; style radiate-penicillate at summit.—Herbs or suffrutescent plants; the leaves alternate, coarsely toothed or lobed, or even bipinnatifid.

root, with lateral decumbent branches, slightly pubescent; leaves lanceolate in outline, 6' long, interruptedly bipinnatifid, nearly smooth above, closely canescent-tomentose beneath, segments subovate, acute, confluent on the wide rachis; sterile involucres about 5-6 toothed; fertile flowers few; fruit spiny.—Near Denver, *Greene*.

*ZINNIA*<sup>1</sup> *GRANDIFLORA*, Nutt. Stems numerous, much-branched from a woody base, 4'-5' high, somewhat hirsute; leaves opposite, linear, connate, with scabrous margins, 1' long, 2''-3'' wide; scales of the involucre rounded, closely imbricated; rays yellow, very large, orbicular-oval,  $\frac{3}{4}$ ' wide; paleæ fimbriate; achenia of the disk with a single awn.—Cañon City, *Brandegee*. Colorado Springs, *Redfield*.

*HELIOPSIS* *LÆVIS*, Pursh.—Near Cañon City, *Brandegee*.

*RUDBECKIA* *LACINIATA*, L.—Cañon City, *Brandegee*. B. H. Smith. Sierra Madre Range, *Coulter*.

*RUDBECKIA* *HIRTA*, L.—On the Platte near Denver and Bear Creek, *Coulter*.

*LEPACHYS* *COLUMNARIS*, T. & G. Strigose-scabrous, branched from the base, 1°-2° high; radical leaves usually undivided, spatulate-lanceolate, cauline ones pinnately-parted, the upper sessile, segments linear-lanceolate or oblong, rigid, mucronulate, entire, rarely somewhat lobed; disk columnar, longer than the 5-8 oblong or obovate-oval, recurved, yellow rays; chaff with woolly tips. Disk 1' or more long.—Abundant on the plains around Denver and Colorado Springs. *Hall & Harbour*, 266; *Dr. Smith*; *Brandegee*; *Coulter*.

Var. *TAGETES*, Gr., *Pl. Wright*, 1, p. 106. Rays deep reddish-brown.—Purgatory River, *Dr. Bell*. Pueblo, *Greene*.

*HELIANTHUS* *PETIOLARIS*, Nutt. *T. & G. Fl. N. Am.* 2, p. 319. Stem erect, 1°-3° high, strigose or hispid, branching; leaves scabrous, alternate, the lower sometimes opposite, ovate-lanceolate or ovate, entire or somewhat repand-toothed, 3-nerved, on very long, slender, scabrous petioles; peduncles terminal, naked, bearing solitary (usually large) heads; scales of the involucre lanceolate, acute or acuminate; disk-flowers pubescent at base; achenia villous; pappus of two chaffy awns. Heads very variable in size.—Near Denver, *Dr. Smith*. Plains near Colorado Springs, *Porter*. Cañon City, *Brandegee*. *Meehan*. Along the Platte, *Coulter*. *Hall & Harbour*, 270; *Parry*, 420.

*HELIANTHUS* *LENTICULARIS*, Dougl. Annual, scabrous or hispid, branching, stout, 3°-8° high; leaves ovate, alternate, acuminate, coarsely-serrate, 3'-6' long, 2'-4' broad, 3-nerved at the base and suddenly narrowed into a petiole nearly as long as the leaf, uppermost often lanceolate and entire; heads mostly panicled, peduncled 2'-4' broad; scales of the involucre ovate, ciliate, abruptly and conspicuously acuminate, in about 3 rows, spreading; rays 20-40, large; chaff of the flat receptacle nearly as long as the purplish disk-flowers, concave, carinate,

<sup>1</sup> *ZINNIA*, L. Heads many-flowered; the ray-flowers pistillate, those of the disk tubular, perfect. Involucre imbricate; the scales roundish or oval, margined. Receptacle conical or somewhat cylindrical, covered with oblong conduplicate, chaffy scales which envelope the disk flowers. Rays obovate or oblong, coriaceous, reticulated, persistent, continuous with the summit of the achenium, or rarely somewhat articulated. Lobes of the corolla of the disk densely velvety-villous at the summit with colored hairs. Branches of the style in the disk-flowers terminated by a hairy somewhat capitate cone. Achenia nearly wingless; those of the ray somewhat 3-sided, mostly destitute of pappus; of the disk, compressed or flat, 1-2 awned or toothed, rarely naked.—Annual (American) herbs, with opposite mostly sessile entire leaves. Heads solitary, terminating the branches, showy, persistent. Rays purple, orange, scarlet, or greenish-white. *T. & G. Fl. N. Am.*

tricuspidate, the middle point much the strongest and dark-colored; achenia finely appressed-pubescent; pappus of two lanceolate, chaffy awns.—Plains near Denver and Colorado Springs, *Porter*; *Dr. Smith*. Cañon City, *Brandegee*. Along the Platte, *Coulter*.

*HELIANTHUS ORGYALIS*, DC. Stem tall, 6°–10° high, very smooth; leaves very numerous and narrow, linear, 3'–6' long, 1''–2'' wide, flat, the lower remotely denticulate, 1-nerved, slightly if at all scabrous; heads 5–7, corymbose, on long peduncles, rather large; scales of the involucre lax, attenuate-subulate, longer than the disk; rays about 15, 1' or more long; chaff of the receptacle, linear-subcuneiform, somewhat ciliate at the apex; pappus of 2–4 awns; achenia glabrous.—*Parry*, 57.

*HELIANTHUS RIGIDUS*, Desf.—*Hall & Harbour*; *Dr. Smith*. Cañon City, *Brandegee*. Platte River, *Coulter*.

*HELIANTHUS PUMILUS*, Nutt. (?) *Sill. Jour.*, (N. S.), v. 33, p. 10. Stem 1°–3° high, hispid, bearing a few heads; leaves opposite, ovate-lanceolate, sub-entire, cinereous-hispid, (when young, covered with resinous atoms,) tripli-nerved next the base, short-petioled, uppermost lanceolate, subsessile, often alternate; involucre a little shorter than the disk, scales oblong, not appendaged, obtusish, white-villous without; flowers of the disk yellow; achenia glabrous, toward the apex sparsely hispid-ciliate; chaff of the pappus subulate, a little shorter than the corolla, with smaller ones interposed on the outside, and margins appressed-hispid.—*Hall & Harbour*, 269.

*HELIANTHUS GIGANTEUS*, L.—Cañon City, *Brandegee*. Denver, *Dr. Smith*. The form with opposite narrowly-lanceolate, and long-acuminate leaves, and long, narrow, foliaceous involucreal scales.

*HELIANTHELLA*<sup>1</sup> *UNIFLORA*, T. & G. Stem and leaves clothed with a short and soft, somewhat-cinereous pubescence, 2°–3° high; leaves broadly lanceolate, 4'–6' long, 1'–2' wide, pointed, narrowed at the base, mostly opposite, lower ones petioled, all 3-nerved above the base; heads solitary or with 1–2 from the upper axils, on long peduncles, 2'–4' broad; involucre leafy at base, scales lanceolate, ciliate-hirsute; chaff of the slightly convex receptacle closely conduplicate, delicately scarious, pubescent at the tip; achenia 2-winged, ciliate and pubescent, crowned with 2 long awns and 2–4 intermediate lacerate squamellæ; rays 15–20, pale yellow.—*Hall & Harbour*, 268. Cañon City, *Brandegee*. Near Denver and Horse Shoe Mountain, *Coulter*.

*HELIANTHELLA PARRYI*, Gr., *Proc. Acad. Phil.*, March, 1863, p. 68. *Note*. Hirsute; stem single from a thickened root; radical leaves narrowly lanceolate, hispidly-ciliate, very acute, 6' long including the petiole, upper cauline ones sublinear, 1'–2' long; heads 2–4, small, somewhat nodding, on short or elongated peduncles; scales of the involucre linear-lanceolate, long-acuminate, inner ones exceeding the disk, hispidly-ciliate; chaff of the receptacle slightly scarious, barbulate on the truncate apex; achenia oblong, awnless, crowned with hyaline squamellæ which are resolved into a villous fringe that equals the proper tube of the corolla in

<sup>1</sup> *HELIANTHELLA*, Toff. & Gr. Heads many-flowered; the ray-flowers 10–24, neutral; those of the disk perfect. Scales of the involucre linear or lanceolate, in about 2 series, loose, somewhat foliaceous. Chaff of the receptacle persistent, embracing the achenia. Corolla of the disk cylindrical, elongated, 5-toothed, with a very short proper tube. Branches of the style very hispid, more or less obtuse. Ovary compressed, with one or both margins slightly winged and produced at the summit into a short auriculate and lacerate persistent appendage or into an awn, sometimes with intermediate squamellæ, or an obscure coroniform fringe, glabrous, or ciliate.—Perennial herbs, with linear or lanceolate mostly scattered and sessile entire leaves, and solitary showy heads terminating the stem or branches. *T. & G. Fl. N. Am.*

length; involucre 6" long; disk 6" broad; ligules 7"-9" long.—*Canby*. Ute Pass, *Porter*.—South Park, *Coulter*. Central City, *Greene*.

*HELIOMERIS*<sup>1</sup> *MULTIFLORA*, Nutt. *Jour. Acad. Phil.*, (N. S.), 1, p. 171. Stems few from a woody root, 1°-2° high, simple or corymbosely branched above; leaves narrowly lanceolate, 1'-2½' long, 3"-6" broad, more or less scabrous pubescent, entire or obscurely serrate; heads 6"-8" broad, excluding the rays, mostly terminal on long branches; chaff of the receptacle rather rigid, pungently acute, villose; rays 10-12, oblong-oval, entire or slightly emarginate; achenia compressed-pyriform, scarcely angled, black and somewhat shining.—*Hall & Harbour*, 271. Near Denver, *Dr. Smith*. Among the mountains, *Canby*. Cañon City, *Brandegee*. Mount of the Holy Cross and Sierra Madre Range, *Coulter*.

Var. *LATIFOLIA*, *Porter*. Taller, 3° high; leaves larger, 3'-4' long, 1'-1½' broad, usually serrulate with scattered teeth.—Foot-hills near Colorado Springs, *Porter*.

*THELESERMA*<sup>2</sup> *FILIFOLIUM*, Gr. Annual, glabrous, 1°-2° high, much branched, branches slender; leaves opposite, 1-2 pinnately parted or divided, the upper 3-5 divided or simple, nearly sessile, divisions attenuate-filiform, scales of the interior involucre with broad scarious margins united nearly to the middle, longer than the linear-subulate, exterior scales; rays obovate, 3-toothed; achenia 3" long, crowned with two triangular-subulate, concave, at length divaricate short awps or teeth which are fringed with yellow, reflexed, bristly hairs; heads numerous, small, 6" broad without the rays.—*Hall & Harbour*, 280. Cañon City, *Brandegee*. Near Denver, *Dr. Smith*. Plains around Colorado Springs, *Porter*. Monument Park, *Coulter*; *Redfield*.

*THELESERMA GRACILE*, Gr. Erect, 2°-3° high, branched above; branches strict, elongated, corymbose; leaves pinnately or pedately about 5-parted, with narrowly-linear, rigid lobes, the uppermost nearly simple; heads few-many, on long peduncles; involucre campanulate, inner scales united above the middle, obtuse or acutish, often with narrow, scarious margins, exterior ovate, very short, obtuse; rays none; achenia oblong-linear, crowned with 2 stout subulate, persistent, spreading, retrorsely pectinate-hispid awns.—*Hall & Harbour*, 279. Plains around Denver and Colorado Springs, *Porter*.

*COREOSIS TINCTORIA*, Nutt.—On the plains. *Hall*.

*COREOSIS INVOLUCRATA*, Nutt. "Minutely pubescent, stem quadrangular below; leaves 1-2 pinnately 3-7 parted, the divisions linear-

<sup>1</sup>*HELIOMERIS*, Nutt. Heads many-flowered, radiate; rays neutral; disk-flowers numerous, perfect, the corolla with a very short pubescent proper tube, (*i. e.* amplified very near the base,) 5-toothed. Involucre spreading; oblong-linear scales in about 2 rows. Receptacle oblong-conical, covered with persistent lanceolate, concave-carinate chaff, partly embracing the disk-flowers and nearly their length. Stamens with broad ovate appendages and blackish anthers. Branches of the style oblong-clavate, slightly hispid. Achenia cuneate-oblong, compressed-quadrangular, entirely destitute of pappus.—Perennial Western North American herbs or suffrutescent plants, with nearly entire, mostly opposite leaves and yellow flowers, smaller than those of most *Helianthi*.

<sup>2</sup>*THELESERMA*, Gray. (*Cosmidium*, T. & G., *Fl. N. Am.*) Heads many-flowered; the ray-flowers about 8, neutral, or sometimes wanting; those of the disk tubular, perfect. Involucre double, each of 8 scales; the interior oblong-ovate, somewhat membranaceous, united to the middle, much larger than the exterior. Receptacle flat; the chaff scarious, oblong, obtuse, with 2 approximate colored nerves, shorter than the flowers, partly investing the achenia, and deciduous with them. Corolla of the disk with a very slender tube and a deeply 5-cleft limb; the segments long and linear, recurved, Achenia linear-oblong (obscurely-angled when young,) terete or slightly obcompressed, a little incurved and tuberculate on the back when mature, not rostrate, the abrupt summit crowned with 2 dentiform retrorsely pectinate-ciliate (persistent?) awns.



lanceolate, incisely toothed; heads paniculate; scales of the exterior involucre about 20, linear-lanceolate, hirsute (as well as the peduncles) longer than the interior; achenium oval, hispid-ciliate, 2-toothed at the summit."—*Parry*, 31. Plains.

*BIDENS FRONDOSA*, L.—Cañon City, *Brandegee*. Introduced.

*BIDENS CHRYSANTHEMOIDES*, Mx.—Plains near Denver, *Dr. Smith*.

*BIDENS BIPINNATA*, L.—Ute Pass, *Porter*. Introduced.

*BIDENS TENUISECTA*, Gr., *Pl. Fendl.*, 86. Annual, nearly glabrous; stem 1°–2° high, very smooth, terete, branching, ascending; branches striate-angled, with 1–3 heads at the naked summits; leaves opposite or alternate, bipinnately-parted or biternately-divided, segments linear, very entire or 2–3 lobed, a little broader than the rachis; scales of the hirsute involucre linear; rays 5–8, inconspicuous, scarcely equaling the disk; achenia attenuate linear, glabrous, somewhat 4-angled, striate, awns 2, short.—Huerfano County, *Greene*.

*XIMENESIA*<sup>1</sup> *ENCELIOIDES*, Cav. Annual, cinereous-pubescent; stems stout, striate, 3°–5° high; branched above; leaves opposite or alternate, ovate, coarsely dentate-serrate, tapering into a long, winged petiole, tripli-nerved, paler beneath; heads corymbose on long, naked peduncles; achenia of the disk slightly villous, surrounded by a broad wing, emarginate at the summit of the deeply 3-toothed, yellow ray, rugose and wingless.—Abundant around Cañon City, *Brandegee*.

*DYSODIA CHRYSANTHEMOIDES*, Lag.—Plains around Denver and Colorado Springs, *Porter*.

*GAILLARDIA*<sup>2</sup> *ARISTATA*, Pursh. Perennial, villous-pubescent or almost tomentose with jointed hairs; stem simple or branched, 1°–2° high; leaves alternate, minutely punctate, radical and lower ones lanceolate, tapering into slender petioles, sinuate-pinnatifid or coarsely toothed, minutely serrate or nearly entire, the uppermost linear or oblong-lanceolate; sessile, usually dilated at the base, and partly clasping; heads large, 1½'–2½' in diameter including the rays; involucre hirsute; corollas of the disk with short, broadly subulate teeth, of a rich brownish-purple or maroon color; rays 10–18, crowded, elongated-cuneiform, deep yellow; chaff of the pappus 6–8, broadly lanceolate; fimbriæ of the receptacle few, aristæform, slender, distinct, not dilated at the base, 2–3 times the length of the nearly smooth achenia.—*Hall & Harbour*. Near Denver, *B. H. Smith*. Pleasant and Monument Parks, *Coulter*. Sangre de Cristo Range, *Redfield*.

*GAILLARDIA PINNATIFIDA*, Torr. *Ann. N. Y. Lyc.* 2, p. 214. Peren-

<sup>1</sup>*XIMENESIA*, Cav. Heads many-flowered; the rays ligulate, in a single series. Scales of the involucre somewhat in 2 series, narrow, acute, foliaceous, spreading. Receptacle convex; the chaff lanceolate, membranaceous, embracing the flowers. Tube of the corolla hispid. Branches of the style in the disk-flowers appendiculate. Achenia of the disk flat (compressed laterally,) winged, somewhat hairy, deeply emarginate at the summit, with 2 setiform awns more or less united with the wing; those of the ray mostly dissimilar and wingless. *T. & G. Fl. N. Am.*

<sup>2</sup>*GAILLARDIA*, Foug. Heads many-flowered, radiate; the ray-flowers neutral, in a single series, deciduous. Scales of the involucre in about 3 series, very acute, foliaceous, more or less callous and appressed or erect at the base, above spreading or at length reflexed; the exterior largest. Receptacle convex or hemispherical, fimbriate (the fimbriæ rigid or corneous and elongated,) or in one species nearly naked. Rays cuneiform, palmately 3-cleft or toothed at the summit. Corolla of the disk with a short tube, and an elongated cylindraceous somewhat inflated 5-toothed limb; the teeth usually subulate, and hispid with jointed hairs. Branches of the style terminated with a very long and acute filiform hispid appendage. Achenia obpyramidal, involucre with villous hairs. Pappus of 6–10 membranous 1-nerved scales, the nerves produced into awns about the length of the corolla. *T. & G. Fl. N. Am.*

nia, canescent; stems 8'-12' high, branching; leaves sessile, pinnatifid, the rachis and remote lobes linear; heads rather small; involucre in about 2 series, nearly equal to the disk; rays deeply 3-cleft; chaff of the pappus lanceolate; fimbriæ of the receptacle aristæform, slender, sparse, longer than the achenia.—Purgatory River, *Dr. Bell*.

**GAILLARDIA PULCHELLA**, Foug. Annual, puberulent, or slightly hirsute, branching; leaves lanceolate, the lower ones tapering at the base and slightly petioled, somewhat toothed or rarely incised, the upper entire, partly clasping, apiculate-acuminate; involucre very hirsute and callous at the base, longer than the disk; heads 1' or more in diameter; rays 10-12, attenuate at the base, deeply 3-cleft, violet-purple, the teeth yellow; corolla of the disk with attenuate, subulate teeth; chaff of the pappus ovate, or lanceolate-oblong, with long awns; fimbriæ of the receptacle aristæform-subulate, not dilated at the base, slender, longer than the achenia; achenia involucre with a villous-ferruginous tuft.—Plains of Eastern Colorado, *Dr. Bell*.

**PALAFOXIA<sup>1</sup> HOOKERIANA**, T. & G., (*P. Texana*, Hook.) Plant 1<sup>o</sup>-2<sup>o</sup> high, strigose-scarbrous; branches paniculate or corymbose; leaves lanceolate, 1-3 nerved; heads 9'' long, many-flowered, radiate; scales of the involucre 12 or more, very glandular as well as the peduncles and branches, imbricated in 2 series, exterior lanceolate, interior obovate-lanceolate or oblong; rays 8-10, more or less exerted, purple, broadly cuneiform, deeply 3 cleft; limb of the disk-corolla 5-cleft below the middle; pappus of the disk-flowers of 6-8 narrowly-lanceolate, acuminate scales as long as the attenuated, hairy achenium, in the rays of as many obovate-spatulate, very obtuse, rigid scales, many times shorter than the nearly glabrous achenia.—*Hall & Harbour*, 352.

**CHEENACTIS<sup>2</sup> DOUGLASSII**, Hook. & Arn. (*C. achilleefolia*, H. & A.) "Biennial and sometimes annual, whitened with a close tomentum, or rarely smoothish; stems 2<sup>o</sup>-3<sup>o</sup> high, simple or much branched, often several from one root; leaves somewhat fleshy, 1'-3' long, ovate, oblong in outline, 2-3 pinnatifid with very numerous and often crowded, minute oblong or obovate, rounded lobes; heads few-many, corymbed; involucre turbinate or campanulate, the oblong-linear scales in 1-2 series; flowers 6''-7'' long, whitish or flesh-colored; corollas pubescent, marginal ones scarcely larger; achenia linear, hispid, blackish, as long as the corolla; pappus of about 10 unequal and oblong or lanceolate, erosely-denticulate scales,  $\frac{1}{2}$ - $\frac{2}{3}$  as long as the

<sup>1</sup>**PALAFOXIA**, Lagasca. Heads 10-30 flowered; the flowers all perfect and tubular, or the exterior series either imperfectly or manifestly radiate; the rays 3-cleft, pistillate, scales of the obconical or campanulate involucre 8-15, membranous or herbaceous with scarios tips, appressed (or spreading in fruit), in 1-2 series, shorter than the disk. Receptacle small, flat, naked or slightly alveolate. Corolla of the disk with a slender tube and an expanded deeply 5-cleft or 5-parted limb; the lobes linear or lanceolate, spreading, glabrous. Branches of the style long and filiform, flattish, glandular-pubescent throughout. Achenia quadrangular, slender, tapering to the base, minutely pubescent. Pappus of 6-12 membranaceous, denticulate, pinnately striate scales, furnished with a strong midnerve, which is thickened at the base and often somewhat produced at the apex; the pappus of the exterior flowers often much shorter. *T. & G. Fl. N. Am.*

<sup>2</sup>**CHEENACTIS**, DC. Heads many-flowered; flowers all tubular and perfect; the corollas glabrous or puberulent, elongated, narrowly obconic or amplified above and trumpet-shaped, 5-toothed; the outer ones (rays) more expanded than the rest and often somewhat irregularly ventricose, 5-cleft; teeth or lobes pubescent. Involucre campanulate; the scales oblong-linear, about 20, in 1-2 rows. Receptacle alveolate. Style with very long, narrowly-linear branches, the upper part hispid. Achenia linear, tapering to the base, striate or quadrangular. Pappus of 4-12 hyaline, membranous, usually nerveless scales, with erosely-denticulate margins, those of the disk flowers usually much shorter.

achenium." We have adopted for this variable species the excellent emended description of Prof. Eaton in *King's Report*, vol. 5, p. 172.—*Hall & Harbour*, 283; *Parry*; *Canby*. Upper Arkansas, *Porter*. Sangre de Cristo Pass and Sierra Mojado, *Brandegee*. Twin Lakes, Mount La Plata, and Sierra Madre Range, *Coulter*.

*HYMENOPAPPUS TENUIFOLIUS*, Pursh. Whitened-tomentose, often becoming smoothish; stems 8'-15' high, leafy at base, sparingly corymbose toward the summit, sometimes several from a rather stout, simple or branched, perennial caudex; radical leaves petioled, 2'-4' long, 2-3 pinnately divided, divisions very narrowly linear, cauline ones sessile, similar but smaller or reduced above the linear bracts; heads pedunculate, 4"-6" wide, hemispherical-campanulate; scales of the involucre 6-8, oval, appressed, with broad, obscurely-denticulated, scarios margins; corolla-tube very short, throat abruptly inflated; pappus of spatulate-oblong, obtuse, slightly-erose scales, nerved to the middle, mostly as long as the tube of the corolla.—*Hall & Harbour*, 282. Upper Arkansas, *Porter*. Cañon City, *Brandegee*. Plains of the Platte, *Coulter*. Wet Mountain Valley, *Redfield*.

*BAHIA*<sup>1</sup> *OPPOSITIFOLIA*, T. & G. Perennial, canescently pubescent, very much branched from the base upward, 4'-8' high; branches opposite, more or less spreading or decumbent; leaves opposite, petioled, 1-2 palmately divided, segments linear or lance-linear, about 1' long; peduncles slender; involucre campanulate; scales 5-8, oblong-ovate; rays about the same number, very short; pappus minute, scales 5-8, partly obtuse, somewhat lacerate; achenium fusiform, tapering to the base, sparingly scabrous.—*Hall & Harbour*, 278. Around Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*; *Canby*.

*VILLANOVA*<sup>2</sup> *CHRYSANTHEMOIDES*, Gr. *Pl. Wright*, 2, p. 96. Puberulent; stems erect, 1<sup>o</sup>-4<sup>o</sup> high, corymbosely-paniculate above; flowering branches and peduncles viscous-glandular; leaves alternate, 1-2 ternately parted, segments 2-3 lobed or pinnatifid, lobes oblong or sub-linear, obtuse; heads 6" in diameter exclusive of the ligules which are 5" long; flowers all yellow; scales of the involucre 16-20, in about 3 series, equal, acuminate, herbaceous; ligules 16-20, oval-oblong; flowers of the disk many, tubes glandular; receptacle rather convex; achenia quadrangular, sub-clavate, nearly glabrous, striate, all fertile.—*Hall & Harbour*, 281. Cañon City, *Brandegee*. Soda Springs, *Porter*. Twin Lakes, *Coulter*.

*ACTINELLA ACAULIS*, L. Cæspitose, dwarf and acaulescent, villous pubescent or silky; caudex perennial, simple or branching; leaves all radical, spatulate or linear-obovate, entire, 1'-2½' long; scapes 1'-6' high, usually leafless and bearing a single head, 9"-15" broad; involucre of 2 rows of oval or oblong scales, equaling the disk; rays 10-12, broadly cuneate, 3-toothed and often sprinkled with resinous atoms; pappus of

<sup>1</sup> *BAHIA*, Lagasca. Heads many-flowered, radiate; rays 5-30, pistillate, fertile; disk-flowers tubular, perfect, fertile; corollas glandular-hairy, 5-toothed. Involucre subglobose or campanulate; the scales appressed, in one or two rows. Receptacle convex or conical; naked branches of the style in the disk-flowers short, thickened at the apex, and obtuse, or truncate, or with a conical fleshy appendage. Achenia narrowly turbinate or linear, 4-sided. Pappus a crown of short scarios nerveless or rarely 1-nerved and even awnless scales.

<sup>2</sup> *VILLANOVA*, Lagasca, *DC. Prod.* 6, p. 75. Heads few-flowered, heterogamous. Ray-florets 5-10, pistillate, ligulate, obovate, toothed at the apex. Flowers of the disk perfect, fertile, tubular, terete, 5-toothed. Scales of the campanulate involucre few, in 1 series. Receptacle flat, naked. Branches of the style in the disk-flowers capitate, blunt. Achenia obpyramidal, wingless, punctate, glabrous. Disk epigynous, minute. Pappus none.

5-7 broadly ovate scales, tipped with slender awns. Alpine.—*Hall & Harbour*, 276. Wet Mountain Valley, *Brandegee*. Mount Lincoln, at 14,000 feet altitude, and Horse Shoe Mountain, *Coulter*. South Park, *Canby*. *Meehan*.

*ACTINELLA SCAPOSA*, Nutt. Villous; scapes single from a woody caudex, 6'-9' high, leafless, bearing a single head; leaves radical, linear-spatulate, acute or obtusish, 2'-3' long, 2"-3" wide, becoming smooth and shining, conspicuously punctate, entire; heads 1' wide, including the rays; scales of the involucre ovate, appressed, rather shorter than the disk, in about 3 series, densely villous; rays about 12, 3"-4" long, cuneate-ovate, bright yellow, 4-nerved and 3-toothed; scales of the pappus 5, short-awned, oval.—*Hall & Harbour*, 275. Monument Park, *Porter*. Garden of the Gods, *Coulter*.

*ACTINELLA RICHARDSONII*, Nutt. Puberulent; stems 3'-6' high from a perennial, somewhat branching, woody caudex; leaves petioled, rigid, 3'-6' long, pinnately or irregularly 3-7 parted toward the summit, divisions narrowly linear; heads loosely corymbose, 9"-12" broad, including the rays; involucre shorter than the disk; scales in 2 rows, oblong or ovate, the exterior united at the base; pappus of 5-7 ovate-lanceolate, cuspidate-awned scales; caudex and bases of the lower leaves woolly tomentose.—*Hall & Harbour*, 274. Abundant at middle elevations, South Park and Ute Pass, *Porter*. Wilson Creek, Fremont County, *Brandegee*. *Canby*. Twin Lakes and Weston's Pass, *Coulter*. *Redfield*.

*ACTINELLA GRANDIFLORA*, T. & G. Perennial, more or less densely clothed with soft, white wool; stems erect from a woody caudex, stout, striate, 6'-9' high, leafy, simple or with 2-3 branches from the base or middle of the stem; lower leaves pinnately or bipinnately parted, with margined petioles from broad scarious bases, 2'-2½' long, including the petiole, divisions linear; upper cauline leaves simple or sparingly divided; heads very large, 2'-3' broad, including the bright yellow rays; involucre very densely woolly with copious white wool; scales of the involucre in about 2 series, lanceolate, acuminate, exceeding the disk; ligules oblong, 6"-12" in length, 2-3-cleft at the truncate apex; scales of the pappus 6-8, narrowly subulate, exceeding the tube of the corolla; achenia villous-hispid. A very showy, high-alpine plant.—*Hall & Harbour*, 273. *Parry*; *Meehan*. Mount Lincoln, at 14,000 feet altitude, Gray's Peak, at 12,000 feet, and White House Mountain, at 13,000 feet, *Coulter*.

Var *GLABRATA*, *Porter*. Softly tomentose, becoming glabrate; stems simple from a woody caudex, 6'-8' high, unbranched, naked above, bearing a single head; lower leaves spatulate-linear, simple or 3-7-parted at the summit, with long, flat, margined petioles from somewhat expanded, scarious bases, 2'-3' long, including the petiole, divisions linear; upper leaves linear, entire; heads 1¼'-1½' broad including the rays; scales of the involucre ovate, rather obtuse, in about 2 series, woolly, but not conspicuously so, much shorter than the disk; ligules about 6" long, rather narrow, yellow, 2-3-cleft at the apex; scales of the pappus 5, subulate, acuminate, sharply serrate on the margins, much shorter than the corolla of the disk, lead-colored; achenia villose. Alpine.—Sangre de Cristo Pass, *Brandegee*.

*HELENIUM AUTUMNALE*, L.—Platte near Denver, *Dr. Smith*. Wet Mountain Valley, *Brandegee*.

*HELENIUM HOOPESII*, Gr. *Proc. Acad. Phil.*, March, 1863, p. 65. *Note*. Stem stout, somewhat tomentose above, striate-angled, 2°-4° high; leaves pale glaucous, thickish, punctate, smooth or slightly pubescent,

entire; radical ones lanceolate-spatulate, narrowed into a short-winged petiole, often very large, 6'-11' long; cauline ones oblong-lanceolate, semi-amplexicaul; peduncles thickened above; heads on long peduncles, naked above, 3-6, very large, 2'-3' broad; scales of the involucre lanceolate or linear, whitish-tomentose; receptacle subglobose; rays 15-20, linear, cuneate, about 1' long, orange-yellow; pappus of lanceolate, subulate, obscurely-nerved scales, a little shorter than the corolla of the disk, as long as the silky-villous achenium. A very showy plant.—*Hoopes*. Wet Mountain Valley, *Brandegee*. Sierra Madre Range, *Coulter*.

*ACHILLEA MILLEFOLIUM*, L.—Very common throughout Colorado, *Dr. Smith*; *Porter*; *Coulter*; *Brandegee*; *Canby*; *Meehan*.

*LEUCAMPYX*<sup>1</sup> *NEWBERRYI*, Gray.—Herbaceous, at first woolly, at length nearly glabrous; stems stout, 1°-2° high, corymbosely branched; leaves 2-3 pinnately parted, segments short, linear, revolute on the margins, radical ones lanceolate in outline, 4'-6' long including the petioles; heads many, rather large, long-peduncled; scales of the involucre obovate, obtuse, with broad scarious tips; corolla of the disk yellow, of the ray white or cream-colored with a spreading cuneate limb 6'' long; achenia glabrous, angled, black.—This only species of the genus, which in habit resembles a *Hymenopappus*, was first collected in 1867, by Dr. Newberry in New Mexico, and later in 1872, by Prof. Porter, at the Soda Springs, 35 miles N. W. of Cañon City.

*ARTEMISIA DRACUNCULOIDES*, Pursh.—*Hall & Harbour*, 302. Cañon City, *Brandegee*. *Hoopes*. Sierra Madre Range, *Coulter*.

*ARTEMISIA BOREALIS*, Pall.—*Parry*.

*ARTEMISIA CANADENSIS*, Mx.—*Hall & Harbour*, 300; *Canby*; *Dr. Smith*; *Porter*; *Hoopes*.

*ARTEMISIA FILIFOLIA*, Torr. Stems 1°-3° high, with slender, virgate, paniced branches; leaves 1'-2' long, whitish-tomentose, becoming smooth, filiform with revolute edges, lower ones mostly 3-parted; heads very small, crowded in virgate, leafy panicles, tomentose, 3-5 flowered; two florets, pistillate and fertile, with short truncate corollas, the rest perfect but sterile; corollas funnel-form, 5-toothed. *Hall & Harbour*, 307. Near Denver, *Dr. Smith*.

*ARTEMISIA TRIDENTATA*, Pursh. Shrubby, 1°-6° high, much branched, densely silvery-canescens; leaves crowded, cuneiform, 6''-12'' long, usually 3-toothed at the apex, teeth short and obtuse, those of the flowering branchlets often linear and entire; heads obovoid, 5-6 flowered; outer scales of the involucre tomentose, very short, inner ones scarious; flowers all perfect and fertile; corollas funnel-form, 5-toothed, the proper tube very short; styles 2-cleft, the branches widened somewhat upward, truncate and somewhat penicillate.—On the Blue River, west of the Rocky Mountain Range. *Hall & Harbour*, 306. *Canby*. *B. H. Smith*. On the Arkansas, *Porter*; *Coulter*.

<sup>1</sup> *LEUCAMPYX*, A. Gray (in Benth. & Hook. *Gen. Pl.* 2, p. 422.) Heads heterogamous, radiate; flowers of the ray in one series, pistillate; those of the disk perfect; both fertile. Involucre broadly hemispherical; bracts in 2-3 series, imbricated, broadly scarious at the apex. Receptacle somewhat convex, covered with broad membranaceous-hyaline, chaffy scales half inclosing the achenia. Corollas of the ray pistillate; tube slender; limb broad, 3-toothed or 3-cleft at the apex; those of the disk perfect, regular, tubular; limb campanulate, 5-cleft at the apex. Anthers obtuse at base, entire. Branches of the style in the perfect flowers with short penicillate appendages. Achenia cuneate, incurved, dorsally compressed, subtriquetrous, attenuate at base, obtuse at the apex. Pappus none.

ARTEMISIA LUDOVICIANA, Nutt.—Plains around Denver, *Coulter*.

Var. LATILOBA, Nutt. Lower leaves dilated, deeply pinnatifid or the upper trifid, the lobes and the upper leaves broadly lanceolate, the upper surface less tomentose or becoming smooth.—Near Denver, *Dr. Smith*. Glen Eyrie, *Porter*.

Var. GNAPHALODES, T. & G. Very tomentose-canescens throughout; leaves entire or sharply and irregularly serrate towards the apex.—Near Denver, *Dr. Smith*; *B. H. Smith*.

Var. MEXICANA, Gr. Lower leaves pinnatifid, upper ones trifid; lobes linear or linear-lanceolate, with revolute margins; heads small, tomentose-canescens.—Huerfano County, *Greene*.

ARTEMISIA DISCOLOR, Pall. Suffruticose, erect or ascending, 10–20 high, glabrous, simple below; leaves 1'–3' long, mostly smooth above, paler and tomentose beneath, pinnately-lobed with lanceolate, pointed, entire or sparingly toothed segments, with revolute margins; heads subglobose, 1½"–2" broad, disposed in an elongated, virgate raceme, or strict panicle; involucre at first tomentose, cup-shaped, the outer scales ovate, inner ones oval, with hyaline, ciliate-fringed margins; receptacle smooth; florets numerous, a few of the outer ones pistillate, fertile, with very slender corollas and smooth branches of the style, the rest perfect, fertile, with funnel-form corollas and truncate, penicillate styles.—Sierra Madre Range, *Coulter*.

ARTEMISIA FRIGIDA, Willd.—*Hall & Harbour*, 304; *Parry*; *Dr. Smith*; *B. H. Smith*; *Porter*; *Meehan*; *Brandege*; *Coulter*.

ARTEMISIA ARCTICA, Less. Herbaceous, tomentose-pubescent or nearly glabrous; stems 8'–15' high, simple, erect, leafy, terminating in a virgate raceme or sparingly-branched panicle, somewhat angled; lower leaves bipinnatifid, on long petioles, lobes linear or linear-lanceolate, incisely toothed; heads large, globose, nodding, sessile or on short slender petioles; scales of the involucre ovate, with blackish scarious margins.—*Hall & Harbour*, 298; *Parry*; *Dr. Smith*; *Brandege*; *Meehan*; *Coulter*. Alpine.

ARTEMISIA SCOPULORUM, Gr., *Proc. Acad. Phil.*, March, 1863, p. 66. Note. Cæspitose; rhizoma creeping; stems very simple, 3'–8' high; leaves white-silky, numerous, pinnately 3–5 cleft, segments especially of the radical ones 3-parted, lobes as well as the uppermost leaves linear, narrow; heads many or few, simply racemose-spicate, short-pedicelled, erect, 2"–3" broad; involucre hemispherical, scales oval, villose on the back, margin broad, scarious, dark-brown; wool of the receptacle copious, as long as the florets; florets 18–30. Alpine.—Weston's Pass and White House Mountain, *Coulter*. Summit of Pike's Peak, *Canby*.

Var. MONOCEPHALA, Gr. l. c. Stem 2'–6' high, terminated by a solitary, larger head; radical and lower leaves simply 3-parted or occasionally 5-parted; uppermost ones linear, very entire; flowers 30 or more, tipped with purplish.—Summit of Pike's Peak, *Canby*.

ARTEMISIA PARRYI, Gr. *Proc. Am. Acad.*, vol. 7, p. 361. Very smooth; stem simple, a span or more high, from a perennial root, leafy; leaves 2–3 pinnately parted; pinnæ 5–9, crowded, segments linear, acute, 3"–5" long; panicle racemose, many-headed; heads nodding, nearly 3" in diameter; scales of the involucre ovate, very obtuse, with scarious, dark-brown margins; marginal flowers pistillate, few, the others fertile; corollas very smooth.—Sangre de Cristo Pass, *Parry*, 1867.

GNAPHALIUM LUTEO-ALBUM, L., var. SPRENGELII, D. C. Eaton, in *King's Rep.*, v. 5, p. 184. (*G. Sprengelii*, H. & A.) Annual, whitened with loose wool; stem 6'–30' high, simple below, corymbose with long

branches toward the summit (sometimes unbranched;) leaves slightly decurrent; lower ones 2'-3' long, linear-spatulate, obtuse; upper ones linear-lanceolate, acute; heads clustered; involucre scales shining, yellowish-white, scarious, oblong-ovate, rather obtuse; pistillate florets very numerous, in several rows outside of the perfect ones; achenia one-half larger and smoother than in the European plant.—*Brandegee*. Near Denver, *Dr. Smith*; *H. B. Smith*. Wet Mountain Valley, *Redfield*.

*GNAPHALIUM STRICTUM*, Gr. *Pac. R. R.*, v. 4, p. 110. Annual, white-woolly; stem simple, or branched from the base, strict, 3'-9' high, virgate; leaves narrowly linear, elongated, uniform throughout, 1'-1½' long, rather crowded; heads closely glomerated in the axils, leafy-braeted; involucre campanulate, outer scales lanceolate, brownish, inner ones linear, white at the apex; receptacle broad and flat; achenia smooth.—*Hall & Harbour*, 311. Wet places in the mountains.

*GNAPHALIUM DECURRENS*, Ives. "Subalpine; rare."—*Hall & Harbour*, 312. *Hoopes*.

*ANTENNARIA CARPATHICA*, R. Br., var. *PULCHERRIMA*, Hook. Whole plant covered with a soft silvery tomentum, becoming somewhat glabrate with age; stems simple, leafy, 9'-15' high, sterile ones not stoloniferous; radical leaves narrowly oblanceolate, 3'-4' long, acute, 3-5 nerved, upper leaves gradually smaller; corymb more or less spreading; involucre woolly at the base, scales brownish, tips white, not crisped.—*Canby*. South Park, *Porter*. Cañon City, *Brandegee*. Plains of the Platte and Long's Peak, *Coulter*.

*ANTENNARIA ALPINA*, Gärtn. Cæspitose, producing stoloniferous, flowerless stems; flowering stems 2'-8' high, simple; leaves 6'-9' long, white-tomentose, the radical ones spatulate, the cauline linear; heads 3-7, nearly sessile in capitate clusters; involucre somewhat woolly at the base; scales olivaceous with paler and erosely-denticulate, narrowed tips, rather obtuse in the sterile heads, but acute in the fertile; pappus of the sterile flowers strongly clavate.—*Hall & Harbour*, 310; *Parry*. Clear Creek, Cañon and Twin Lakes, *Coulter*.

*ANTENNARIA DIOICA*, Gärtn. Sterile stems stoloniferous, 6'-1° high, leafy; leaves silvery-tomentose, caulescent on the lower or on both sides; the radical spatulate, 1-nerved or 3-nerved at base, the cauline lanceolate or linear, appressed; heads usually many in the capitate or open corymbs; scales of the involucre with loose-denticulate, mostly obtuse tips, white, ochroleucous, rose-color or purple; achenia perfectly smooth.—*Parry*; *Canby*; *B. H. Smith*; *Porter*; *Brandegee*; *Coulter*. Common at middle elevations.

*ARNICA ANGUSTIFOLIA*, Vahl. More or less villous; stems 4'-1° high, bearing a single head; leaves lanceolate, acute or obtuse, entire or sparingly denticulate, 3-nerved; the radical and lowest tapering into winged petioles, cauline 1-3 pairs, sessile; involucre villous-hirsute; achenia hirsute.—*Hall & Harbour*, 334; *Parry*. Cañon City, *Brandegee*. Long's Peak, Monument Park, Horse Shoe Mountain, and Sierra Madre Range, *Coulter*. "A variable species, from the low and middle to the alpine region; flowering early and late."

Var. *ERADIATA*, Gr. *Proc. Am. Acad.*, March, 1863, p. 68. Heads discoid; leaves broader; scales of the involucre longer and narrower; usually taller and larger in every way, often 2° high; ripe achenia in our specimens hirsute.—*Hall & Harbour*, 338. *Parry*, 10. Gothic Mountain, *Coulter*.

*ARNICA CHAMISSONIS*, Less. Hirsute-pubescent or somewhat woolly;

stems simple or branched above,  $1^{\circ}$ – $1\frac{1}{2}^{\circ}$  high, bearing 3 or more heads, leafy to the summit; leaves oblong-lanceolate, acute or obtuse, entire or sparingly denticulate, 3–5-nerved, radical and lower cauline ones narrowed into short petioles, the rest (2–6 pairs) sessile; rays short; involucre finely villous-pubescent; achenia minutely hirsute.—*Hall & Harbour*, 337. South Park.

ARNICA MOLLIS, Hook. Readily distinguished by its almost plumose pappus. "Alpine and sub-alpine."—*Hall & Harbour*, 335; *Dr. Smith*. Sierra Madre Range, at 11,000 feet altitude, *Coulter*.

ARNICA LATIFOLIA, Bong. Sparingly hirsute-pubescent or nearly glabrous; stems  $1^{\circ}$  high, from a slender, creeping caudex; leaves thin and flaccid, ovate or oblong-ovate, acute, unequally and often very sharply serrate, veiny; the radical ones on long, slender petioles, cauline in about 3 pairs, closely sessile by a cordate base or the lowermost somewhat petioled; heads solitary or 1–2 additional from the uppermost axils, rather small; involucre obconic; scales lanceolate; acuminate; somewhat hairy towards the base; ligules narrow; achenia nearly smooth.—*Parry*, 403. White House Mountain, at 12,000 feet altitude, *Coulter*.

ARNICA CORDIFOLIA, Hook. Woolly-pubescent, becoming glabrate with age; caudex slender, creeping; stems 6'–14' high; leaves thinnish, radical and lower ones cordate, roundish, obtuse or acute, on long slender petioles, denticulate or sharply toothed, the cauline 1–3 pairs, on shorter petioles, less deeply cordate and more acute, the highest pair sessile; heads rather large, 1–3, on long peduncles; involucre villous-pubescent; scales lanceolate, often somewhat abruptly acuminate; achenia hirsute.—*Hall & Harbour*, 336. Common; alpine and sub-alpine; very variable in size. Gray's Peak, *Dr. Smith*. South Park, *Canby*, *Meehan*. Sierra Madre Range, Mount Lincoln, at 13,000 feet altitude, Twin Lakes and Clear Creek Cañon, *Coulter*.

SENECIO LUGENS, Richards. Perennial, white-tomentose, deciduously lanate or nearly smooth; stem  $6'$ – $2^{\circ}$  high, often several from one root; leaves glandular-toothed or denticulate, sometimes entire, obscurely veined, 2'–8' long, 6''–2' wide, the radical obovate or oblong-spatulate obtuse, narrowed into a petiole, cauline sessile and partly clasping, lanceolate; corymb open or dense; heads variable in size, usually rather large; involucre with a few bractlets at the base; scales linear-lanceolate, acute, with blackish-purple tips; rays from 10–12, oblong-linear; twice as long as the involucre; achenia glabrous.

Var. HOOKERI, Eaton. *King's Rep.*, vol. 5, p. 188. (*S. lugens*, Hook. *Fl. Bor. Am.* 1, 332, t. 114.) Deciduously tomentose or smooth; stem simple; leaves entire or glandular-toothed; radical ones oblong-spatulate, cauline lanceolate, acute, clasping; corymb dense; scales of the involucre conspicuously sphacelate.—*Dr. Smith*. Cañon City, *Brandegee*; *Meehan*. Sierra Madre Range, at 11,500 feet altitude, *Coulter*.

Var. PARRYI, Eaton. *l. c.* Slightly webby at first, becoming glabrate; leaves mostly not toothed, rather broad; involucre scales scarcely or not at all blackened at the tips.—Long's Peak and Head of Boulder Cañon, *Coulter*.

Var. EXALTATUS, Eaton, *l. c.*, (*S. exaltatus*, Nutt.) Stem and corymb densely webby-tomentose, stout,  $1\frac{1}{2}^{\circ}$ – $2^{\circ}$  high; leaves nearly entire or finely glandular-denticulate, ample; lower ones sometimes 9' long and 2' broad; heads small, in a dense compound, somewhat umbel-like corymb; scales of the involucre with a dark midvein and the tips some-



what blackened.—*Hall & Harbour*, 325. Gray's Peak, *Dr. Smith*. Sangre de Cristo Pass, *Brandegee*. *Meehan*. Clear Creek Cañon and Mount Lincoln, at 12,000 feet altitude, *Coulter*.

*SENECIO TRIANGULARIS*, Hook. Glabrous throughout; stems 2°–4° high, simple, striate, leafy, 3–4 from one root; leaves 3'–5' long, 1½'–3' wide, deltoid-ovate or triangular-lanceolate, sharply and unequally repand-dentate or cut-toothed, acute, truncate or subcordate at the base or abruptly narrowed into a winged petiole; heads rather large, 6" long, few in a loose or sometimes fastigiata corymb; involucre subcylindrical, with a few subulate bractlets at base; scales about 15, lanceolate, with sphacelate tips; rays 6–9, less than twice as long as the involucre; achenia striate, glabrous.—*Hall & Harbour*, 323. Twin Lakes and Mount Lincoln, at 12,000 feet altitude, *Coulter*.

*SENECIO ANDINUS*, Nutt. Glabrous; stems many from one root, 2°–4° high, simple, striate, very leafy; leaves 3'–5' long, 3"–10" wide, linear-lanceolate, acute at both ends, sharply serrulate with incurved teeth, upper ones sessile, lower ones short-petioled; heads 4" long, numerous, in panicle corymbs; involucre calyculate with small subulate bracts; rays 5–8; disk-flowers 12–20; achenia glabrous.—*Hall & Harbour*, 324. Sierra Madre Range, *Coulter*.

*SENECIO INTEGERRIMUS*, Nutt. Glabrous throughout; stem simple, striate, 12'–18' high; leaves entire; radical ones 3'–5' long and 1'–2' wide, rather obtuse, tapering into a petiole, somewhat fleshy, upper small, lanceolate, acute, partly clasping; corymb simple or nearly so; heads rather large, 8–20; involucre hemispherical, bracteolate, scales 15–20, narrowly linear, acute, rays about 8, small; disk flowers 40–50; achenia striate, nearly glabrous.—*Hall & Harbour*, 318. "A low form; alpine."

*SENECIO AUREUS*, L. An extremely variable species, very abundant among the mountains, of which the following are the most marked varieties:

Var. *ALPINUS*, Gr., *Sill. Jour. (N. S.)* v. 33, p. 11. Stem scapiform, bearing 1–2 heads, 3' high, bracteate; radical leaves coriaceous, rounded or obovate-oblong, almost veinless, very entire or somewhat 3-toothed at the apex.—*Hall & Harbour*, 229. White House Mountain, at 13,000 feet altitude, *Coulter*. The specimens of the last collection have the leaves more denticulate; heads sometimes 3.

Var. *WERNERILÆFOLIUS*, Gr. *Proc. Am. Acad.*, March, 1863, p. 68. Note. Cæspitose, at first arachnoid-woolly; radical leaves numerous, spatulate, oblanceolate or spatulate-linear, attenuate at the base, erect, coriaceous, rigid, veinless, very entire, margins frequently revolute, becoming glabrate, with the petiole 2'–4' long, 2"–3" broad; scapes leafless, 3'–5' high, bracts few, subulate-setaceous, wrapped in wool; corymb 3–8 headed.—*Hall & Harbour*. Clear Creek Cañon, *Coulter*.

Var. *OBOVATUS*, T. & G. Radical leaves roundish-obovate or broadly spatulate, toothed or serrated.—White House Mountain, at 11,500 feet altitude, *Coulter*.

Var. *BOREALIS*, T. & G. Smooth; radical leaves thickish, obovate or spatulate, entire or crenulate-toothed at the apex only.—*Hall & Harbour*, 333; *Dr. Smith*; *B. H. Smith*. Clear Creek Cañon and Twin Lakes, *Coulter*.

Var. *BALSAMITÆ*, T. & G. More or less woolly, becoming glabrous; radical leaves oval and oblong, spatulate and lanceolate, crenate, sharply crenate-toothed or lyrate-ly-incised; achenia glabrous or strigose on the

angles.—Gray's Peak, *Dr. Smith*. Twin Lakes, Bear Creek, Long's Peak, and Ute Pass, *Coulter*. Wet Mountain Valley, *Brandegee*.

Var. *CROCEUS*, Gr. *Proc. Acad. Phil.*, March, 1863, p. 68. Smooth; radical leaves roundish-oval, more or less crenately-toothed or incised; corymb rather compact; rays saffron-yellow.—*Hall & Harbour*, 332. South Park, *Porter*. Wet Mountain Valley, *Brandegee*. Twin Lakes, Mount Lincoln, at 12,000 feet altitude, and White House Mountain, at 13,000 feet, *Coulter*.

*SENECIO LONGILOBUS*, Benth. Glabrous; stems 2°–2½° high, usually much branched; branches erect; leaves linear, somewhat tapering to the base, 2'–4' in length, 1''–2'' wide, entire or pinnately 3–9 parted, divisions linear, divaricate; heads corymbose, calyculate, with a few small scales, 5'' long; scales of the involucre glabrous, linear-lanceolate, with scarious margins, finely striate; pappus bright white; achenia strigose-canescens. Branches of the panicle often flexuose.—*Canby*; *B. H. Smith*; *Hall & Harbour*, 328. Plains around Denver, *Dr. Smith*. Along the Platte, *Coulter*.

*SENECIO FILIFOLIUS*, Nutt., var. *JAMESII*, T. & G. Suffruticose, much branched, densely tomentose-canescens; branches very leafy to the summit; leaves narrowly linear, 3' long, entire or pinnately-parted, divisions 3–9, margins revolute; heads in a terminal corymb, rather large; involucre somewhat calyculate; rays 7–8, linear, rather long; achenia canescensly-strigose.—Cañon City, *Brandegee*.

*SENECIO CERNUUS*, Gr. *Sill. Jour.*, (N. S.), v. 33, p. 10. Glabrous; stem slender, 1½° high, paniculate at the summit; leaves lanceolate or linear-lanceolate, tapering at the base into a long petiole, subciliate on the margins, sparingly toothed or nearly entire, lower leaves, including the petiole, 4'–7', long, 1' broad; heads numerous, small, scarce 6'' long, nodding, discoid; pedicels 1–2 bracteolate; involucre with a few minute bracteoles at base; achenia very glabrous.—*Hall & Harbour*, 320; *Parry*, 52; *Dr. Smith*. Ute Pass, *Porter*. Twin Lakes, *Porter*.

*SENECIO CANUS*, Hook. Whitish-tomentose throughout; stems tufted, 2'–12' high; radical leaves oblong-spatulate, entire, cauline sessile, lanceolate, partly clasping, sinuate-pinnatifid or somewhat toothed towards the base; heads few, in a simple corymb; involucre nearly ecalyculate; rays 8–12, short; achenia glabrous.—*Hall & Harbour*, 330. "Alpine and sub-alpine," *Parry*, 20.

*SENECIO EREMOPHILUS*, Richards. Perennial, glabrous; stem striate, often purplish, 1°–4° high, corymbosely branched toward the summit, leafy; leaves short-petioled, 2'–3' long, 6''–12'' wide, lower sometimes larger, deeply incised, with unequal, ovate-lanceolate, toothed segments, sometimes deeply parted, with linear segments which are sharply toothed; heads many, in compound corymbs; involucre cylindrical-bell-shaped; calyculate bractlets few; scales often blackish-tipped and sphacelate; rays 7–9, rather long; achenia striate, glabrous.—*Hall & Harbour*, 327. Near Denver, *Dr. Smith*. Ute Pass, *Porter*. Cañon City, *Brandegee*. Near Mount Lincoln, *Coulter*.

*SENECIO FREMONTII*, T. & G. Perennial, glabrous; stems 1–several, 3'–15' high, leafy to the top, often decumbent; leaves sessile, oblong or obovate-spatulate, somewhat fleshy, lacinate-dentate or obscurely toothed, upper ones 1'–2' long, lower ones gradually smaller; heads solitary or few, on very short, erect peduncles; involucre bell-shaped, 4''–6'' long, sparingly bracteolate; rays 10–16, yellow; achenia glabrous. "Alpine."—*Hall & Harbour*, 322. *Dr. Smith*. Twin Lakes, *Coulter*.

SENECIO BIGELOVII, Gr. in *Bot. Whipl. Exped., Pacif. R. R. Surv.*, 4, p. 111. Glabrous; stem simple, stout, erect, 18'-20', from a perennial root, racemose at the summit, bearing 3-15 heads; leaves ovate-lanceolate, acuminate, sharply callous-dentate, contracted into a large margined petiole; uppermost lanceolate, narrowed at the base, partly clasping; heads large, nodding, homogamous; involucre broadly campanulate, with a few short setaceous bracteoles at base; scales 10-12, acute, equal, outer ones lanceolate, inner ones broader, scarious-margined; rays none; achenia very glabrous.

Var. HALLII, Gr. *Proc. Acad. Phil.*, March, 1863, p. 67. *Note.* Leaves almost all lanceolate, more or less woolly pubescent, hairs articulated; cauline leaves all sessile or the lowest contracted into a winged petiole.—*Hall & Harbour*, 321. *Canby*. Cañon City, *Brandegee*. Mount Elbert and Sierra Madre Range, *Coulter*.

SENECIO AMPLECTENS, Gr. *l. c.* Slightly woolly, becoming glabrate; stem 6'-15' high from a perennial root, naked at the apex, bearing 1-3 heads; leaves membranaceous, oblong or lingulate, either repand or very sharply-toothed or even sub-laciniate, lowest narrowed at the base or attenuated into a winged petiole, upper sessile, half-clasping by a broad base; heads upon long, slender peduncles, nodding; involucre loosely calyculate; rays linear, elongated, 1'-2' long, golden-yellow; achenia very smooth.—*Hall & Harbour*, 317. *Canby*. Gray's Peak, *Dr. Smith*; *Meehan*. White House Mountain, at 13,000 feet altitude, La Plata Mountain, at 12,000 feet, and Horse Shoe Mountain, at 11,000 feet, *Coulter*.

Var. TARAXACOIDES, Gr. *l. c.* Truly alpine; 2'-5' high, bearing a single head; head smaller, less nodding; rays less than 1' long; leaves all attenuated at base, more or less laciniate.—Summit of Pike's Peak, *Canby*. Sange de Cristo Pass, *Brandegee*.

SENECIO SOLDANELLA, Gr. *Proc. Am. Acad.*, March, 1863, p. 67. *Note.* Subcaulescent, 4'-5' high; very smooth, sub-glaucous; stems bearing a single head, rarely more; root fasciculate-fibrous; leaves thick, purpletinged beneath, radical and lowest orbiculate, occasionally somewhat reniform, contracted at the 3-nerved base into a long or very long flat petiole, often somewhat denticulate, 1'-2' in diameter, upper ones 1-3, smaller, oblong or spatulate, on short dilated petioles; heads large, somewhat nodding, 8"-12" broad and about as long; scales of the involucre lanceolate, with scarious margins, 16-20, with 7-9 of the outer ones narrower, and without margins, looser and either a little or one-half shorter; rays oblong, 16-18, yellow, about 4" long, scarcely surpassing the disk; achenia very glabrous.—*Hall & Harbour*, 319. "High alpine, among rocks." Sangre de Cristo Pass, *Brandegee*. Mount La Plata, at 14,000 feet altitude, and White House Mountain, at 13,000 feet, *Coulter*.

SENECIO RENIFOLIUS, Porter, (*n. sp.*) Very smooth; stems, as well as the petioles and under surfaces of the leaves, bright purple, numerous, ascending from a long, slender, creeping purple root-stock, 1½'-2' high; leaves clustered at the base, all reniform, crenate, or crenate-lobed, 4'-6" long, on flattened petioles of the same length, dark green above; upper leaves 1-2, spatulate, crenate, sessile; peduncle somewhat elongated, bearing a single erect head, about 4"-6" long, 4"-5" broad; scales of the involucre rather shorter than the disk, nearly equal, 4" long, lanceolate and linear-lanceolate, purple, inner ones with slightly scarious margins; calyculate scales few, minute, subulate; rays oblong, about 4" in length; bright yellow; achenia glabrous. High alpine.—White House Mountain, at 13,000 feet altitude, *Coulter*.

*TETRADYMIA*<sup>1</sup> *CANESCENS*, DC., var. *INERMIS*, Gr. (*T. inermis*, Nutt.) Shrubby, much branched, 1°-2° high, silvery-canescens, unarmed; leaves thickish, short, 6"-9" long, 1"-2" wide, densely tomentose, acute but scarcely mucronate; axillary fascicles of smaller leaves none; heads corymbose-clustered; involueral scales 2"-4" long, four, oblong, obtuse, carinate; florets 4; achenia sparingly villous with short, soft hairs, soon becoming nearly smooth.—North Park, *Hayden*. Upper Arkansas, *Porter*. Arkansas River, *Coulter*.

*TETRADYMIA GLABRATA*, T. & G. *Pacif. R. R. Rep.*, 2, p. 122, t. 5. Shrubby, divaricately branched, unarmed; young branchlets and foliage loosely clothed with white floccose wool which is soon deciduous; leaves subulate or acerose, rather fleshy, primary ones erect, not spinescent, 3"-5" long,  $\frac{1}{8}$ " wide, linear-subulate, mucronate, producing the next year from their axils shorter, obtuse, ericoid leaves; heads corymbose; scales of the involucre 4, white-pubescent or glabrate, about 4" long; florets 4; achenia villous, the hairs much shorter than the pappus.—Wet Mountain Valley, *Brandegee*.

*CIRSIUM UNDULATUM*, Spreng.—Near Denver, *Dr. Smith*. Along the Platte, and also a form with yellowish flowers, *Coulter*.

*CIRSIUM VIRGINIANUM*, Mx.—Wet Mountain Valley, *Brandegee*. Along the Platte, *Coulter*.

*CIRSIUM FOLIOSUM*, DC., (*C. edule*, Nutt.) Stem erect, stout, striate, somewhat woolly, branched toward the top; leaves loosely webby on both surfaces, elongated, 6'-11' long, not over 1' wide, irregularly sinuate-toothed, teeth triangular, and the veins ending in strong stramineous spines; heads large, glomerate in the axils of the uppermost leaves, or peduncled; involueral scales linear-lanceolate, appressed, spine-tipped, arachnoid-tomentose.—Near Denver, *Dr. Smith*. *Hall & Harbour*, 330 and 341. Weston's Pass and Sierra Madre Range, *Coulter*.

*CIRSIUM DRUMMONDII*, T. & G. Stemless or with simple stems, 1°-2° high, sparsely hairy; leaves green and smooth above, paler and slightly webby beneath, radical ones oblanceolate or spatulate, primary ones entire, with ciliate-spinulose margins, later ones and the stem-leaves pinnately-toothed or incised, often doubly so, and spiny with weak slender prickles; heads 1-4, sessile or short-stalked, surrounded either by the radical leaves or by a circle of leaves at the top of the stem; involucre glabrous, or with the scales softly ciliate on the margins; scales triangular-lanceolate, appressed, tipped with weak prickles; flowers red or purplish.

(a.) Caulescent form. *Hall & Harbour*, 343. (b.) Acaulescent form. *Hall & Harbour*, 339. Sierra Madre Range, *Coulter*.

*CIRSIUM EBOICEPHALUM*, Gr. *Proc. Acad. Phil., March*, 1863, p. 69. Stem 1°-2° high, simple, leafy, deciduously arachnoid-tomentose; leaves nearly smooth above, paler and webby beneath, far decurrent, linear or oblong-linear, pinnatifid, with very numerous, crowded, short, very spiny lobes; heads several, sessile, in a dense terminal cluster, involucre with very spiny foliaceous bracts which pass gradually into spinulose-ciliate, spine-tipped involueral scales, which are clothed with a finely

<sup>1</sup>*TETRADYMIA*, DC. Heads 4-flowered, (in one species 5-9-flowered;) the flowers all tubular, perfect and fertile; the corollas funnel-form with a long slender tube, deeply 5-lobed, the linear lobes slightly recurved. Involucre of 4 (rarely 5-6) sub-equal concave-carinate, rigid, oblong, scales. Receptacle very small, naked. Anthers linear, exerted. Branches of the style linear, with very short, ovate, obtuse, pubescent appendages. Achenia oblong-linear, villous or glabrate. Pappus copious, of very fine, unequal, capillary, denticulate filaments as long as the tube of the corolla.

tomentose wool, inner scales entire, spine-tipped; flowers yellow.—*Hall & Harbour*, 341. Sangre de Christo Pass, *Brandegee*. White House Mountain and Mount La Plata, at 13,000 feet altitude, *Coulter*.

*CIRSIUM OCHROCENTRUM*, Gr. *Pl. Fendl.*, p. 110. Stem very leafy, erect, 2°–3° high, webby-tomentose; leaves pinnatifid, sessile; uppermost decurrent, becoming glabrate; cauline leaves 4'–6' long, very spiny; spines 6'' in length, yellow; heads subsolitary, sessile on the ends of the branches, rather small, 1' or less in diameter; scales of the globose involucre glabrous, abruptly ending in stout yellow spines 6'' in length.—Wet Mountain Valley, *Brandegee*.

*STEPHANOMERIA*<sup>1</sup> *MINOR*, Nutt. (Including *S. runcinata*, Nutt.) Perennial, glabrous; stems single, much branched, 1°–2° high, lower leaves 2'–3' long, runcinately toothed, upper ones reduced to subulate entire, 2–4 toothed bracts; heads 5–7 flowered, solitary on the ends of the branchlets; proper involucre scales 5–7, 4''–5'' long; achenia 5-ribbed, smooth; pappus of 15 distinct setæ, plumose nearly or quite to the base.—*Hall & Harbour*, 346. Plains near Denver, *B. H. Smith*. Colorado Springs, *Porter*.

*CYNTHIA VIRGINICA*, Don.—Wet Mountain Valley, *Brandegee*; *Redfield*.

*TROXIMON CUSPIDATUM*, Pursh.—Plains around Denver and Saint Vrain River, *Coulter*.

*HIERACIUM FENDLERI*, Schultz. (*Crepis ambigua*, Gr. *Pl. Fendl.*, p. 114.) Stem scape-form and simple from a perennial root, or with 1 or 2 elongated branches from the base or near it, each bearing 5–8 heads; leaves obovate-oblong, very entire, beset with scattered, spreading, hispid bristles, otherwise very smooth, 2'–3' long, sessile, the radical with a tapering base, somewhat purplish underneath; heads 9'' long, on rather long peduncles; florets about 30; involucre cylindrical, hairy, scales linear, exterior ones twice shorter, appressed; ligules very short, a little longer than the pappus, usually a little shorter than the styles; achenia fusiform, narrowed upwards, but not truly rostrate, 4'' in length, many-ribbed, very smooth, as long as the copious, dull-white pappus.—*Mace's Hole*, Frémont County, *Brandegee*. *Parry*. Wet Mountain Valley, *Redfield*.

*HIERACIUM ALBIFLORUM*, Hook. Stems simple, 1°–3° high, rather slender, smooth above, hispid near the base, like the petioles and midribs, with rather long deflexed hairs; leaves mostly radical or low on the stem; oblong-lanceolate, acute, entire or denticulate; heads rather small, on nearly smooth, bracteolate pedicels, in a compound, at length very open corymb; involucre nearly ecalyculate, the blackish scales sparsely hairy; flowers white; about 20; achenia very slightly narrowed toward the summit.—*Hall & Harbour*, 350, "subalpine, west of the range; rare." Mountain of the Holy Cross, *Coulter*.

*HIERACIUM TRISTE*, Willd. Stem slender, simple, 6'–12' high, smooth below, hispid with blackish hairs above; leaves chiefly radical, hirsutulous or smooth, entire or remotely denticulate, mucronate, tapering into slender petioles; involucre hispid with blackish hairs; flowers 20–30;

<sup>1</sup> *STEPHANOMERIA*, Nutt. (Including *Hemiptilium*, Gray.) Heads 3–12 flowered; the flowers all ligulate. Involucre cylindrical, calyculate; bractlets few, very small; proper scales 3–7, subequal, but in two species more numerous, unequal and imbricated. Receptacle naked, slightly honey-combed. Achenia oblong-linear or clavate-oblong, with 5 prominent angles or ribs, the intercostal spaces either plain or tuberculate, rugose, or occupied by additional less elevated ridges. Pappus simple, of 5–25 plumose, filiform setæ or bristles, slightly dilated at the base.

achenia oblong, not narrowed at the summit.—*Hall & Harbour*, 349. Sierra Madre Range and Twin Lakes, *Coulter*.

NABALUS RACEMOSUS, Hook.—*Hall & Harbour*, 351. "South Park; rare." Wet Mountain Valley, *Brandegee*.

LYGODESMIA JUNCEA, Don.—*Hall & Harbour*, 345. Plains near Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*; *Redfield*. Plains of the Platte, *Coulter*.

Var. ROSTRATA, Gr. *En. Hall & Harbour*, p. 69. *Note*. Achenia attenuate-rostrate at the apex, 6" long; heads often 8-9 flowered; leaves very narrowly linear, elongated, 3'-4'. Near Greeley, *Greene*.

PYRRHOPAPPUS GRANDIFLORUS, Nutt. Scape simple, naked, much longer than the deeply pinnatifid and ciliate radical leaves, bearing a single head, 1° high, with a small bract in the middle; involucre slightly canescent; ligules golden-yellow; pappus fulvous, with a villous ring at base; achenia produced into a long, slightly scabrous beak.—Plains of Eastern Colorado, *Dr. Bell*.

CREPIS<sup>1</sup> RUNCINATA, T. & G. Perennial, slightly hirsute, becoming smoother; radical leaves obovate or oblong-lanceolate, runcinate-lobed or only slightly toothed, tapering to the base, 2'-7' long; scape 1°-2° high, branching, bearing a few linear, bract-like leaves; branches and involucre more or less hirsute with blackish, often glandular, hairs; involucre many-flowered, calyculate; scales linear-lanceolate, with scarious margins; achenia striate, slightly tapering upwards.—*Hall & Harbour*, 348. South Park, *Porter*. Wet Mountain Valley, *Brandegee*. Bear Creek and Sierra Madre Range, *Coulter*.

CREPIS OCCIDENTALIS, T. & G. Perennial, canescent, with a close furfuraceous pubescence; stem 6'-18' high, branching, leafy; radical leaves, with the petiole, 6'-9' long, lanceolate, tapering both ways, acuminate, more or less deeply runcinate-pinnatifid, with acute, often toothed lobes; cauline leaves similar, but smaller and sessile; heads corymbed, 11-35 flowered; involucre calyculate, with a few loose bractlets, the proper scales 8-10, 6"-8" long; mature achenia rather stout, 3" long, tapering to the apex, evidently 10-striate.—*Hall & Harbour*, 353.

Var. GRACILIS, Eaton. (*C. acuminata*, var. *gracilis*, Torr. Ms.) Stem evry slender, bearing 3-6 narrow, 9-14 flowered heads; leaves narrowly linear, long-acuminate, with a few very narrow, almost filiform, elongated teeth near the middle.—Middle Park, *Parry*, 1864.

CREPIS NANA, Richards. Perennial, nearly acaulescent; scapes numerous from the summit of the somewhat fusiform caudex, bearing 1 or more, about 14-flowered heads, scarcely equalling the elliptical, or roundish, entire, or sinuate-lyrate, long petioled leaves; petioles purplish; rays yellow; involucre few-flowered, cylindrical, exterior calyculate-scales short and appressed; receptacle naked; achenia slender, 5-10 striate, narrowed at the apex, scarcely rostrate.—Mount Lincoln, at 12,500 feet altitude, *Coulter*.

<sup>1</sup>CREPIS, L. Heads several-many-flowered; the flowers all ligulate. Involucre usually calyculate with a few small bracteoles, the proper scales nearly equal, in a single series. Receptacle naked or slightly hairy. Achenia terete or somewhat compressed, 8-30 striate, usually narrower above or even tapering into a short beak, the apex expanded into a minute disk. Pappus pure white, copious, of denticulate or scabrous delicate capillary bristles, or sometimes of more rigid bristles slightly dilated toward the base.

**MACRORRHYNCHUS<sup>1</sup> GLAUCUS**, Eaton. (*Troximon glaucum*, Nutt.) *King's Rep.*, vol. 5, p. 204. Perennial, smooth and somewhat glaucous; leaves linear-lanceolate or lanceolate, 3'-6' long, about 6'' broad, entire or slightly runcinately-toothed; scape 6'-9' high; involucre scales unequal, the outer ones shorter and broadly ovate-lanceolate, slightly pubescent, inner ones lanceolate, 7''-9'' long; achenia 10-ribbed, contracted toward the summit, but scarcely beaked; pappus rather coarse, longer than the achenium.—*Hall & Harbour*, 354 in part. Wet Mountain Valley, *Brandegee*. Common on the plains of the Platte, *Coulter*. Gray's Peak, *Dr. Smith*.

Var. **DASYCEPHALUS**, T. & G. "Involucre woolly, at least when young, exterior scales spreading; leaves and scape often somewhat pubescent; receptacle sometimes but not always furnished with a few linear, acuminate, chaffy scales intermixed among the flowers."—*Hall & Harbour*, 356. Along the Platte and in the Sierra Madre Range, *Coulter*.

**MACRORRHYNCHUS TROXIMOIDES**, T. & G. Perennial, smooth and somewhat glaucous; leaves oblanceolate, or linear-lanceolate, 4'-10' long, 3''-9'' wide, acuminate or obtuse and slightly apiculate, entire or laciniately pinnatifid; scapes 4'-2° high; involucre 6''-10'' long; scales nearly equal, lanceolate from a broad base; achenia 10-ribbed, at length produced into a slender beak two-thirds as long as the achenium proper and with it slightly or considerably longer than the pappus.—*Hall & Harbour*, 355. "Very variable at all heights, even alpine; flowers in July and August." Near Denver, *B. H. Smith*. Wet Mountain Valley, *Brandegee*. Plains of the Platte, Twin Lakes and White House Mountain at 12,000 feet altitude, *Coulter*.

**TARAXACUM PALUSTRE**, DC. Sparingly tomentose, at length very smooth; leaves lanceolate or oblong-spatulate, entire, sinuate, or strongly runcinate, usually shorter than the scape, 4'-8' long, 5''-2' broad, obtuse or acutish; inner scales of the involucre, more or less corniculate, lanceolate, outer scales ovate, appressed, much shorter; achenia muricate and spinulose towards the apex, when mature scarce half the length of the beak. Scapes 4'-12' high.—*Hall & Harbour*, 357. Wet Mountain Valley and Sangre de Cristo Pass, *Brandegee*. Clear Creek Cañon; Mount Lincoln, at 14,000 feet altitude, and White House Mountain, at 13,000 feet, *Coulter*.

**MULGEDIUM PULCHELLUM**, Nutt.—*Hall & Harbour*, 344. Near Denver, *Dr. Smith*; *B. H. Smith*. Colorado Springs, *Porter*.

### LOBELIACEÆ.

**LOBELIA SYPHILITICA**, L.—Wet Mountain Valley, *Brandegee*. Near Denver, *Dr. Smith*; *Greene*.

**LOBELIA CARDINALIS**, L.—Pueblo, *Greene*, 1873.

### CAMPANULACEÆ.

**CAMPANULA ROTUNDIFOLIA**, L. *Hall & Harbour*, 358. Near Denver, *Dr. Smith*; *B. H. Smith*. Colorado Springs, *Porter*. North Park, *Hayden*. Plains of the Platte, *Coulter*.

**MACRORRHYNCHUS**, Lessing. Heads many-flowered, the flowers all ligulate; involucre campanulate; the lanceolate or ovate-lanceolate scales imbricated in 2-3 series, the inner ones scarious-margined, the outer ones sometimes shorter, often foliaceous. Receptacle naked, or very rarely with a few chaffy scales among the flowers. Achenia glabrous, terete or slightly obcompressed, 10-ribbed or winged, narrowed above and in most species at length produced into a long slender beak, the apex dilated into a small flat disk. Pappus of copious, white, scarcely, scabrous, soft and capillary or coarser and somewhat rigid bristles.

CAMPANULA LANGSDORFFIANA, Fisch. Glabrous; stem simple, slender, erect, 4'-1° high, leafy toward the base, 1-flowered; leaves sparsely denticulate, radical ones spatulate, 1'-2' long, tapering to the base, stem-leaves narrowly lanceolate or linear; ovary obconic; calyx-lobes lanceolate, acuminate, serrulate on the margins, more than half as long as the corolla; corolla spreading-campanulate, deeply 5-lobed, narrowed toward the base, large for the size of the plant, 1' in diameter.—*Hall & Harbour*, 359. "Very common in the subalpine region and lower, in wet ground." North Park, *Hayden*. Wet Mountain Valley, *Brandegee*. South Park, *Porter*. Sierra Madre Range and Ute Pass, *Coulter*.

CAMPANULA UNIFLORA, DC. *Prod.* 7, p. 482. Stem 1-flowered; leaves subentire, lower obovate, petioled, the middle ones obovate-lanceolate and the upper ones occasionally linear-lanceolate; calyx slightly villous with linear acuminate lobes, nearly equaling the funnel-form corolla; capsule cylindrical; stems 2'-4' high.—*Hall & Harbour*, 360. "Pike's Peak; high alpine." Divide between Sacramento and Mosquito, at 13,000 ft. lat., *Coulter*. Sangre de Cristo Pass, *Brandegee*.

CAMPANULA APARINOIDES, Pursh.—*Hall & Harbour*, 361.

SPECULARIA PERFOLIATA, A. DC.—Plains of the Platte near Denver, *Coulter*. Golden City, *Greene*.

### ERICACEÆ.

VACCINIUM CÆSPITOSUM, Mx.—*Hall & Harbour*, 363.

VACCINIUM MYRTILLUS, L. Branches sharply-angled, green; leaves deciduous, ovate, minutely serrate, glabrous, shining; peduncles 1-flowered, solitary, axillary, nodding; stem 6'-1° high, very diffusely branched; flowers small, 1" in length, white; fruit small, about 2" in diameter, light red. Leaves variable in size, 2"-6" long, 2"-6" broad. Alpine and subalpine.—*Hall & Harbour*, 362. Cañon City, *Brandegee*. Georgetown, *Dr. Smith*. Clear Creek Cañon, *Coulter*.

ÆCTOSTAPHYLOS UVA-URSI, Spreng.—*Hall & Harbour*, 364. *Dr. Smith*; *B. H. Smith*; *Porter*. Common in the mountains, *Coulter*. The "Kinnikinick" of the Indians.

GAULTHERIA MYRSINITES, Hook. *Fl. Bor.-Am.* 2, p. 35, t. 129. Low, trailing; stems 2'-6' long, leaves orbicular-ovate, ciliate-serrate, shining, 4"-9" in diameter; flowers solitary, with several ovate bracts; subcampanulate corolla scarcely exceeding the calyx, white, 1" in length; anthers obtuse; filaments glabrous; disk none; fruit scarlet.—*Hall & Harbour*, 365.

KALMIA GLAUCA, Ait., var. MICROPHYLLA, Hook. Stems leafy, 1'-2' long; leaves somewhat oval, scarcely 6" in length; flowers 1-4, on pedicels 1' long. Alpine.—*Hall & Harbour*, 370.

PYROLA ROTUNDIFOLIA, L., var. ULIGINOSA, Gr.—*Hall & Harbour*, 367; *Parry*. Wet Mountain Valley, *Redfield*.

PYROLA CHLORANTHA, Swartz.—*Hall & Harbour*, 368; *Meehan*.

PYROLA SECUNDA, L.—*Hall & Harbour*, 366. Georgetown, *Dr. Smith*; *Meehan*. Twin Lakes, *Coulter*.

PYROLA MINOR, L.—*Parry*. Twin Lake Creek, at 10,000 feet altitude, *Coulter*. Alpine forests, Jefferson County, *Greene*.

MONESSES UNIFLORA, Gr.—*Hall & Harbour*, 369. Wet Mountain Valley, *Brandegee*. Mount La Plata, at 11,000 feet altitude, *Coulter*.

PTEROSPORA ANDROMEDEA, Nutt.—North Park, *Hayden*. Chiann Cañon, *Porter*. *Hall & Harbour*, 371. Sangre de Cristo Range, *Redfield*.



## PLANTAGINACEÆ.

PLANTAGO ERIPODA, Torr. *Ann. N. Y., Lyc.* 2, p. 237. Perennial; base of the leaves and scape invested with a long dense wool of a rusty brown color; leaves broadly lanceolate, 4'-6' long, 1'-2' wide, attenuate at each end, long-petioled, acute, very smooth and entire, distinctly 5-nerved; scape 6'-1° high, terete, very glabrous; spike cylindrical, 3'-6' long, of rather remote, perfect flowers; stamens and styles very long; bracts broadly ovate, obtusish; capsules 2-celled, 4-5 seeded; seeds not hollowed.—*Hall & Harbour*, 372. South Park, *Porter*. Weston's Pass, *Coulter*.

PLANTAGO PATAGONICA, Jacq., var. GNAPHALIOIDES, Gr. Very abundant on the plains. *Hall & Harbour*, 374. Near Denver, *Dr. Smith*. Colorado Springs, *Porter*; *B. H. Smith*. Plains of the Platte, *Coulter*.

Var. ARISTATA, Gr.—Plains of the Platte, *Coulter*.

## PRIMULACEÆ.

PRIMULA PARRYI, Gr. *Sill. Jour.* (N. S.) 34, p. 257. Leaves oblanceolate, narrowed to a broad, fleshy petiole, and with the rest of the plant somewhat glandular-scabrous, at least upon the margin, which is entire or denticulate with short glandular teeth, 6'-12' long; scapes 4'-16' high; flowers rose-color, becoming purple in drying, 6-15, on unequal pedicels,  $\frac{1}{2}$ '-3' long; leaves of the involucre subulate or linear, unequal, acute, several times shorter than the elongated pedicels; calyx-lobes broad-lanceolate, acute, equaling the tube of the pink corolla; corolla-lobes rounded, obcordately 2-cleft or emarginate. Alpine and sub-alpine; common.—*Parry*, 311; *Hall & Harbour*, 379. Gray's Peak, *Dr. Smith*; *Meehan*. Mount Lincoln, at 13,000 feet attitude, July 9, *Coulter*. *Redfield*.

PRIMULA ANGUSTIFOLIA, Torr. *Ann., N. Y. Lyc.* 1, p. 34, t. 3, fig. 3. Tufted, from a thick rootstock; scapes 3'-12" high, leafless; leaves elliptical-lanceolate or oblong, sometimes spatulate, 6"-12" long, obtuse, membranaceous, veinless, glabrous, very entire; scape solitary, 1-flowered, shorter than the leaves, with a bract a little below the flower; calyx cylindrical-oblong, 5-6 cleft, smooth, segments subulate, erect; corolla purple, sub-campanulate, tube  $\frac{1}{2}$  longer than the calyx, limb erect, spreading, with ovate, obtuse, very entire segments, 6"-7" broad; stamens in the tube of the corolla; filaments very short; anthers oblong, 2-celled; style 1, straight, persistent; stigma globose; capsule ovate. High-alpine.—Pike's Peak, *Porter*; *Parry*. James's Peak, at 12,000 feet altitude, Mount Lincoln, at 13,000 feet, and Mount La Plata, at 14,000 feet, *Coulter*. Gray's Peak, *Redfield*.

PRIMULA FARINOSA, L.—*Hall & Harbour*, 378. Cañon City, *Brandegge*. Colorado Springs, *Porter*. South Park, *Coulter*.

ANDROSACE SEPTENTRIONALIS, L. *DC. Prod.* 8, p. 52. Annual, acaulescent, minutely pubescent; leaves rosulate, lanceolate or lance-ovate,  $\frac{1}{4}$ '-1' long, denticulate, on a broad petiole; scapes numerous, many-flowered, 3-20,  $\frac{1}{2}$ '-6' high; leaflets of the involucre subulate, acute; calyx-lobes ovate-lanceolate, acuminate, equaling the corolla; pedicels numerous, filiform; calyx-tube obconic. Common at all elevations from low sub-alpine to alpine.—*Hall & Harbour*, 376; *Parry*. Cañon City, *Brandegge*; *Canby*. Georgetown, *Dr. Smith*; *B. H. Smith*. *Porter*. Clear Creek Cañon, Long's Peak, and the Sierra Madra Range, *Coulter*.

ANDROSACE FILIFORMIS, Retz. *DC. Prod.* 8, p. 53. Acaulescent;

leaves rosulate, ovate, or ovate-rotund, subacute, very smooth, serrate-dentate, petiolate, petiole winged, nearly equaling the limb; scapes numerous, erect, filiform, sparingly pilose above; involucre small; pedicels 20-30, capillary; calyx 5-cleft, campanulate, very smooth, lobes equaling the tube or a little shorter, lance-ovate, acute; limb of the corolla very small, with obtuse, lance-ovate lobes.—Much smaller and more delicate in all its parts than the preceding, which it much resembles, but is readily distinguished by its subglobose calyx with shorter and less spreading teeth.—“Subalpine; not rare.” *Hall & Harbour*, 375.

**ANDROSACE OCCIDENTALIS**, Nutt.—“On the plains.” *Hall & Harbour*, 377.

**ANDROSACE CHAMÆJASME**, Willd. *DC. Prod.* 8, p. 51. (*A. carinata*, Torr.) Stems erect; 1'-2' high; leaves rosulate, much crowded, ovate-lanceolate, acute, very entire, scarcely petioled, subglabrous on both sides, ciliate on the margin; scapes 1 or few, 2-5-flowered, villous with jointed hairs; leaflets of the involucre equaling the pedicels or a little shorter, lance-ovate, villous, ciliate; lobes of the campanulate calyx about 5, pilose, about equaling the tube, acute or obtuse; lobes of the corolla entire, ovate, sinuate; capsule globose,  $1\frac{1}{2}$ " in diameter. High alpine.—Pike's Peak, *Porter*. *Hall & Harbour*, 202. Sangre de Cristo Pass, *Brandegee*. Mount Evans, *Greene*.

**DODECATHEON MEADIA**, L.—*Hall & Harbour*, 381; *Meehan*. Middle Boulder, *Coulter*. South Park, *Porter*. Subalpine and alpine.

**LYSIMACHIA CILIATA**, L.—“Mountains at medium height,” *Hall & Harbour*, 382; *Meehan*.

**GLAUX MARITIMA**, L.—*Hall & Harbour*, 60 and 577. South Park, *Porter* and *Coulter*.

### LENTIBULACEÆ.

**UTRICULARIA VULGARIS**, L.—“In a subalpine lake.” *Hall & Harbour*, 580. Cold Marsh, near Long's Peak, *Coulter*.

**UTRICULARIA GIBBA**, L.—Alpine lake, 1870, *Greene*.

### OROBANCHACEÆ.

**PHELIPÆA LUDOVICIANA**, Don.—On roots of *Artemisia frigida*, Willd., *Meehan*.

**APHYLLON FASCICULATUM**, T. & G.—*Hall & Harbour*, 383. Near Denver, *B. H. Smith*; *Meehan*. Cañon City, *Brandegee*. South Park, *Porter*. Monument Park and Weston's Pass, *Coulter*.

**APHYLLON UNIFLORUM**, T. & G.—Golden City, *Greene*.

### SCROPHULARIACEÆ.

**LINARIA CANADENSIS**, Spreng.—Golden City, *Greene*.

**SCROPHULARIA NODOSA**, L.—Foot-hills west of Denver, *Porter*. Bear Creek, *Coulter*; *Greene*.

**COLLINSIA PARVIFLORA**, Dougl.—*Hall & Harbour*, 402. Cañon City, *Brandegee*. Saint Vrain Cañon, *Coulter*.

**PENTSTEMON BARBATUS**, Nutt. *Gr. Rev. Pentst. Proc. Am. Acad.*, 6, p. 59. Very glabrous, 2°-3° high; leaves very entire; upper ones linear-lanceolate; panicle lax, elongated; segments of the short calyx margined; corolla strongly bilabiate, scarlet, 1' or more long, upper lip broad, con-

cave, slightly emarginate-bifid, lower deflexed, deeply 3-cleft, scarce equal in length to the upper, usually bearded; tube elongated, scarcely ampliate; sterile filament naked.

Var. *TORREYI*, Gr. *Bot. Mex. Bound.*, p. 114. (*P. Torreyi*, Benth. in *DC. Prod.* 10, p. 324.) Tall, 2°-3° high, glaucous; leaves entire, cauline sessile, lanceolate or linear; panicle elongated, few-flowered; corolla 1'-1½' long, somewhat dilated above, throat less bearded or naked; lips, especially the upper, a little longer; bright scarlet.—*Hall & Harbour*, 395. Cañon City, *Brandegee*. Upper Arkansas, *Porter*. Ute Pass, *Coulter*. Not common.

*PENTSTEMON GLABER*, Pursh. *Gr. Rev. l. c.*, p. 59. Very glabrous; stems 6'-3° high, usually several from the same root, stout; leaves fleshy, glaucous, sessile, entire, 2'-4' long, 4''-9'' wide; flowers large, showy, in a thyrsoid panicle, violet-purple, 12''-15'' long; sepals broadly ovate, submembranaceous on the margin, obtuse or more or less pointed; corolla bright purple, showy, widely dilated above, the limb shortly 2-lobed with the lobes rounded and spreading equally, bearded in the throat; anthers loosely hairy, hirsutulous or glabrous, the divaricate cells dehiscent from the base nearly to the summit, but not expanded; the sterile filament short-hirsute toward the apex or glabrous.—*Hall & Harbour*, 384. Monument Park, *Porter*. Plains near Denver, *Dr. Smith*. Common.

Var. *ALPINUS*, Gr. (*P. alpinus*, Torr.) Dwarf, 4'-12' high, more strict, sometimes pruinose-puberulent; sepals from an ovate base or oblong-lanceolate, long acuminate.—*Parry*. "Rocky Mountains on both sides." *Hoopes*.

*PENTSTEMON CYANANTHUS*, Hook. *Gr. Rev. l. c.*, p. 60. (*P. glaber*, var. *cyananthus*, Gr.) Glabrous; stems slender but sometimes stout-1½°-2° high; cauline leaves broadly ovate or oblong, acute or acuminate, 2'-4' long, 1'-2' broad; thyrsoid panicle usually very short, 4' long—sepals ovate-lanceolate with a long attenuated acumination; otherwise as in *P. glaber*.—*Platte River*, *Coulter*.

Var. *BRANDEGEL*, *Porter*. Minutely puberulent except the peduncles and flowers; stem stout, erect, 1½°-2° high; leaves opposite, very entire, thick, coriaceous, veiny, the lower ones spatulate or ovate-lanceolate, narrowed to the base, upper ones much larger, somewhat crowded, cordate-ovate, sessile, clasping and almost connate, finely ciliate on the margins, 2'-3' long, 1'-1¾' broad; bracts of the ample thyrses (6' long) similar but smaller; cymes 6-8-flowered; calyx-segments broad-ovate, with scarious erose-denticulate margins, subulate-acuminate, glabrous; corolla 1'-1¼' long, abruptly ventricose-campanulate, the upper part and the rounded lobes bright azure blue, paler or white beneath, slightly hairy in the throat, smooth within; sterile filament scantily bearded under the dilated apex; capsule ovoid, acute.—*Sierra Mojado*, *Brandegee*.

*PENTSTEMON FREMONTI*, Gr. *Gr. Rev. l. c.*, p. 60. Pruinose puberulent, a span or more high; lower leaves spatulate, cauline lanceolate, sessile; panicle strict, spike-form, naked, cymules approximate, many-flowered, very short-peduncled; sepals oblong-ovate, acute, membranous on the margin; corolla 9'' long, narrowly funnel-form, scarcely bilabiate; anthers sparingly hirsute; sterile filament dilated and bearded at the apex.

Var. *PARRYI*, Gr. *King's Rep.* vol. 5, p. 218. Stem slender, 1°-2° high; leaves lanceolate or ovate-lanceolate, 2' long, 4''-9'' wide; panicle few-many-flowered, more or less interrupted, with the pedun-

cles, 6''-12'' long; flowers purple or occasionally nearly white; anthers glabrous except along the dehiscence.—Colorado, *Parry*.

**PENTSTEMON CÆRULEUS**, Nutt. *Gr. Rev. l. c.*, p. 61. (*P. angustifolius*, Nutt.) A span high; glabrous or the upper stem and leaves usually minutely pubescent; leaves linear-lanceolate, thick, entire, sessile, erect, crowded; sepals lanceolate, gradually acuminate, often ciliate on the margins, white-membranaceous; corolla 6'' long, somewhat dilated, scarcely 2-lipped, bright azure or purplish-blue; anthers glabrous, often with short-ciliate margins; sterile filament, usually dilated and yellow-bearded at the apex.—Foot-hills near Denver, *Coulter*.

**PENTSTEMON ACUMINATUS**, Dougl. *Gr. Rev. l. c.*, p. 61. Glabrous and glaucous, 6'-18' high; radical leaves spatulate, cauline lanceolate, oblong or ovate-lanceolate, or the upper ones subcordate, rigid, glaucous; thyrsus elongated, many-flowered, often secund; sepals either ovate or lanceolate, acute or acuminate; corolla 6''-10'' long, blue or purple, tube gradually dilated upward, lobes rounded, flat, spreading; capsule very sharply acuminate.—*Hall & Harbour*, 386; *Parry*. Near Denver, *Dr. Smith*. Colorado Springs, *Porter*. *B. H. Smith*. Monument Park and Clear Creek Cañon, *Coulter*.

**PENTSTEMON SECUNDIFLORUS**, Benth. *DC. Prod.*, 10, p. 325. Glabrous, pale, and somewhat glaucous, 12'-30' high; radical leaves petioled, elliptic-spatulate or narrowly-lanceolate, obtuse or acute, upper ones lanceolate or linear-lanceolate, sessile, middle ones 3'-4' long, erect; thyrsus elongated, narrow, 6'-9' long, interrupted; cymes secund, few-many-flowered; segments of the calyx oval-oblong, acute or acutish, with membranous margins; tube of the corolla more or less abruptly amplified below the middle; anthers glabrous or very minutely puberulent; sterile filament dilated at the apex, not bearded, (bearded, Benth.)—This species is merged by *Dr. Gray* into the preceding one, *Rev. Pentst.*, p. 62, but it seems to maintain its distinctive characters well. It is extremely abundant on the plains and at lower elevations in the mountains.—Cañon City, *Brandege*. Denver, *Dr. Smith*. Georgetown, *B. H. Smith*. Colorado Springs, *Porter*. Monument Park, *Canby*.

**PENTSTEMON AMBIGUUS**, Torr. *Gr. Rev. l. c.*, p. 64. Glabrous, 10-20 high, paniculately branching from a ligneous base; lower leaves linear, attenuated at base; upper ones subulate-filiform or acerose-subulate; racemes loosely-flowered; corolla 5''-8'' long, tube 6'', often incurved, scarcely dilated above, with the spreading limb, 6'' in diameter; sterile filament glabrous.—Southeastern Colorado, *F. R. Diefenderffer*.

**PENTSTEMON CÆSPITOSUS**, Nutt. *Gr. Rev. l. c.*, p. 66. Grayish puberulent, depressed, branching from the base; branches crowded, short, 2'-6' long, decumbent or ascending, very leafy to the apex; leaves 3''-12'' long, lanceolate or linear-spatulate, acute or submucronate, veinless, entire; peduncles axillary, short, secund, at length decurved, spreading, with 2 leafy bracts at the apex and 1-3 flowers ascending on short pedicels; sepals linear-lanceolate, rather broader and scarious-margined at the base; corolla 6''-9'' long, bluish-purple, tubular, somewhat dilated above and biplicate; limb shortly bilabiate, with nearly equal lobes; sterile filament long-bearded.—Middle elevations. *Hall & Harbour*, 393; Middle Park, *Parry*. South Park, *Porter*. Taylor River, *Coulter*. Cañon City, *Brandege*. *Canby*.

**PENTSTEMON ALBIDUS**, Nutt. *Gen.* 2, p. 53. Stem puberulent, 6'-9' high; lower leaves petioled, oblong, obtuse, subentire, upper serrate, lanceolate, glabrous or puberulent; thyrsus oblong, subverticillately-

interrupted; cymes subsessile, few-flowered; segments of the calyx lanceolate, pubescent; tube of the corolla widened above,  $\frac{3}{4}$ ' long, less ventricose than in *P. cristata*; beard of the sterile filament rather short, somewhat interrupted.—“Plains; flowers white,” *Hall & Harbour*, 389.

PENTSTEMON CRISTATUS, Nutt. *Gr. Rev. l. c.*, p. 67. Viscid-pubescent; lower leaves oblanceolate, petioled, upper ones oblong-lanceolate, sessile, clasping, entire or denticulate; panicle strict, with short, appressed, 3-4-flowered peduncles; sepals linear-lanceolate, attenuate, very hirsute; corolla 1' long, violet, broadly funnel-form above the calyx, somewhat bilabiate, the lower lips and sterile filament strongly bearded with long hairs; anthers glabrous, expanding.—Cañon City, *Brandegee*. Pueblo, *Greene*. The specimens differ from the typical form in having much narrower, sometimes almost linear leaves.

PENTSTEMON PUBESCENS, *Soland.*, var. GRACILIS, Gr. (*P. gracilis*, Nutt.) *Gray's Rev. l. c.*, p. 69. Nearly glabrous; cauline leaves and thyrus narrowed; corolla usually more slender, not bearded.—Cañon City, *Brandegee*. Colorado Springs and South Park, *Porter*. Monument Park, *Coulter*.

PENTSTEMON HUMILIS, Nutt. *Gr. Rev., l. c.*, p. 69. Glabrous below and somewhat glaucous, minutely viscid-pubescent above, 3'-10' high; lower leaves spatulate or oblanceolate, the upper oblong or linear-oblong, sessile and clasping; all acute or acuminate, usually entire, occasionally somewhat serrulate; peduncles rather short, appressed, 2-8-flowered; sepals ovate-lanceolate, with usually a slender herbaceous recurved acumination; corollas 4''-8'' long, deep blue, dilating upwards, somewhat bilabiate, throat open and without folds; anthers glabrous, expanding; sterile filament yellow-bearded.—“Low mountains; an early species,” *Hall & Harbour*, 387. Plains of the Platte, *Dr. Smith*. Clear Creek Cañon, *Coulter*. Cañon City, *Brandegee*.

PENTSTEMON GLAUCUS, Grah. *Gr. Rev., l. c.*, p. 70. Glabrous except the viscid-pubescent inflorescence,  $\frac{1}{2}$ °-1 $\frac{1}{2}$ ° high; leaves subglaucous, denticulate or entire; radical ones subovate, petioled, the upper oblong-lanceolate, dilated and clasping at the base; thyrse subcompact; sepals ovate-lanceolate; corolla 1' long, widely and abruptly ventricose above the base, the throat open and without folds, the lower lip slightly longer and sparingly villous with long hairs, violet or lilac color; anthers glabrous and expanding; sterile filament yellow-bearded.

Var. STENOSEPALUS, Gr. Sepals lanceolate with a long slender acumination; thyrse short.—*Hall & Harbour*, 399. Sangre de Cristo Pass, *Brandegee*. Mount Lincoln, at 13,000 feet altitude, *Coulter*.

PENTSTEMON HALLII, Gr. *Gr. Rev., l. c.*, p. 70. Stems numerous from a creeping root-stock, 3'-5' high, glabrous except the inflorescence which under the microscope is very minutely glandulose; leaves very entire, pale, glaucous, linear-spatulate or linear, radical and lower cauline ones attenuated at the base, 1'-2' long, including the petiole, 1 $\frac{1}{2}$ ''-4'' wide; thyrse or simple raceme 4-10-flowered; pedicels short; sepals ovate or oblong, with broad, often erose, scarious margins; corolla 7''-9'' long, inflated, ventricose-campanulate from a very short base, bluish-purple, lips short, about equal in length, upper one almost 2-lobed to the middle, lower 3-lobed, glabrous within; beard of the sterile filament short.—*Hall & Harbour*, 388. Wet Mountain Valley, *Brandegee*. Horse Shoe Mountain, at 11,000 feet altitude, *Coulter*. *Gray's Peak*, *Redfield*.

PENTSTEMON HARBOURII, Gr. *Gr. Rev., l. c.*, p. 71. Stems many from a slender, creeping root-stock, low, 2'-4' long, pruinose-puberulent even

to the top, leafy; leaves uniform, almost glabrous, thickish, obovate or oblong, very obtuse, very entire or repand; pedicels short, alternate, viscous-pubescent, as well as the calyx; sepals ovate, shortly acuminate or broadly lanceolate, margins not scarious; corolla purple, 7''-9'' long; tube cylindraceous, limb shortly 2-lipped, upper lip deeply 2-lobed, lower lip deeply 3-lobed, with a hispid beard in the throat; sterile filament dilated at the apex and bearded downwards; capsule scarce exceeding the calyx.—“Mount Breckenridge on Blue River, west of the main range, in the high alpine region near perpetual snow,” *Hall & Harbour*, 396. *Brandegee*.

PENTSTEMON CONFERTUS, Dougl. *Gr. Rev.*, l. c., p. 72. Very glabrous, erect, 1°-1½° high; lower leaves oblong-lanceolate, petioled, the upper sessile and lanceolate or somewhat ovate, all entire; flowers densely clustered in an interrupted spike, the upper cymes nearly sessile, crowded, often reflexed; sepals broadly lanceolate or ovate, margins white-scarious or erose-dentate or laciniate, acute or produced into a long green acumination; corolla 5''-6'' long, sulphur-yellow, narrow, somewhat bilabiate; sterile filament bearded.

Var. CÆRULEO-PURPUREUS, Gr. Stems 6'-2° high; corolla deep bluish-purple.—*Hall & Harbour*, 391. Twin Lakes, *Porter*. *Brandegee*; *B. H. Smith*. Abundant throughout the mountains in damp places. Mount Lincoln, at 13,000 feet altitude, *Coulter*.

CHIONOPHILA<sup>1</sup> JAMESII, Benth. Low, glabrous, from a thick root-stock; stem scape-form, 1'-4' high, with a pair of leaves above the middle, terminated by a crowded spike of flowers; radical leaves tapering into the expanded membranaceous, hyaline bases, spatulate or oblong-linear, obtuse, very entire, thickish; flowers 2-4, crowded; bracts opposite ovate, connate at base, obtuse or acute, unequal, flower in the axil of the larger one which nearly equals its tube; flowers yellowish, on very short pedicels; calyx 4''-5'' long, companulate, teeth broad, obtuse; corolla a little longer, lower lip densely tomentose within.—Plant dries black.—*Hall & Harbour*, 397. “High alpine, Pike’s Peak,” *Meehan*. Mount Lincoln, at 13,000 feet altitude, *Coulter*.

MIMULUS LUTEUS, L. *DC. Prod.* 10, p. 370. Smooth or viscid-puberulent, ascending or erect, 2'-4° high; leaves numerous, erose-dentate or denticulate, orbiculate, ovate, or suboblong, the lower long-petioled and often sublyrate, the upper sessile or cordate-amplexicaul, about 7-nerved, shorter than the peduncles; calyx ovate, becoming inflated in fruit, with ovate teeth, the upper one largest; tube of the dilated yellow corolla twice longer than the calyx, the lower lip bearded.—Very common in damp spots at middle elevations.—*Hall & Harbour*, 398; *Brandegee*; *Porter*; *Coulter*.\*

MIMULUS JAMESII, Torr., var. FREMONTII, Benth. Pedicel slender, longer than the leaf; flowers smaller.—*Hall & Harbour*, 399. Cherry Creek, near Denver, *Dr. Smith*.

MIMULUS FLORIBUNDUS, Gr. *DC. Prod.* 10, p. 372. Viscidly-pilose; stem slender, 2'-18' long, diffusely branching at the base, ascending; leaves petioled, 3'-18' long, ovate, dentate, or denticulate, lower subcordate, somewhat pinnately 5-7 nerved; peduncles axillary to nearly

<sup>1</sup> CHIONOPHILA, Benth. in *DC. Prod.* 10, p. 1, 331. Calyx large, membranous, 4-5 toothed, the fifth tooth smaller. Tube of the corolla scarcely exsert; lips short, broad, upper one emarginate, somewhat concave, lower spreading, short-trifid. Fertile stamens 4, declined at base, at length ascending; anthers glabrous; cells confluent; filament of the fifth stamen sterile, scarcely shorter than the others. Apex of the style slightly stigmatose. Ovaries numerous in each cell.

every leaf, solitary, slender, mostly longer than the leaves; alyx ovate, 5-angled, with very short, subequal teeth, becoming much dilated; corolla yellow, 3"-4" long, twice longer than the calyx.—*Hall & Harbour*, 400. Upper Arkansas, *Porter*. Grand Cañon of the Arkansas, *Brandegee*.

MIMULUS RUBELLUS, Gr. *Bot. Mex. Bound.*, p. 116. Annual, dwarf,  $\frac{1}{2}$ '-3' high, glabrous or viscid-puberulent; stem erect, simple or much branched; leaves 2"-6" long, obovate or spatulate, narrowly oblong or lanceolate or linear, 3-5 nerved, mostly entire, sessile and narrowed at base or the lower short-petioled, about equaling the peduncles; calyx oblong, 1"-2" long, becoming somewhat dilated, the mouth squarely truncate, with short equal teeth; corolla yellow, red or purple, small and scarcely exerted or 2-3 times longer than the calyx and the dilated limb.—"Sub-alpine; scarce." *Hall & Harbour*, 401.

GRATIOLA VIRGINIANA, L.—Platte River, *Coulter*.

LIMOSELLA AQUATICA, L.—"Low mountains," *Hall & Harbour*, 80; *Brandegee*; *Canby*.

SYNTHYRIS PLANTAGINEA, Benth. *DC. Prod.*, 10, p. 455. Woolly-pubescent, becoming smooth; radical leaves oblong, crenate, thick, coriaceous, 3'-6' long, 2'-3 $\frac{1}{2}$ ' broad, abruptly narrowed at base and somewhat decurrent on the petiole; petioles 2'-3' long, somewhat pilose on the veins and ribs; scape 6'-12' high, furnished with numerous oblong or orbicular, nearly sessile bracts; flowers in a long, dense spike, in fruit 6' in length; fruit scarcely exceeding the round, ovate, persistent bracts.—*Hall & Harbour*, 405; *Canby*. Chiann Cañon, Ute Pass, and South Park, *Porter*. Este's Park, *Coulter*. At lower elevations.

SYNTHYRIS ALPINA, Gr. *Sill. Jour.*, (*N. S.*), 33, p. 125. Somewhat woolly, becoming smooth; radical leaves elliptic or oval, sometimes subcordate, closely crenate, 1'-2', on slender petioles; scape 2'-6' high, leafy-bracted; spike short, dense, in flower 9"-12" long; sepals lanceolate, villous on the outside toward the edge with long hairs as well as the bracts; corolla 2-parted, upper lip very broad, erose, lower much smaller, 2-3-parted, lobes narrow, purplish-blue; stigma capitate; stamens exerted.—High alpine.—*Parry*, 255. Gray's Peak, *Dr. Smith*; *Meehan*. Chicago Lakes, at 13,000 feet altitude, *Coulter*. *Redfield*.

VERONICA AMERICANA, Schwein.—*Hall & Harbour*, 408; *Dr. Smith*; *Porter*; *Meehan*; *Coulter*.

VERONICA ALPINA, L.—*Hall & Harbour*, 407; *Meehan*; *Brandegee*. Mount Lincoln, at 14,000 feet altitude, *Coulter*.

VERONICA SERPYLLIFOLIA, L.—*Hall & Harbour*, 406; *Meehan*. Clear Creek Cañon, at 9,000 feet altitude, *Coulter*.

VERONICA PEREGRINA, L.—Monument Park, *Coulter*.

GERARDIA TENUIFOLIA, Vahl. Branches slender, erect, strict, crowded.—Near Denver, *Dr. Smith*. Clear Creek, below Golden City, *Greene*.

CASTILLEIA LINARIÆFOLIA, Benth. *DC. Prod.*, 10, p. 532. *Gray's Rev. Sill. Jour.*, (*N. S.*), 34, p. 335. Very glabrous, smooth or loosely woolly-pubescent above; stems 2°-4° high from a woody base, simple or branched, somewhat glaucous, shining, rarely pubescent throughout; leaves 1'-3' long, occasionally 3"-4" broad, 1-nerved or more or less 3-nerved at base, linear, entire or often 3-cleft or parted, narrowed at base, floral ones scarlet-colored and acute; spike interrupted; flowers sessile or on short peduncles; calyx incurved,  $\frac{1}{2}$ '-1' long, deeply cleft anteriorly, sub-

ulately 4-toothed at the apex, mostly exceeding the bracts, colored; corolla 1'-2' long, nearly glabrous, bright scarlet; lobes of the lower lip linear-subulate, the yellow galea usually 1' or more in length or sometimes scarcely exsert. —Cañon City, *Brandegee*. Twin Lakes, *Porter* and *Coulter*. Sangre de Cristo Range, *Redfield*.

CASTILLEIA BREVIFLORA, Gray (*non* Benth.) *Gr. Rev. l. c.*, p. 238. (*Euchroma breviflora*, Nutt.) Low, subvillous or subcinereous, 3'-6' high, branched from the base; leaves mostly 3-5 cleft with linear lobes, the floral ones not dilated or colored; spikes dense, scarcely 1' long in flower; calyx equally cleft or moderately cleft in front, segments deeply bifid, obovoid-oblong, lobes lanceolate; tube of the yellow corolla nearly included, lower lip tri-saccate, carinate, shortly 3-cleft, lobes oblong, obtuse. Alpine.—*Hall & Harbour*, 409; *Parry*, 1872. Gray's Peak, *Dr. Smith*.

CASTILLEIA PARVIFLORA, Bong. *Gr. Rev. l. c.*, p. 336. Perennial, pilose-pubescent and hirsute throughout, scarcely hispid; stems 3'-20' high, usually numerous, simple or branched; the lower leaves usually entire and linear, upper ones 3-cleft or laciniately-pinnate, the floral ones more or less dilated and nearly always colored, color deep red, flesh-color, yellow, or rarely green; calyx deeply cleft both above and below; the segments either emarginately 2-lobed or deeply bifid; lip of the corolla very short, galea scarcely exceeding the calyx or exserted, 5''-6'' long. Sangre de Cristo Pass, *Brandegee*. North Park, *Hayden*.

CASTILLEIA INTEGRATA, *Gr. Rev. l. c.*, p. 338. Loosely tomentose; stems numerous from one root, erect, 6'-15' high, usually branched above; leaves linear or lance-linear, all very entire, 1½'-2' in length, whitish-tomentose, widely spreading, the floral ones somewhat lobed, rarely trifid, much enlarged and bright scarlet above; flowers 1½' long; segments of the calyx mostly bifid; galea exserted.—The most abundant species on the plains and in the mountains as far west as the Snowy Range. *Hall & Harbour*, 410. Denver, *Dr. Smith*. Clear Creek Cañon, Pleasant Park, and Monument Park, *Coulter*. Colorado Springs and Twin Lakes, *Porter*.

CASTILLEIA PALLIDA, Kunth. *Gr. Rev. c.*, p. 337.—Subalpine. Cañon City, *Brandegee*. Clear Creek Cañon and Weston's Pass, *Coulter*. *Hall & Harbour*, 412.

Var. MINIATA, *Gr. Rev. l. c.*, p. 337. (*C. miniata*, Dougl.) Greener, glabrous below, taller, 1°-2° high; floral leaves dull red; galea usually much exserted.—*Hall & Harbour*, 411. The most common form at middle elevations. Cañon City, *Brandegee*. Gunnison River, East River, Sierra Madre Range, and South Park, *Coulter*. *Meehan*. North Park, *Hayden*. Denver, *Dr. Smith*; *B. H. Smith*. *Canby*. Ute Pass and Twin Lakes, *Porter*.

Var. ALPINA, *Porter*. Woolly-pubescent, 2' high, few-flowered; flowers almost concealed in the broad uncolored floral leaves.—High alpine. Summit of Pike's Peak, *Porter*. Mount Lincoln, at 12,000 feet altitude, *Coulter*.

ORTHOCAEPUS<sup>1</sup> LUTEUS, Nutt. *DC. Prod.*, 10, p. 536. Stem hard, his-

<sup>1</sup> ORTHOCAEPUS, Nutt. Calyx tubular-campanulate, membranous at base, usually sub-equally 4-cleft or 4-toothed. Corolla-tube slender; galea erect, entire, channeled, the margin inflexed; lower lip shorter, 3-plicate or 3-saccate, sub-entire at the apex or with three erect teeth. Stamens with one anther-cell fixed by the middle, the other pendulous, smaller or wanting. Capsule loculicidal. Seeds usually numerous and small, with a loose, reticulated or pitted testa, the radicle usually pointing toward the hilum.



pid, erect, 2'-15' high, simple or branched above, branches strict; leaves linear-lanceolate, entire or trifid; spike elongated, leafy, somewhat interrupted; bracts oblong or ovate, entire or 3-lobed, rarely 5-lobed, segments acute or acutish; calyx 3''-4'' long with short lanceolate, acute teeth a little shorter than the tube; corolla yellow, pubescent, 6'' long, little exceeding the bracts; capsule 3'' long, obtuse, many-seeded; seeds small.—*Hall & Harbour*, 413. Cañon City, *Brandegee*. South Park, *Porter*. North Park, *Hayden*. *Canby*. Taylor River, *Coulter*.

*RHINANTHUS CRISTA-GALLI*, L.—*Hall & Harbour*, 422. *Hoopes*.

*PEDICULARIS CANADENSIS*, L.—“In the mountains at middle elevations,” *Hall & Harbour*, 416. South Park, *Porter*. Platte River, *Coulter*. Wet Mountain Valley, *Redfield*.

*PEDICULARIS GREENLANDICA*, Retz. *DC. Prod.*, 10, p. 566. Erect, 1°-2° high, glabrous; stem simple, leafy; leaves pinnately-parted, segments lanceolate-linear, serrate; spikes elongated, 3'-8' long, many-flowered; calyx 2''-3'' long, tubular, 5-toothed, the upper tooth smallest, the lateral ones with very shallow sinuses; galea of the reddish corolla arched, exceeding the calyx, produced into an elongated, subulate beak, twice longer than the calyx, nearly straight or more usually becoming strongly recurved upward and almost circinate.—*Hall & Harbour*, 419; *Parry*; *Canby*. Georgetown, *Dr. Smith*. Cañon City, *Brandegee*. Mount Lincoln, at 12,000 feet altitude, *Coulter*.

*PEDICULARIS BRACTEOSA*, Benth. *DC. Prod.*, 10, p. 574. Glabrous or scantily pilose upon the spike; stem erect, 1°-2° high, leafy; leaves pinnately-parted, segments lanceolate, incisely-dentate or pinnatifid; spike pedunculate, elongated, 2'-8' long, densely flowered; the bracts ovate, acuminate and somewhat membranous; calyx-lobes lanceolate, setaceous; galea of the yellow corolla slightly incurved, not beaked, hooded at the apex and terminating in an obtuse, somewhat 2-toothed projection; lip much shorter.—*Hall & Harbour*, 417; *Parry*.

*PEDICULARIS RACEMOSA*, Dougl. *DC. Prod.*, 10, p. 580. Glabrous; stems numerous, simple or occasionally branched above, ascending, 1°-2° high, leafy; leaves short-petioled, 1½'-4' long, narrowly lanceolate, doubly serrate with minute teeth; flowers axillary, in a loose, leafy raceme; calyx cleft above, 2-toothed; galea of the ochroleucous corolla arched, beak long, subulate, incurved.—“Subalpine; common in pine woods.” *Hall & Harbour*, 414; *Parry*. Mount La Plata, at 11,000 feet altitude, and Horse Shoe Mountain, *Coulter*.

*PEDICULARIS CRENULATA*, Benth. *DC. Prod.*, 10, p. 568. Pubescent; stems erect, simple 6'-12' high; leaves all linear-oblong, obtuse, doubly crenate, 9''-15'' long; spikes short, densely flowered; calyx cleft on the upper side, minutely 2-3-toothed; galea hooded, subincurved, 2-toothed under the apex.—Ute Pass, *Porter*. Cañon City, *Brandegee*. *Canby*. Horse Shoe Mountain at 11,000 feet altitude, *Coulter*. South Park, *Hall & Harbour*, 415.

*PEDICULARIS PARRYI*, Gr. *Sill. Jour. (N. S.)* 33, p. 250. Very smooth except the ciliated bracts; stem 6'-1° high, more or less bracted; leaves linear-lanceolate, pectinate-pinnatifid, petioled, cauline ones small, segments linear, acute, about 3'' long, cartilaginous-serrate; bracts small, trifid; flowers numerous, short-pedicelled, somewhat crowded in a narrow spike, 1'-2' long, of a dirty or faded yellow; calyx membranaceous, marked with 5-striæ, at length subinflated, teeth 5, short, lanceolate, very entire, lanulose within; galea narrow, apex incurved, gradually produced into a longish, emarginate beak which is somewhat decurved,

much surpassing the lower lip; filaments very smooth.—*Hall & Harbour*, 420; *Parry*, 251. Cañon City, *Brandegee*. Mount Lincoln, at 12,000 feet altitude, and Weston's Pass, *Coulter*.

PEDICULARIS SUDETICA, Willd. *DC. Prod.*, 10, p. 568. Erect, simple, 8'–12' high, glabrous except the spike; lower leaves pinnately-parted, narrowly lanceolate in outline; segments lanceolate, subincised-serrate and crenate, upper ones pinnatifid; spike short, densely hirsute-wooly; calyx 5-toothed, teeth entire or the lateral denticulate; galea of the reddish-purple corolla arcuate, scarcely hooded, shortly and broadly subrotate, 2-toothed under the apex.

Var. Differs from the typical form in the smoother spikes and the lack of teeth on the tip of the galea.—*Hall & Harbour*, 421; *Parry*, 253. South Park and Mount Lincoln, *Coulter*.

PEDICULARIS PROCERA, Gr. Stem  $1\frac{1}{2}$ °–3° high, stout leafy, bearing above a dense-flowered, softly pubescent spike 9'–18' long; leaves glabrous, pinnately-parted, segments lanceolate, lacinate-pinnatifid, lobes serrate or incised, radical ones 1°– $1\frac{1}{2}$ ° long; bracts elongated, linear from an ovate-lanceolate base, lower ones pectinate-pinnatifid, exceeding the flowers; calyx about equally 5-cleft, lobes lanceolate, entire, about half shorter than the tube; corolla 1' or more long, striate, dirty-green; galea hooded at the apex, not beaked, truncate, 2-toothed, scarcely equaling the shortly 3-lobed, somewhat spreading lip.—*Hall & Harbour*, 418; *Parry*, 252; *Brandegee*. Weston's Pass, *Coulter*.

#### VERBENACEÆ.

VERBENA HASTATA, L.—Cañon City, *Brandegee*.

VERBENA BRACTEOSA, Mx.—Plains of the Platte, *Coulter*. Colorado Springs, *Porter*.

VERBENA AUBLETIA, L.—Plains near Denver and Saint Vrain River, *Coulter*.

VERBENA STRICTA, Vent.—Common on the Arkansas at Pueblo, *Greene*.

LIPPIA LANCEOLATA, Mx.—Purgatory River, *Dr. Bell*. Eastern Colorado, *Porter*.

#### LABIATÆ.

TEUCRIUM CANADENSE, L.—Cañon City, *Brandegee*.

TEUCRIUM LACINIATUM, Torr. *Ann. N. Y. Lyc.*, 2, p. 231. Perennial; stem suffrutescent, branched, smooth; leaves opposite, lower ones pinnately 5-parted, sessile, segments linear, rather obtuse, nearly smooth, minutely reticulate, upper ones trifid, cuneate at base; flowers axillary, solitary, on pedicels about 2" long, large in proportion to the plant; calyx subcampanulate, 5-cleft, smooth; segments lanceolate, acute, lowest one 2-cleft or 3-toothed; stamens exerted, anthers roundish; nutlets destitute of longitudinal, thickened ribs.—Afterward referred by Dr. Torrey to *T. Cubense*, L., from which it is shown by Dr. Gray to be clearly distinct. *Proc. Amer. Acad.*, May, 1872, 8, p. 372.—Pueblo County, 1873, *Greene*.

MENTHA CANADENSIS, L., var. GLABRATA, Benth.—Near Denver, *Dr. Smith*. *Hall & Harbour*, 425. Mountains west of Denver, *Porter* and *Coulter*.

LYCOPUS SINUATUS, Ell. Gray in *Proc. Am. Acad.*, Dec. 1870, 8, p. 286.

(*L. Europæus*, L., var. *sinuatus*, Gr. Manual, p. 346.)—Cañon City, *Bran-degee*.

PYCNANTHEMUM LANCEOLATUM, Pursh.—Near Denver, *Dr. Smith*.

CALAMINTHIA CLINOPODIUM, Benth.—Sierra Madre Range, at 10,000 feet altitude, *Coulter*.

HEDEOMA HISPIDA, Pursh.—*Hall & Harbour*, 423. (*H. hirta*, Nutt.)

HEDEOMA DRUMMONDII, Benth. *DC. Prod.*, 12, 245. Gray in *Proc. Am. Acad.*, May, 1872, 8, p. 367. Annual, cinereous-puberulent or pubescent, 4'-6' high, branched from the base; leaves oval, oblong, or the upper ones linear, obtuse, very entire, sessile or narrowed at the base into a petiole; whorls few-flowered; calyx ovate, tubular, hispid, scarcely 2-lipped, teeth all subulate-setaceous, connivent, erect after flowering and more or less curved upward, lower ones twice longer than the upper, more or less shorter than the corolla.—*Hall & Harbour*, 424. Purgatory River, *Dr. Bell. Meehan*.

HEDEOMA PIPERITA, Benth. *Gray, l. c.*, p. 336. Cinereous-pubescent or puberulent; leaves ovate, obtuse, usually rounded at the base, uppermost floral ones sometimes oblong, petiolate; whorls loose, few-many-flowered; calyx oblong-tubular, gibbous, hirsute, 2-lipped, upper lip spreading, with subulate teeth, the lower with longer, more setaceous erect teeth, about equaling the corolla.—Bluffs of the Arkansas near Pueblo, 1873, *Greene*.

SALVIA LANCEOLATA, Willd. (*S. trichostemmoides*, Pursh.) Canescently pubescent; stems 3'-15' high, herbaceous, ascending, branched; leaves lanceolate or oblong-linear, 1'-2' long, rather obtuse or acuminate, narrowed at the base into a long slender petiole, sparsely and obtusely serrulate in the middle; bracts subulate, a little longer than the short pedicels; raceme simple, 2'-4' long, whorls about 2-flowered, all remote; calyx tubular, striate, puberulent, enlarged in fruit, inflated at the base, teeth acute; corolla blue, a little longer than the calyx, and with it 4'' long; style short-bearded.—*Hall & Harbour*, 426. Near Denver, *Dr. Smith*. Plains around Colorado Springs, *Porter*; *Meehan*.

SALVIA PITCHERI, Torr. *DC. Prod.*, 12, p. 302. Tomentose-pubescent or canescent; stem herbaceous, 1½°-2° high, erect, simple or branching above; leaves oblong-lanceolate, or linear, acute, subserrate, narrowed at the base, but scarcely petioled, somewhat tomentose beneath, smoother above; raceme simple, elongated, (6') whorls distant, 6-15-flowered; bracts lance-linear, much longer than the pedicels and often equaling the calyx; calyx subsessile, tubular, striate, villose, teeth 3, broad, obtuse; corolla twice or more longer than the calyx, pubescent on the outside; style bearded.—*Hall & Harbour*, 427. Eastern Colorado, *Porter*; *Dr. Smith*.

MONARDA ARISTATA, Nutt. *DC. Prod.*, 12, p. 363. Canescent, 1° high, with numerous spreading branches; leaves linear or oblong-lanceolate, narrowed at the base, sharply and remotely serrate, floral ones and outer bracts sessile, somewhat colored, tipped with a long subulate awn; whorls many-flowered, compact, remote; calyx striate, pubescent, bearded in the throat, teeth nearly equal, long, subulate, pilose, penicillate at the apex; tube of the corolla scarcely longer than the calyx-teeth.—Plains and base of the foot-hills, *Hall & Harbour*, 428. Colorado Springs, *Porter*. Near Denver, *B. H. Smith*. Plains of the Platte, *Coulter*. Wet Mountain Valley, *Redfield*.

MONARDA FISTULOSA, L. Very common along streams on the plains

and extending into the mountains. Colorado Springs and Denver, *Porter*. Cañon City, *Brandegee*. *B. H. Smith*; *Dr. Smith*.

MONARDA PUNCTATA, L.—Foot-hills west of Denver, *Dr. Smith*.

MONARDELLA<sup>1</sup> ODORATISSIMA, Benth. *DC. Prod.*, 12, p. 190. Stems numerous, from a woody base, procumbent, 6'–10' high; leaves subsessile, oblong-lanceolate, 6''–12'' long, very entire, or with a few denticulations, acute at each end; hoary, or at length becoming green; heads of flowers 9''–12'' in diameter; outer bracts broadly ovate, very obtuse, colored, equaling the elongated tubular calyces; lobes of the rose-colored corolla oblong-linear, 3'' long; calyx-teeth and margins of the bracts softly villose.—Gothic Mountain, August, *Coulter*.

LOPHANTHUS URTICÆFOLIUS, Benth. *DC. Prod.*, 12, p. 368. Glabrous, erect, 2°–4° high; leaves cordate-ovate, crenate or serrate, green upon both sides, obtuse or the uppermost acute, the floral ones sessile, ovate and acute; bracts few, lanceolate or lance-linear, shorter than the calyx; spikes dense, oblong, 2'–4' long; calyx 2''–6'' long, incurved, glabrous or puberulent, the throat oblique, the membranous teeth colored, long-subulate-acuminate, the upper ones longest; corolla purple, short-exserted, the throat slightly inflated and limb short; stamens much exserted.—Sierra Madre Range, *Coulter*.

LOPHANTHUS ANISATUS, Benth.—*Hall & Harbour*, 429. Plains near Denver, *Coulter*.

DRACOCEPHALUM PARVIFLORUM, Benth.—*Hall & Harbour*, 430. Twin Lakes, *Coulter*. Upper Arkansas, *Porter*. Georgetown, *Dr. Smith*. Cañon of the Arkansas, *Redfield*.

BRUNELLA VULGARIS, L. Cañon City, *Brandegee*; *Redfield*.

SCUTELLARIA RESINOSA, Torr. *DC. Prod.*, 12, p. 427. Minutely glandular pubescent or puberulent, much branched from the base, 2'–12' high; leaves  $\frac{1}{2}$ '–1' long, short-petioled, broadly ovate, obtuse, entire or crenate, rounded or cuneate at base, floral ones similar; flowers axillary, opposite, secund, very variable in size; corolla blue, 2''–1' long, densely villos, attenuate at base, usually more than four times longer than the herbaceous calyx.—*Hall & Harbour*, 431. Near Denver, *Dr. Smith*. South Park, *Porter*. Cañon City, *Brandegee*. Bear Creek, Clear Creek and Saint Vrain River, *Coulter*.

SCUTELLARIA GALERICULATA, L.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. *Hall & Harbour*, 432.

STACHYS PALUSTRIS, L., var. CORDATA Gr. (*S. cordata*, Ridd.) Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. *Meehan*. Near Colorado Springs, *Porter*. Plains of the Platte, *Coulter*; *Redfield*.

### BORRAGINACEÆ.

ONOSMODIUM CAROLINIANUM, DC.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. Plains of the Platte, *Coulter*.

LITHOSPERMUM ANGUSTIFOLIUM, Mx. (Including *L. longiflorum*, Spreng.) The latter, according to M. E. Bebb, *Am. Nat.* 7, p. 691, is only

<sup>1</sup>MONARDELLA, Benth. Calyx tubular, often elongated, 10–13-nerved, 5-toothed; teeth short, nearly equal, straight, throat naked within; corolla-tube equaling the calyx or slightly exserted, the throat glabrous within; somewhat bilabiate, the upper lip 2-cleft, the lower 3-cleft, and the lobes all oblong or linear, flat and nearly equal. Stamens 4, somewhat equal, or the lower ones longer, straight, divergent, and exserted. Anthers with two parallel cells, becoming divergent or divaricate. Styles very shortly 2-cleft. Nutlets dry.

the spring-state of the former with larger flowers and greatly elongated corolla tubes.—Cañon City, *Brandegee*. *Meehan*. Clear Creek, *Coulter*.

LITHOSPERMUM HIIRTUM, Lehm.—Near Denver, *Dr Smith*.

LITHOSPERMUM PILOSUM, Nutt. Watson in *King's Rep.*, vol. 5, p. 238. Stems slender, branched,  $1^{\circ}$ – $1\frac{1}{2}^{\circ}$  high, strict, numerous from a perennial root, hirsute, sulcate; leaves broadly linear or linear-oblong,  $1'$ – $2'$  long, sub-acute, sessile, strigose and somewhat hispid; spikes very leafy, elongated in fruit; flowers nearly sessile, yellow,  $6''$  long, tube much exceeding the linear sepals; calyx 5-parted, hirsute, lobes unequal, linear; nutlets  $1\frac{1}{2}''$  long, smooth and shining.—*Hall & Harbour*, 441. *Parry*, 295. Near Denver, *Dr. Smith*; *B. H. Smith*. Bear Creek, Pleasant Park, and Clear Creek Cañon, *Coulter*.

MERTENSIA PANICULATA, Don.—Cañon City, *Brandegee*; *Parry*.

MERTENSIA SIBIRICA, Don. *Gr. Rev. Mert. Sil. Jour.*, (N. S.) 34, p. 340. Glaucous, glabrous or subpubescent,  $1^{\circ}$ – $5^{\circ}$  high; cauline leaves ovate or ovate-lanceolate, or often oblong-lanceolate, acute or acuminate, mostly sessile or very short petioled; calyx 5-parted, the lobes oblong or oblong-linear, ciliate, obtuse, 2–4 times shorter than the corolla-tube, which is sparingly hairy or nearly glabrous within; corolla  $4''$ – $6''$  in length, limb 5-cleft, more than half longer than the tube; filaments dilated, shorter than the anthers.—*Hall & Harbour*, 442. Chicago Lakes, at 11,000 feet altitude, *Coulter*. Wet Mountain Valley, *Brandegee*. Twin Lakes, *Porter*. *Dr Smith*. Banks of mountain-streams; variable.

MERTENSIA ALPINA, Don. *Gr. Rev. l. c.*, p. 340. Glabrous or hirsute,  $6''$ – $12''$  high; leaves spatulate-oblong, lanceolate or the uppermost oblong-ovate, rather small and mostly acute; calyx-segments ovate or oblong-lanceolate and obtusish or linear-lanceolate and acute, ciliate, a little shorter than the corolla-tube which equals the limb and is usually hairy within; anthers inserted in the throat.—Common on the plains and in the mountains, and very variable. *Hall & Harbour*, 444 and 445. Colorado Springs and South Park, *Porter*. Cañon City and Wet Mountain Valley, *Brandegee*. Near Denver, *Dr. Smith* and *B. H. Smith*. *Canby*. Horse Shoe Mountain, at 11,000 feet altitude, Gray's Peak, at 12,000 feet, Mount Lincoln, at 13,000 feet, and Clear Creek Cañon, at 9,000 feet, *Coulter*.

MERTENSIA BREVISTYLA, Watson. *King's Rep.*, vol. 5, p. 239. t. 23. Low,  $4'$ – $10'$  high, 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, 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.—*Hall & Harbour*, 443.

ERITRICHIMUM<sup>1</sup> VILLOSUM, DC. *Prodr.*, 10, p. 126. Stems  $3'$ – $6'$  high,

<sup>1</sup>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 quinquecinal 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.—*DC. Prodr.*

loosely branched from the base and caespitose, 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 with inflexed, ciliate teeth on the margins.

Var. *ARETOIDES*, Hook. Densely caespitose, 3''-2' high, covered with soft silky hairs; leaves densely imbricated below, elliptical-lanceolate, acute; racemes few-flowered, short-exserted; tube of the corolla scarcely exceeding the calyx, limb bright blue, 1''-3'' in diameter; nutlets nearly 1'' in length, concave on the back, the toothed margin conspicuous.—High alpine. *Hall & Harbour*, 440; *Parry*, 278. James' Peak, at 12,000 feet altitude, Chicago Lakes, at 13,000 feet, and Mount Lincoln, at 14,000 feet, *Coulter*. Sangre de Cristo Pass, *Brandegee*. *Meehan*. Gray's Peak, at 12-13,000 feet altitude, *Redfield*.

*ERITRICHIMUM ANGUSTIFOLIUM*, Torr., *Pacif. R. R. Surv.*, 5, p. 363. Annual, very hispid, with spreading hairs; stem 3'-1° high, suberect, widely branched; leaves linear; racemes terminating the branches, usually forked and at length elongated; flowers sessile, bractless; calyx 2''-3'' long in fruit, very hispid with yellowish hairs, lobes lanceolate-linear; corolla white, 6''-12'' long, falling early; stamens inserted near the base on very short filaments; nutlets 1-4, oblong, acute, 1'' long, convex and minutely papillose on the back, attached to the style to the middle by a ventral groove.—Near Denver and Colorado Springs, *Porter*.

*ERITRICHIMUM CRASSISEPALUM*, T. & G. *Pacif. R. R. Surv.*, 2, p. 171. Annual, very hispid, with spreading hairs; stem much branched from the base, branches ascending, 3'-5' high; leaves obovate-lanceolate, rather obtuse; racemes bracteate except the upper portion; fructiferous calyx ventricose at base, closed and contracted above the middle, the segments thickened and indurated on the back, finely pilose on the margins, with large, strong, hispid hairs on the back; nutlets heteromorphous, ovate, convex on the back, 3 of them muriculate-granulate, the 4th larger and nearly or quite glabrous.—*Hall & Harbour*, 434. Denver and Colorado Springs, *Porter*. Cañon City, *Brandegee*.

*ERITRICHIMUM GLOMERATUM*, DC., *Prod.* 10, p. 131. Perennial or 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, sub-acute, hirsute and usually more or less appressed, pubescent; spikelets 5-9 flowered, lateral axillary, clustered, more or less peduncled, and usually bifurcated, and the upper ones sessile; flowers 2''-4'' long, nearly sessile; calyx very hispid, 5-parted, the linear-lanceolate lobes equalling the corolla-tube, much enlarged in fruit; limb of the white corolla broad and expanded, truncated scales of the throat conspicuous; nutlets large, 1½'' long, ovate and narrowed above, but obtuse, more or less rugose and tuberculated on the back, which is surrounded by an acute, slightly raised margin, sulcate ventrally and attached to the elongated style to the middle.—*Hall & Harbour*, 438 in part. Colorado Springs, *Porter*.

Var. *VIRGATUM*, *Porter*, (*E. virgatum*, *Porter*, *Hayden's Rep.*, 1870, p. 479.) Stout; stem erect, 2°-3° high, very hispid; inflorescence much elongated, virgate, spike-like, 1°-2° in length; cymes many, conglomerated, few-flowered, lower ones short-peduncled, upper ones sessile, very much shorter than the long, spreading, bracteal leaves, which become narrowly linear above.—This variety is very common on the plains at

the base of the mountains and among the foot-hills.—Colorado Springs, Monument Park, and Ute Pass, *Porter*. Clear Creek Cañon, *Coulter*.

*ERITRICHIMUM JAMESII*, Torr., (*Myosotis suffruticosa*, Torr. in *Ann. N. Y. Lyc.* 2, p. 225.) Hirsute, much branched from a suffruticose base; branches 6'-10' high; leaves linear-lanceolate, tapering to the base, 1'-2' long; spikes terminal, numerous; flowers on very short pedicels; calyx campanulate, at first scarcely longer than the tube of the corolla, but in fruit elongated and closed, segments ovate; corolla ochroleucous, tube shorter than the calyx-teeth, spreading limb 2"-3" wide, lobes very obtuse; nutlets 4, similar, depressed, conniving at the top, but separated at the sides, very convex and smooth on the back, shining, edges very acute, ventral suture adhering to the style above the middle.—*Hall & Harbour*, 435. Plains near Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandege*. *Meehan*. Plains of the Platte, *Coulter*.

*ECHINOSPERMUM DEFLEXUM*, Lehm., var., *FLORIBUNDUM*, Watson. (*El. floribundum*, Lehm.) Biennial; stem erect, 2°-4° high, fistulous, branched villous with spreading hairs; leaves oblong-lanceolate, obtuse or acute, ciliate at base, hirsute-pubescent; racemes erect, spreading, bifid, bracteolate, with deflexed pedicels; calyx-lobes ovate, shorter than the bluish or white corolla; nutlets compressed, with a single marginal row of barbed prickles which are connate at base, the dorsal surface granulate or shortly pilose or nearly smooth. Near Denver, *Dr. Smith*. Plains of the Platte, *Coulter*. Wet Mountain Valley, *Brandege*. Colorado Springs, *Porter*. *B. H. Smith*.

*ECHINOSPERMUM REDOWSKII*, Lehm.—Near Denver, *Dr. Smith*; *B. H. Smith*. Cañon City, *Brandege*. Abundant on the plains, *Porter*; *Coulter*.

*HELIOTROPIMUM CURASSAVICUM*, L.—*Hall & Harbour*, 192.

*HELIOTROPIMUM CONVULVULACEUM*, Gr. Canescent with appressed scabrous pubescence, branching from a suffrutescent base, branches weak and spreading, 6'-9' high; leaves ovate and lance-ovate, 9"-1' long, ciliate on the margins, petioles short, about 3" long; flowers scattered along the leafy branches, short-peduncled; calyx-lobes subulate; corolla salver-form, tube 3"-4" in length, narrow, spreading limb 6"-9" long, somewhat 5-angled, throat naked; nutlets 4, approximate in pairs, angled, oblique, hairy, adnate to the style.—*Hall & Harbour*, 436.

### HYDROPHYLLACEÆ.

*HYDROPHYLLUM VIRGINICUM*, L. Mountains west of Denver, *Dr. Smith*. Cañon City, *Brandege*. Clear Creek Cañon at 9,000 feet altitude, *Coulter*; *Redfield*.

*ELLISIA NYCTELEA*, L.—Cañon City, *Brandege*.

*PHACELIA CIRCINATA*, Jacq. *DC. Prod.* 9, p. 298. Perennial, hispid; stems erect or ascending, 6'-20' high, branching or subsimple; leaves petioled, 1'-3' long, simple or pinnate, the 3-5 leaflets distinct or the uppermost confluent, terminal one much larger, ovate to narrow-lanceolate, acute, entire, or obscurely serrulate, usually strongly nerved, on the upper side the appressed strigose hairs between the nerves, on the lower side chiefly upon the nerves; racemes densely many-flowered, strongly circinate; calyx-lobes oblong or linear, erect, acute; corolla blue or nearly white, 2"-3" long, somewhat exceeding the calyx; stamens exserted; filaments hairy; capsule 2" long, very hispid with

erect hairs, shorter than the calyx; seeds often solitary, deeply pitted.—*Hall & Harbour*, 439. Georgetown, *Dr. Smith*. Denver, *Porter*. Plains of the Platte, *Coulter*.

*PHACELIA INTEGRIFOLIA*, Torr. *DC. Prod.*, 9, p. 299. Annual, erect, 4'-15' high, branching above and sometimes at the base, viscidly glandular pubescent; leaves 1'-2' long, varying from oblong to ovate, cordate or truncate at base, simple or crenately-dentate or doubly serrate, or sometimes more or less deeply pinnatifid, and the segments often toothed, the upper at times nearly sessile; sepals ovate, ciliate-hispid and glandular; corolla-segments oblong, the appendages short and encircling the base of the filaments; stamens exerted, naked; style united to the middle; ovary oblong, hairy; capsule globose, minutely pubescent and glandular, equaling or slightly exceeding the calyx; seeds 4, minutely warted on the back and transversely ridged on the face.—*Southeastern Colorado*, *F. R. Diffenderffer*.

*PHACELIA POPEI*, Torr. & Gr. *Pacif. R. R. Surv.* 2, p. 172, t. 10. Viscidly pubescent, hispidulous with spreading hairs; stems 4'-1° high, branching from a biennial root; leaves bipinnately parted or pinnately cut, 2'-4' long, segments pinnatifid, 3"-10" long, or the lower ones reduced in size, lobes 5-9, short, obtuse; spikes corymbose, densely-flowered; segments of the calyx spatulate, about half the length of the white campanulate corolla and a little longer than the globose capsule; stamens at length much exerted; filaments naked; seeds 4, oval, with the inner face strongly bilunate, the central keel very prominent, pitted, 1½" long.—*Hall & Harbour*, 446. Near Denver, *Coulter*. Gray's Peak, *Dr. Smith*.

*PHACELIA TANACETIFOLIA*, Benth. *DC. Prod.* 9, p. 299. Annual, 3'-2° high, suberect; branches lax and slender, more or less scabrous-pubescent, or the stem and branches glabrate; leaves variable, 2'-6' long, 1-2-pinnatifid, the 3-7 pairs of segments oblong and incised dentate; calyx-lobes linear or lanceolate, usually dilated and foliaceous above, very pilose, especially on the margins; corolla campanulate, 3" long, scarcely exceeding the calyx, the appendages small, and encircling the filaments; style hairy at base, bifurcate to below the middle; ovary hairy, 4-ovuled; capsule 2" long, ovate, acute, pubescent; seeds 1½" long, pitted.—*Wet Mountain Valley*, *Brandegee*. *South Park*, *Coulter*.

*PHACELIA NEO-MEXICANA*, Thurber., *Bot. Mex. Bound. Surv.*, p. 143. Stem erect, 1°-2° high, hispidly-pilose and viscidly-pubescent; leaves pinnatisect, 3'-4' long, thin, the segments rather distant and unequal, about 1' long, incised-dentate, lobes ovate, subdentate, mostly obtuse; racemes spike-form, densely-flowered, corymbose; flowers subsessile; calyx not enlarged in fruit, lobes oblong; corolla scarce twice longer than the calyx, small, campanulate, margin minutely crose-dentate; stamens scarcely exerted; filaments smooth; style cleft to the middle, hairy below; capsule globose-ovate, 3" long; seeds very minutely pitted, nearly 3" in length.—*Plains of the Platte*, *Coulter*. *Garden of the Gods*, *Porter*.

*PHACELIA SERICEA*, Gr. (*Eutoca sericea*, Grah. *DC. Prod.*, 9, p. 294.) Perennial, canescent with a somewhat silky pubescence appressed upon the leaves; stems 6'-2° high, rather stout, simple, terminating in a narrow, compound raceme; leaves mostly oblong, 2'-3' long, incised-pinnatifid, segments coarsely cut or entire, petioles hispid-ciliate; racemes mostly short-peduncled, ½-1' long in fruit, forming a compound raceme, 3'-12' in length; calyx-lobes linear, exceeding the pedicels, shorter than the corolla which is 3" long, campanulate, blue or rarely white,



persistent, the appendages conspicuous, nearly as long as the tube and distinct from the filaments; stamens 3 times longer than the corolla, the anthers small and roundish; style bifid at the apex; capsule pubescent, ovate-oblong, acute, 3" long, about 16-seeded; seeds pitted.—*Hall & Harbour*, 447. Sangre de Cristo Range, *Brandegee*. Gray's Peak, *Dr. Smith*. Clear Creek Cañon, *Coulter*; *Redfield*.

NAMA<sup>1</sup> DICHOTOMA, Ruiz & Pav. *Gray in Proc. Am. Acad.*, 8, p. 283. More or less viscosely pubescent; corolla not, or but little, surpassing the leaves; capsule ovate or short-oblong; seeds strongly rugose-pitted,  $\frac{3}{8}$ "-- $\frac{1}{2}$ " long, oval-oblong.

Var. ANGUSTIFOLIA, Gray, *l. c.*, p. 284. Leaves linear-lanceolate.—S. Colorado, *Hayden*; *Hoopes*.

### POLEMONIACEÆ.

PHLOX CANESCENS, T. & G. *Gr. Rev. Polemon. Proc. Amer. Acad.*, Dec., 1870, v. 8, p. 253. Dwarf and matted-cæspitose, with a woody, perennial, much-branched base which is usually covered with the dead leaves of previous seasons; the branchlets densely leafy up to the solitary, sessile flowers, woolly-canescens; leaves 3"--4" long, evergreen, rigid, subulate, more or less acerose, scarious-connate at base, usually strongly revolute on the margin, soon spreading or somewhat squarrose-recurved from the appressed base; tube of the white corolla exceeding the calyx, the obovate lobes entire or emarginate, 3"--4" long; ovules solitary.—Cañon City, *Brandegee*.

PHLOX CÆSPITOSA, Nutt. *Gr. Rev. l. c.*, 253. Dwarf, densely or rather loosely cæspitose; leaves rigid, linear-subulate, or oblong-linear, 4"--6" long, pungent, hispid on the thickened, somewhat revolute margins, otherwise smooth or sparingly glandular; corolla-tube more or less exceeding the calyx, lobes obovate, entire, 3" long.

Var. CONDENSATA, Gr. Densely cæspitose, 1½"--2' high; leaves short, 2"--3" long, very closely crowded, erect, imbricated.—Gray's Peak, at 13,000 feet altitude, *Coulter*. *Hall & Harbour*; *Parry*.

PHLOX DOUGLASII, Hook. *Gr. Rev. l. c.*, 254. Cæspitose, very much branched, pubescent or smoothish; leaves rather rigid, acerose, usually spreading, less crowded; margins naked or somewhat hirsute-ciliate at base; flowers subsessile; corolla purple or white, tube exceeding the calyx, lobes obovate, entire, 3" long.—*Hall & Harbour*, 453.

PHLOX LONGIFOLIA, Nutt. *Gr. Rev. l. c.*, 255. Perennial, woody only at the base, glabrous or pubescent; stems erect or ascending; leaves slightly rigid, not fascicled, linear or very narrowly linear, sometimes lanceolate, 1'--3' long; flowers solitary or subcymose, long-peduncled; corolla white or pink, tube longer than the narrow, subulate calyx-teeth; style elongated and often equaling the tube.—Near Long's Peak, *Coulter*. Sangre de Cristo Range, *Brandegee*.

COLLOMIA<sup>2</sup> LINEARIS, Nutt. *Gr. Rev. l. c.*, 259. Annual, more or less

<sup>1</sup>NAMA, L. Calyx 5 sepaled, persistent. Corolla tubular-funnel-form. Stamens subincluded. Styles 2, with rather obtuse stigmas. Capsuls 2-celled, loculicidal, the septum bearing two laminar placentæ projecting into each cell from the axis, which are at first united, at length free.—Low, annual branching herbs, perennial or somewhat woody at the base, variously pubescent, with alternate or rarely opposite entire leaves, and axillary and terminal flowers.—*Choisy, DC. Prod.*, 10, p. 182.

<sup>2</sup>COLLOMIA, Nutt. Corolla tubular-funnel-form or salver-form, with a more or less dilated throat. Filaments slender, unequally inserted, usually protruded. Ovules solitary, few or many in each cell. Seed-coat developing mucilage and projecting spiral threads (spiracles) when wetted, (except in *C. gracilis*).—Annuals or semi-biennials, with alternate leaves, which are usually pinnately incised or divided, and with clustered or sometimes scattered flowers.

viscid-pubescent, becoming glabrate below, glandular above; stems erect, simple or branching, 6'-18' high; leaves sessile, lanceolate, very entire; heads crowded; lobes of the calyx triangular-lanceolate, acute; corolla light blue or nearly white, 6'' long, slender, but little enlarged at the throat, the limb small; ovules solitary; seeds with very numerous spiracles.—*Hall & Harbour*, 404. Cañon City, *Brandegee*. Monument Park and plains of the Platte, *Coulter*.

*COLLOMIA GRACILIS*, Dougl. *Gr. Rev. l. c.*, 259. Annual, viscid-pubescent, at length much branched and spreading, 2'-6' high; leaves sessile, lanceolate or linear or the lowest oval or obovate, entire; flowers rather loosely cymose or scattered; calyx rounded at the base and nearly 5-parted, with linear-subulate segments; corolla 5'' long, purple or violet, nearly salver-form, the narrow tube yellowish and seldom exceeding the calyx; seeds without spiracles.—*Hall & Harbour*, 403. Plains near Denver, *Coulter*.

*COLLOMIA LONGIFLORA*, Gr. *Gr. Rev. l. c.*, 261. Annual, very smooth, erect, 6'-2° high, much branched, paniculately ramose, loosely flowered; peduncles 1-flowered, generally slender, subcorymbose; leaves apiculate, pinnately 3-7-parted, segments linear or almost filiform; lobes of the calyx shorter than the tube, subulate; corolla white, salver-form, tube very long, 9''-18'', not widened above, lobes orbicular or ovate, sometimes apiculate at the apex; filaments included, sometimes 2-3 unequally inserted at the throat; anthers oblong, cells about 10-12-ovuled.—On the plains around Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*.

*GILIA*<sup>1</sup> *NUDICAULIS*, Gr. *Gr. Rev. l. c.*, 266. Annual, very glabrous, 1'-4' high; stem leafless from the cotyledons to the capitate inflorescence which is subtended by an involucre of several ovate-lanceolate or lanceolate, sessile, entire, foliaceous bracts, from whose axils sometimes 1 or 2 smaller heads are produced on short peduncles; corolla white, pink or yellow, salver-form, tube 2''-3'' long, slender, exceeding the calyx, the cuneate lobes 1''-2'' long, somewhat undulate-toothed or decidedly 1-3 dentate at the broad apex; anthers sessile in the somewhat dilated throat, short, included; ovaries numerous.—South Park. *Hall*.

*GILIA NUTTALLII*, Gr. *Gr. Rev. l. c.*, 267. Puberulent; stems numerous from a perennial woody base, slender, simple or loosely branched, 8'-12' high; leaves opposite, mostly shorter than the internodes, palmately-parted into 3-7 narrow-linear, mucronate or acerose segments, 6''-9'' long; flowers crowded into a leafy cluster; corolla white with a yellow throat, fragrant, salver-form, with a short dilated funnel-form throat, the tube puberulent, scarce exceeding the narrow calyx; filaments short, inserted in the throat, scarcely exerted; anthers ovate-oblong; cells 2-ovuled. Figured by *Watson*, *King's, Rep.*, vol. 5, Pl. 25.—Near Mount Lincoln, *Coulter*.

*GILIA PUNGENS*, Benth. *Gr. Rev. l. c.*, 268. Viscid-pubescent, puberulent or glabrate, much branched from woody stems; leaves alternate, short, erect or a little spreading, rigid, fasciated in the axils, palmately 3-7-parted, segments entire and with the calyx-lobes acerose or subulate and pungent; flowers solitary or few in a terminal cluster; corolla pink, white or yellow, salver-form, tube at length longer than the calyx, the

<sup>1</sup>*GILIA*, Ruiz. & Pav. Corolla from salver-form or funnel-form to campanulate or rotate. Stamens equally inserted in or below the throat or sinuses of the corolla and mostly equal; filaments not declined, naked (rarely pubescent) at the base. Ovules sometimes solitary, commonly few or many in each cell. Seed-coat (with few exceptions) developing mucilage or spiracles when wetted.—Herbs, or in a few cases, suffruticose; leaves, &c., various.

wedge-obovate lobes 2''-4'' long; anthers in the somewhat funnel-form throat oblong, cells 8-10 ovuled; seed-coat close, without mucilage or spiracles.—*Hall & Harbour*, 463. Near Denver, *Dr. Smith*. Upper Arkansas, *Porter*. *B. H. Smith*. Cañon City, *Brandegee*. Twin Lakes, *Coulter*.

*GILIA MINIMA*, Gr. *Gr. Rev. l. c.*, 269. Low,  $\frac{1}{2}$ '-1' high, simple or branched, smoothish; leaves pinnately divided with the acerose, spinescent segments widely divaricate; bracts densely crowded, almost hiding the small white flowers, nearly glabrous; calyx slightly hairy in the sinuses, teeth unequal, entire or two of them somewhat divided; corolla  $1\frac{1}{2}$ '' long, about equaling the calyx tube; stamens shorter than the corolla-lobes; cells 1-3 ovuled, 1-seeded.—Colorado, *Vasey*.

*GILIA SPICATA*, Nutt. *Gr. Rev. l. c.*, 273. Perennial; stem stout, erect, 4'-10' high, bearing many heads crowded in a long virgate interrupted leafy spike, densely woolly-tomentose; leaves trifid or very entire, scarcely pointed, alternate, becoming smooth; lobes of the corolla oblong-ovate, shorter than the more or less exerted tube; anthers sessile in the throat, cells 4-6-ovuled.—*Hall & Harbour*, 460. Northern Colorado, *Hayden*.

Var. *CAPITATA*, Gr. Smaller; leaves very entire; flowers in a single terminal head. *Hall & Harbour*, 461. Weston's Pass, at 11-12,000 feet altitude, *Coulter*.

*GILIA CONGESTA*, Hook. *Gr. Rev. l. c.*, 274. Perennial, more or less woolly-pubescent, bearing single, terminal or few corymbose and close heads; stems 3'-12' high; leaves very entire or 3-7 pinnately-parted, with 3-7 narrowly-linear segments, divisions aristulate-mucronate; corolla salver-form, white, the tube about equaling the oval lobes, not exceeding the usually awned calyx-segments; filaments inserted in the sinuses, equaling or exceeding the anthers; cells 2-4-ovuled.—South Park, *Canby*. Gray's Peak, *B. H. Smith*. *Hoopes*.

*GILIA AGGREGATA*, Spreng. *Gr. Rev. l. c.*, 275. Biennial, more or less pubescent; stems 1°-4° high, less leafy above and loosely branching; leaves alternate, pinnately-parted, with linear, mucronulate-apiculate segments; panicle contracted into a virgate spike or loose with open branches; calyx usually glandular, lobes subulate; corolla deep scarlet, varying to light pink or even white or variegated and spotted, tubular-funnel-form, 6''-20'' long, with ovate or lanceolate-acute, widely spreading or soon recurved lobes; filaments either exerted or included; anthers oval or short-oblong; ovules numerous; seeds mucilaginous and spiraliferous.—Very common on the plains on dry slopes and among the foot-hills up to an elevation of 9,000 feet.—*Hall & Harbour* 459; *Parry*; *Dr. Smith*; *B. H. Smith*; *Canby*. North Park, *Hayden*. *Porter*; *Coulter*.

*GILIA PINNATIFIDA*, Nutt. *Gr. Rev. l. c.*, 276. Minutely viscid-glandular, especially above; stem 6'-2° high; leaves pinnately-pinnatifid, narrowly lanceolate in outline, lobes uniform, oblong, 3'' long, curved upward, apiculate, rarely cleft; panicle ample, thyrsoid or sometimes widely spreading and corymbose; bracts linear or subulate, few; corolla salver-form, white or bluish, tube about twice longer than the calyx, a little longer than its obovate lobes; filaments inserted beneath the sinuses, much exerted; anthers ovate; cells 6-8 ovuled; seeds neither mucilaginous nor spiraliferous.—*Hall & Harbour*, 456. South Park, *Canby*. Common on the plains around Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*. *B. H. Smith*. Pleasant Park and La Plata Mountain, at 11,000 feet altitude, *Coulter*.

*GILIA INCONSPICUA*, Dougl. *Gr. Rev. l. c.*, 278. Annual, erect, 4'-12' high, glabrate or viscid-glandular and pubescent, branched and loosely paniced; leaves alternate, the lower 1-2 pinnatifid or pinnate-toothed; flowers scattered, on slender pedicels, purple or blue, rarely white, 3''-5'' long, funnel-form, with the throat more or less dilated, 2-3 times the length of the calyx, the tube little or not at all exerted, the lobes ovate or obovate, mostly exceeding the stamens; filaments slender; cells many ovuled; very variable.—Cañon City, *Brandegee*. *Hall & Harbour*, 457.

*POLEMONIUM CONFERTUM*, Gr. *Gr. Rev. l. c.*, 280. Perennial, 6'-8' high, glandular-viscid and musk-scented, woolly-pubescent above; leaflets very numerous, small, 1''-4'' long, mostly as if whorled or fascicled, being 2-5 divided and sessile, segments either broadly oval or linear-oblong; flowers capitate-crowded, at length racemose-spicate, somewhat nodding, honey-scented; lobes of the calyx narrow, twice shorter than the cylindrical or oblong tube; corolla 8''-12'' long, blue, the narrow funnel-form tube longer than the calyx and 2-3 times longer than its rounded lobes; filaments barely hairy and scarcely dilated at base.—*Hall & Harbour*, 450 and 451. Gray's Peak, at 12,000 feet altitude and Horse Shoe Mountain, at 11,000 feet, *Coulter*. *B. H. Smith*; *Redfield*.

Var. *MELLITUM*, Gr. Laxer in leaflets and inflorescence, with a pale or whitish corolla 1' long, the lobes one-fourth the length of the narrow tubes. Alpine, 2'-3' high.—*Hall & Harbour*. Sangre de Cristo Range, *Brandegee*.

*POLEMONIUM VISCOSUM*, Nutt. *Gr. Rev. l. c.*, 280. Low, 3'-4' high, pubescent and very viscid-glandular; leaflets very entire, ovate or rounded; flowers subcorymbose; calyx subcampanulate, lobes elongated-lanceolate, (broadish, *Gray*;) corolla-tube equaling the calyx, not exceeding its own lobes.—Gray's Peak, *B. H. Smith*.

*POLEMONIUM CÆRULEUM*, L.—*Hall & Harbour*, 449. Twin Lakes, *Coulter*; *Porter*.

Var. *FOLIOSISSIMUM*, Gr. *Gr. Rev. l. c.*, 281. Very viscid-pubescent; stems 2° high, with the corymbose branches very leafy to the top; leaflets often confluent on a wing-margined rachis; stamens and style mostly shorter than the smaller white or blue corolla, which is twice longer than the calyx.—*Hall & Harbour*, 448. Wet Mountain Valley, *Brandegee*. Plains of the Platte, *Coulter*. South Park, *Porter*.

*POLEMONIUM HUMILE*, Willd. (*P. pulchellum*, Bunge.; *P. Richardsonii*, Grah.; *P. capitatum*, Benth.; *P. pulcherrimum*, Hook.) *Gr. Rev. l. c.*, 281. Dwarf, 4'-8' high, branching from the base, softly glandular-pubescent; stems 1-2 leaved; leaflets ovate or oblong-ovate, acute, small; flowers subcorymbose, few, on rather long, slender pedicels, small, blue, tube shorter than the calyx; calyx cleft below the middle; ovules 2-4; seeds 1-2 in each cell.—*Hall & Harbour*, 452; *Parry*. Wet Mountain Valley, *Brandegee*. Chicago Lakes, at 12,000 feet altitude, and Horse Shoe Mountain, at 11,000 feet, *Coulter*. Subalpine woods.

### CONVOLVULACEÆ.

*IPOMÆA LEPTOPHYLLA*, Torr. in *Fremont*, 1st Rep., p. 94; *Emory's Rep.*, p. 148, t. 11. Annual(?), 2°-3° high, much branched from the base; branches long, spreading and prostrate, angular, glabrous; leaves linear and lanceolate-linear, attenuated at both ends, strongly veined, glabrous, mucronate-apiculate, short-petioled; peduncles 1-3-flowered,

$\frac{1}{2}$ '-1 $\frac{1}{2}$ ' in length; sepals appressed, broadly ovate, very obtuse, with a minute mucro, 5'' long; corolla funnel-form, 2'-2 $\frac{1}{2}$ ' long, purple; stamens inserted near the base, filaments villous at the base, anthers oblong-linear, large; style as long as the stamens; stigma 2-lobed, lobes capitate; ovary 2-celled, with 2 ovules in each cell.—On the Platte near Denver and on the mesas around Colorado Springs, *Porter* and *Dr. Smith*.

CONVOLVULUS LOBATUS, Eng. & Gr. *Pl. Lindh.*, p. 44. (*C. hastatus*, Nutt. *Trans. Amer. Phil. Soc.*, (n. ser.) 5, p. 194, non Thurb. *C. Nuttallii*, Torr. in *Emory's Rep.*, p. 149.) Root perennial; stem twining, herbaceous and pubescent; leaves petiolate, on either surface covered with a short hoary and silky pubescence, the primary ones simply hastate, the rest partly palmated, about 2' long, commonly producing on either side of the base two lateral, reflexed and toothed, or almost entire lobes, the central segment more than twice their length and double their breadth; peduncles solitary, mostly 2-flowered, much longer than the leaves, the pedicels each producing 2 bracts; segments of the 5-leaved calyx externally pubescent, imbricated, oval and obtuse, tinged with purple; corolla rose-colored; stigmas 2, filiform; capsule 2-celled, cells 2-seeded.—Cañon City, *Brandegee*.

CALYSTEZIA SEPIUM, R. Br.—Along the Platte near Denver and Colorado Springs, *Porter*. Pleasant Park, *Coulter*.

EVOLVULUS ARGENTEUS, Pursh.—*Hall & Harbour*, 579. Cañon City, *Brandegee*. Plains of the Platte, *Coulter*. Colorado Springs, *Porter*.

CUSCUTA ARVENSIS, Beyrich. *Eng. Monog., Trans. Saint Louis Acad.*, vol. 1, p. 494. Var. *pentagona*, Eng. *l. c.*, p. 494. Calyx thin and shining; lobes orbicular, as long or longer than the shallow tube of the corolla, forming, where they join, 5 projecting angles.—*Hall & Harbour*, 464.

CUSCUTA DECORA, Eng. *l. c.*, p. 501. On *Psoralea*, near Denver, *Dr. Smith*. Cañon City, *Brandegee*. Plains, *Porter*.

CUSCUTA GRONOVII, Willd. *Eng. l. c.*, p. 507.—Cañon City, *Brandegee*. Manitou Springs, *Porter*; climbing high on *Clematis ligusticifolia*. Foot of the Spanish Peaks, Huerfano County, *Greene*.

CUSCUTA CUSPIDATA, Eng. *l. c.*, p. 509. Inflorescence loosely paniculate, with many sterile hyaline bracts on the pedicels and at the base of the calyx; flowers pediceled, membranaceous, about 2'' long; sepals free, imbricate, ovate or orbicular, cuspidate or sometimes obtuse, like the surrounding sterile bracts; ovary oval, with a thick stylopodium; capsule thick and glandless at the apex; seeds about 4'' long, obovate, compressed, rostrate, with a very short oval, mostly transverse hilum; withered corolla covering the capsule like a hood.—*Parry*, 273.

### SOLANACEÆ.

SOLANUM TRIFLORUM, Nutt. *Gen.* 1, p. 128. Stem unarmed, herbaceous, procumbent, hirsutulous; leaves petiolate, pinnatifid, segments acute, entire, or dentate, with broad sinuses; peduncles nearly opposite the leaves, 2-3-flowered; calyx about 5-parted, lobes linear-oblong; corolla small, white, with revolute lobes; berry globose, about the size of a cherry, when ripe blackish-brown.—Buffalo Peaks, *Coulter*. Colorado Springs, *Porter*. *Hall & Harbour*, 467. Denver, *Dr. Smith*.

SOLANUM NIGRUM, L.—Cañon City, *Brandegee*. *Greene*.

SOLANUM ROSTRATUM, Dunal. *DC. Prod.*, 13, p. 329. Stem herbaceous, 2°-3° high, much-branched, armed with strong, straight, yellow

spines and pilose throughout with cinereous-stellate hairs; leaves petioled, spiny, obovate in outline, 2'-3' long, 5-7 lobed, lobes obovate, obtuse; racemes 2'-3' long, 5-8-flowered; peduncles 1' long; pedicels 3''-4'' long, 1-flowered, longer in fruit; calyx villous, globose-cup-form, tube very spiny, longer spines 6'' in length; corolla yellow, about 5-cleft, the lobes broadly ovate, acute, plicate; stamens 5, unequal; anthers declined, one much larger than the others, produced into a long curved beak; berry about 4-celled, included in the spiny calyx.—Common on the plains. *Hall & Harbour*, 465. Near Denver, *Dr. Smith*; *B. H. Smith*. Cañon City, *Brandegee*. *Porter*. Plains of the Platte, *Coulter*.

*SOLANUM HETERODOXUM*, Dunal. *DC. Prod.*, 13, p. 331. In most points like the preceding, but the leaves are smaller, less deeply lobed and on longer petioles; the yellow spines are shorter; flowers corymbosely clustered, 3-5; corolla blue, small, 5''-6'' in diameter, plicate, hirsute-pubescent without, tube short, limb 5-cleft; stamens 5, unequal, half as long as the corolla; filaments short, smooth; berry globose, at first green, then black, 2-celled.—On the plains near Greeley, *Porter*.

*PHYSALIS ANGULATA*, L.—Cañon City, *Brandegee*. Denver, *Dr. Smith*.

*PHYSALIS PUBESCENS*, L.—Cañon City, *Brandegee*.

*PHYSALIS VISCOSA*, L.—Cañon City, *Brandegee*. Colorado Springs, *Porter*.

*PHYSALIS PENNSYLVANICA*, L., var. *LANCEOLATA*, Gr.—Plains of the Platte and Pleasant Park, *Coulter*. Cañon City, *Brandegee*. Denver, *Dr. Smith*. Ute Pass, *Porter*.

*PHYSALIS LOBATA*, Torr. *Ann. N. Y. Lyc.*, 2, p. 226. Much branched from the base; branches prostrate, decumbent or ascending, smooth, angular, often 12'-18' long; leaves oblong or ovate, irregularly lobed or repand, sometimes lyrate, lobes very obtuse, abruptly narrowed into a petiole, solitary or in pairs, nearly smooth; flowers solitary, nodding, on filiform peduncles about half as long as the leaves; calyx subcampanulate, with 5 acute lobes, minutely tomentose at the tips and margins, often covered as well as the pedicels with minute white granules, about 2½'' in diameter; corolla campanulate-rotate, purple or ochroleucous, 9'' in diameter; stamens 5, filaments shorter than the corolla, smooth. Fructiferous calyx much inflated and larger than the berry, 1' long and 1' wide.—*Hall & Harbour*, 466. Colorado Springs, *Porter*. Cañon City, *Brandegee*.

*WITHANIA*<sup>1</sup> (?) *CORONOPUS*, Torr. *Bot. Mex. Bound.*, p. 155. (*Solanum Coronopus*, Dunal.) Annual, erect or spreading, branched above; leaves lanceolate or linear-lanceolate, sessile, tapering to the base, 1'-2' long, nearly entire, toothed or deeply pinnatifid; flowers solitary or in pairs on slender pedicels which are at length reflexed; corolla dull yellow, 5''-6'' in diameter; fruit globose, size of a large pea, nearly white when mature, covered  $\frac{3}{8}$  or more by the calyx.—Cañon City, *Brandegee*. Pueblo, *Greene*.

*NICOTIANA ATTENUATA*, Torr. "Annual, glutinous-pubescent or

<sup>1</sup> *WITHANIA*, Panquy. Calyx campanulate, 5-cleft; lobes subulate, inflated after flowering, more or less covering the berry. Corolla campanulate, funnel-form or subrotate, longer than the calyx, 5-cleft. Stamens 5, inserted on the tube of the corolla, equal or large; filaments subulate, often dilated at the base, naked or squamose; anthers yellow, oblong, equal to or shorter than the filaments. Ovary ovate-globose, smooth, closely surrounded at base by a thin glandulose, annular disk, 2-celled. Placentæ adnate to the dissepiment; ovules many. Style simple, straight, subulate, equal to the stamens or a little longer. Stigma capitate. Berry globose, 2-celled. Seeds many, subreniform. Embryo fleshy, subcircular. *DC. Prodr.*, 13.

somewhat glabrate, erect, 1°-3° high, branched; leaves oblong lanceolate or the uppermost linear, acuminate, attenuate into a petiole, entire or obscurely repand-dentate; lower ones 4'-6' long and 1'-2' wide, the upper ones proportionately narrower; flowers in loose terminal racemes; calyx 3'' long, tubular-campanulate, teeth short, triangular, acute, equal; corolla narrow funnel-form, 1' long, the short limbs spreading or more usually erect and closed; capsule 3''-5'' long, exceeding the calyx, ovate, acute, 2-valved, valves bifid; seeds pitted." Watson in *King's Rep.*, vol. 5, p. 276, pl. 27.—Gray's Peak, *Dr. Smith*.

### GENTIANACEÆ.

*GENTIANA AMARELLA*, L. *DC. Prod.*, 9, p. 95. (*G. acuta*, Mx.) Stem slender, erect, simple, or branched, 2'-10' high; lowest leaves oval-spatulate, upper ones ovate-lanceolate, sessile and sub-clasping, margins scabrous; cyme mostly compound, raceme-like; calyx 5-cleft, lobes lanceolate, somewhat unequal, shorter than the cylindrical tube of the corolla; corolla pale blue, without folds, fringed at the base of the limb, lobes elliptic-lanceolate, shorter than the tube; ovary oblong-linear, sessile.—*Hall & Harbour*, 473; *Parry*; *Canby*. Twin Lakes and Sierra Madre Range, *Coulter*. Subalpine.

Var. *STRICTA*, Watson, (*G. acuta*, Mx. var. *stricta*, Griseb., *DC. Prod.*, 9, p. 96.) Stem 2°-4° high; cymes raceme-like, axillary, strict, elongated, erect; flowers when dried becoming yellow.—Mountains west of Denver, *B. H. Smith*. Wet Mountain Valley, *Brandegee*.

*GENTIANA HETEROSEPALA*, Eng. *Trans. Saint Louis Acad.*, 1, p. 215. Annual, erect, simple, 4'-16' high, few-flowered, glabrous; lowest leaves obovate-spatulate,  $\frac{1}{2}$ '-1 $\frac{1}{2}$ ' long, upper ones ovate, broad at the base, sessile, acute or sub-obtuse, margin minutely scabrous; flowers solitary or fasciated in the axils, on peduncles of unequal length, (3''-18'') pale blue, 6''-8'' long; calyx 5-cleft, two of the lobes large, ovate, acute, nearly equaling the corolla, the rest shorter and linear-subulate; corolla sparingly-bearded, lobes linear-oblong, obtuse, spreading, half as long as the tube; anthers ovate-cordate; pistil linear.—Sierra Madre Range, *Coulter*.

*GENTIANA DETONSA*, Fries.—*Hall & Harbour*, 471. Wet Mountain Valley, *Brandegee*. *B. H. Smith*. Mount Elbert, near Twin Lakes, at 10,000 feet altitude, *Coulter*.

*GENTIANA BARBELLATA*, Eng. in *Trans. l. c.*, 2, t: 11. Stems 1-3 from a perennial caudex, very smooth, 1-flowered, 2'-4' high; leaves fleshy, obtuse, with a very narrow, cartilaginous, crenulate margin, lowest linear-oblong or spatulate, attenuated into a petiole sheathing at the base, 1' long, cauline few, linear, connate at base, lower pair elongated, attenuate at base, the uppermost (2-4) broader at base, involucre-like below the sub-sessile flower, acute or acuminate; calyx 4-cleft, lobes triangular-lanceolate, scarcely longer than the tube, much exceeding the tube of the corolla, 2' long, outer ones a little broader, with a membranous margin, mostly dentate; lobes of the deep azure-blue corolla linear-oblong, obtuse, erect-spreading, with the margins short-ciliate half way up, dentate above, tube deeply campanulate, greenish-yellow within; lower-part of the purplish-brown filaments attached in the middle, the free edges beset with long and slender fringes, glands between the bases of the filaments conspicuous; ovary ovate, attenuate at base; stigma semi-orbiculate, sessile; seeds squamulose.—Mount Flora, in the Snowy Range, *Parry*. Sierra Madre Range, *Coulter*.

*GENTIANA TENELLA*, Fries. *DC. Prod.*, 9, p. 98. Stem branching at

base; pedicels 1-flowered, frequently 2' high; lowest leaves spatulate, upper ones few, oblong; calyx deeply 5-parted, segments mostly unequal, obtuse, at length shorter than the cylindrical tube of the corolla; lobes of the deep blue corolla, ovate, acutish, about equaling the tube.—Gray's Peak, *Greene*. August, 1872.

*GENTIANA HUMILIS*, Stev. *DC. Prod.*, 9, p. 106. Stems numerous, 1'-2' high, laxly branched from the base; branches 1-flowered; leaves smooth with white margins, more or less apiculate; lowest round-ovate, upper ones lance-oblong, at first crowded and imbricated on the stems; calyx 5-cleft; lobes ovate-lanceolate, erect, shorter than the scarcely enlarged tube of the corolla; corolla blue, lobes ovate, half the length of the tube; folds entire, rounded, a little shorter than the lobes; style none; capsule obovate or somewhat globose, attenuated at the base, rounded at the apex. Alpine—*Parry*. Long's Peak, at 9,000 feet altitude, June 2, *Coulter*.

*GENTIANA PROSTRATA*, Hænke. *DC. Prod.*, 9, p. 106. Var. *AMERICANA*, Engelm. Stems simple, 6''-2' high, slender; leaves oval-spatulate, mostly obtuse, not pointed, smooth on the margin; flowers small, 4-parted, deep blue; teeth of the calyx 5, erect, ovate-lanceolate, acute, shorter than the little-enlarged tube of the corolla; tube of the corolla twice longer than the ovate lobes, folds often more than half the length of the lobes, nearly entire; style short; capsule oblong-linear, base attenuated into a short stipe.—*Hall & Harbour*, 475; *Parry*.

*GENTIANA FRIGIDA*, Hænke. *DC. Prod.*, 9, p. 111. Perennial; stem often solitary, ascending; leaves spatulate-linear, obtuse, smooth on the margin; flowers sub-solitary, terminal; calyx 5-cleft, the lobes oblong-linear, half as long as the corolla; corolla plaited, glandless and beardless, narrowly obconic, whitish, with blue spots, lobes short, ovate, 3 times longer than the entire folds; anthers free; testa slightly winged; capsule at length stipitate.

Var. *ALGIDA*, Pall. Stem usually taller, with the flowers, from 1½'-8' high; leaves broader; flowers 1-3, pediceled, 1½'-2' long, more tinged with purple; calyx somewhat unequal and split; lobes of the corolla longer. High alpine.—*Hall & Harbour*, 472. *Parry*, 305. Summit of Pike's Peak, *Canby*. Gray's Peak, *Dr. Smith*; *B. H. Smith*. Mount La Plata, at 14,000 feet altitude, *Coulter*.

*GENTIANA AFFINIS*, Griseb. *DC. Prod.*, 9, p. 114. Perennial; stems clustered, ascending 8'-20' high; lower leaves obovate-oblong, obtuse, the upper lanceolate, rather acute, scabrous on the margins; flowers solitary and pediceled, or clustered and sub-sessile; calyx 5-cleft, lobes oblong-linear or sometimes dilated, very variable, often almost wanting, rarely all present; corolla blue, beardless and glandless, narrowly clavate, open, twice longer than the calyx, the lobes oblong, obtuse, thrice longer than the cleft folds; stigmas connate or twisted or diverging; anthers free; testa slightly winged; seeds orbicular or oblong, winged or wingless.—*Hall & Harbour*, 468 and 469. North Park, *Hayden*. *Parry*, 439; *Canby*; *Dr. Smith*; *B. H. Smith*. Wet Mountain Valley, *Brandege*. Twin Lakes and Sierra Madre Range, *Coulter*.

*GENTIANA PARRYI*, Engelm. *Trans. Saint Louis Acad.*, 1, p. 218. Perennial; stems 1 or several, ascending or erect, 4'-9' high, simple, leafy, few-flowered; leaves somewhat glaucous, broad at base, sessile, rounded-ovate, ovate or ovate-lanceolate, 10''-15'' long, 3''-10'' wide, 3-nerved, the uppermost carinate and boat-shaped, involucrate to the large, sessile flowers which are 15''-18'' long, very deep purple, greenish below, widening upward, with lobes a third as long as the tube; calyx 5-cleft,



membranous, entire, the lobes linear, shorter than the tube; tube of the open corolla obconic, twice longer than the calyx, the erect broadly obovate lobes very shortly acute; ovary lanceolate, stipitate. Subalpine.—*Hall & Harbour*, 470; *Parry*; *Canby*. Gray's Peak, *Dr. Smith*; *B. H. Smith*. North Park, *Hayden*. Twin Lakes, at 10,000 feet elevation, *Coulter*.

*FRASERA SPECIOSA*, Dougl. Biennial, stem stout, erect, 3°–5° high, strict, usually simple, glabrous, not sulcate; leaves in fours, thick, acutish or acute, 7–9 nerved, the lowest oblong-lanceolate, 6'–9' long, 2' wide, attenuate into a long petiole, the cauline connate at base, the uppermost linear; the racemose cyme densely-flowered, elongated; flowers 1' in diameter, the petals bearded at the base between the filaments; calyx-segments linear, acuminate, rather shorter than the whitish, punctate petals; glands in pairs, elliptic-oblong; filaments dilated at base, scarcely united; style about equaling the ovary.—*Hall & Harbour*, 553. Monument Park, *Coulter*. Ute Pass, *Porter*. Abundant at lower and middle elevations.

*SWERTIA*<sup>1</sup> *PERENNIS*, L. *DC. Prod.*, 9, p. 132. Stems erect, 6'–20' high, few-many-flowered; lower leaves oblong-elliptic, long-petioled, cauline ones opposite, ovate-oblong, obtusish; flowers erect, 6''–8'' in diameter, steel-blue, with darker spots; corolla-segments coriaceous, elliptic-oblong, acutish, twice longer than the lanceolate calyx-lobes; glands in pairs, orbicular, the fimbriate crest distinct; stigma reniform, sulcate; seeds winged.—*Hall & Harbour*, 476. Gray's Peak, *Dr. Smith*. *Parry*; *Canby*. Twin Lakes, at 10,000 feet altitude, *Coulter*.

*PLEUROGYNE*<sup>2</sup> *ROTATA*, Griseb. *DC. Prod.*, 9, p. 122. Annual, simple, erect, 3'–6' high, bearing 1–few flowers at the summit; lowest leaves spatulate, the uppermost linear, obtuse; segments of the calyx lance-linear, equaling the corolla; ovary acute.—“South Park, subalpine,” *Hall & Harbour*, 477.

### APOCYNACEÆ.

*APOCYNUM ANDROSÆMIFOLIUM*, L.—Plains of the Platte, near Denver, *Dr. Smith* and *Coulter*.

*APOCYNUM CANNABINUM*, L.—Plains of the Platte, *Coulter*. Wet Mountain Valley, *Brandegge*. *Meehan*.

### ASCLEPIADACEÆ.

*ASCLEPIAS SPECIOSA*, Torr. *Ann. N. Y. Lyc.*, 2, p. 218. Tomentose, becoming glabrate; stem simple, 2°–5° high; leaves 4'–8' long, cordate-ovate, acute, short-petioled or the uppermost nearly sessile, abruptly apiculate; umbels axillary and terminal, solitary, many-flowered, the short peduncles and the pedicels often densely tomentose; flowers light purple; corolla-lobes ovate, acutish, reflexed; hoods of the crown 6'' long, ovate, long-acuminate, bidentate at the base within, thrice longer than the stigma and the compressed, incurved horn; pods 4' long, 1' in diameter.—Plains near Denver, *B. H. Smith*. Colorado Springs, *Porter*. Plains of the Platte, *Coulter*.

<sup>1</sup> *SWERTIA*, L. Flowers 5- (or sometimes 4-) merous. Calyx-segments united at the very base, valvate. Corolla withering, rotate, without corona or folds, glands fimbriate on the margin. Stamens inserted on the throat; filaments equal at base; anthers at length incumbent, nodding. Stigma terminal, seated on the ovary, continuous, emarginate-reniform. Capsule 1-celled, 2-valved, septicidal. Seeds numerous, attached to the valves.—*De Candolle*.

<sup>2</sup> *PLEUROGYNE*, Escholtz. As in *Swertia*, except that the two lateral stigmas are decurrent upon the margins of the valves and glandulose above.

*ASCLEPIAS JAMESII*, Torr. *Bot. Mex. Bound.*, p. 162. Very smooth, somewhat glaucous; stem stout, 1°-2° high; leaves orbicular or orbicular-obovate, subcoriaceous, retuse or emarginate, cordate at the base, very short-petioled, 3'-4' long, 2½'-3½' wide, abruptly pointed; umbels many-flowered, short-peduncled; corolla greenish, segments broadly ovate; hoods purplish, dilated, obliquely-truncated; the horn with the acute point exerted and projected partly over the stigma; pods ovoid, smooth.—Cañon City, *Brandegee*.

*ASCLEPIAS BRACHYSTEPHANA*, Eng. *Bot. l. c.*, p. 163. Stem branching, 8'-12' high; leaves opposite, linear-lanceolate, abruptly narrowed at the base into a short petiole, gradually tapering to a long, narrow point, 3'-6' long; umbels 3-8; peduncles shorter than the pedicels, many-flowered; corolla dull-purple, segments ovate-oblong, reflexed; hoods broader than long, toothed on the inner margins; falciform process vertical; pods oblong, smooth, 2' long, acuminate.—On the plains. *Hall & Harbour*, 478.

*ASCLEPIAS OVALIFOLIA*, Decaisne.—*Hall & Harbour*, 480. Cañon City, *Brandegee*. Upper Arkansas, *Porter*. Monument Park, *Coulter*.

*ASCLEPIAS TUBEROSA*, L.—Cañon City, *Brandegee*.

*ASCLEPIAS VERTICILLATA*, L.—Cañon City, *Brandegee*. Eastern Colorado, *Dr. Smith*.

Var. Dwarf, 4'-6' high, branched from the base; stems very leafy with crowded, filiform leaves; umbels corymbose at the summit.—*Hall & Harbour*, 481. A common form on the plains around Denver and Colorado Springs, *Porter*. Cañon City, *Brandegee*. *Dr. Smith*.

*ACERTES DECUMBENS*, Decaisne. *DC. Prod.*, 8, p. 552. Stems 1°-2° long, numerous, decumbent, sometimes angular; leaves scattered and subopposite, ovate-lanceolate, or more usually narrow-lanceolate, (6' long, ½'-1' wide,) acute, margins scabrous; umbels terminal, sub-globose; corolla-lobes ovate, greenish-yellow; hoods purple, equaling the lobes and exceeding the disk; pods smooth, 4' long, 1' in diameter.—S. Colorado, *Hoopes*.

*ACERATES VIRIDIFLORA*, Ell.—Wet Mountain Valley, *Brandegee*.

*ACERATES AURICULATA*, Engelm. *Bot. Mex. Bound.*, p. 160. Stem erect, 2°-3° high, somewhat glaucous; leaves scattered, linear, filiform or narrowly linear, slightly scabrous but not revolute on the margins, 4'-6' long, less than 1" wide; umbels several, axillary, many-flowered, on short peduncles; pedicels 6" long, pilose; calyx villose on the outside; lobes of the corolla reflexed, 2½" long; hoods obscurely 3-toothed at the apex, involute on the margins, very broadly biauriculate at base, with large triangular wings; pods lanceolate, long-beaked, 3'-4' long.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. Pueblo, *Redfield*.

### JASMINEÆ.<sup>1</sup>

*MENODORA*<sup>2</sup> *SCABRA*, Gr. *Sill. Jour.*, (2d. Series,) 14, p. 44. Stems erect,

<sup>1</sup> *JASMINEÆ*, Brown. Flowers perfect, regular; calyx persistent, dentate or lobed, lobes 5-8; corolla hypogonous, gamopetalous, 5-8 lobed, salver-form, lobes imbricate in aestivation, two exterior contorted or valvate; stamens 2, adnate to the tube and included, anthers 2-celled, cells dehiscing introrsely by a longitudinal chink; ovary destitute of a hypogonous disk, 2-celled, 2-lobed at the apex; ovules erect, 1 or 2 in each cell or rarely 2-4; style simple, stigma 2-lobed; fruit either two-berried or separable into two capsules; valves septiferous in the middle; seeds with little or no albumen; embryo straight; cotyledons two.

<sup>2</sup> *MENODORA*, H. & B. Calyx 10-14 lobed, rarely 7-9 lobed; lobes linear or setaceous, longer than the tube of the corolla. Corolla short-funnelform or subrotate, more or less bearded in the throat; limb 5-parted, lobes obovate or oblong, scarcely mucronulate; filaments filiform; anthers awless.

mostly corymbose at the summit; lower leaves oblong-lanceolate, upper ones linear-lanceolate, very entire, very rarely 2-3 toothed and minutely scabrous as well as the stems; lobes of the small corolla 3"-4" long, broadly obovate, twice exceeding the 7-10 setaceous divisions of the calyx; fructiferous calyx not exceeding the carpels.—Near Pueblo, *Greene*.

### NYCTAGINACEÆ.

**MIRABILIS<sup>1</sup> OXYBAPHOIDES**, Gr. (*Quamoclidion oxybaphoides*, Gr. *Sill. Jour.*, 2d. S., 15, p. 320.) Stems procumbent, diffuse, slender; leaves all deeply cordate, on rather long petioles, lowest reniform, upper ones acuminate, often subangled; involucre 3-flowered, deeply 5-cleft, very viscid-glandular as well as the peduncles in the loose panicle, lobes ovate, rather acute, a little shorter than the campanulate perigonium; stamens 3; fruit subglobose-obovoid, glabrous, destitute of ribs or angles, blackish.—Cañon City, *Brandegee*.

**MIRABILIS MULTIFLORA**, Gr. (*Oxybaphus multiflorus*, Torr. in *Ann. N. Y. Lyc.*, p. 237; *Quamoclidion multiflorum*, Torr. *Sill. Jour. l. c.*, 321.) Pulverulent and minutely pubescent; stems subquadrangular, erect, widely branched, with enlarged joints; leaves opposite, broadly cordate, acute or acuminate; petioles 4"-6" long; flowers axillary and terminal; involucre campanulate, 1' long, pedunculate, segments ovate, acute; flowers 4-7; perianth funnel-form, 1½"-2" long, persistent, 5-lobed, lobes acuminate, purple; stamens 5-6, as long as the perianth; anthers large, yellow; fruit smooth.—Cañon City, *Brandegee*.

**OXYBAPHUS NYCTAGINEUS**, Sweet.—*Hall & Harbour*, 483. Golden City, *Dr. Smith*. Denver, *Porter*. Cañon City, *Brandegee*.

Var. **CERVANTESII**, Gr. (*O. Cervantesii*, Lag.) *Bot. Mex. Bound. Surv.*, p. 174. Branches and involucre viscid-pubescent or villous; leaves much thicker, obtuse, and cordate or sub-cordate at base.—Cañon City, *Brandegee*.

Var. **OBLONGIFOLIUS**, Gr. *Bot. l. c.*, p. 174. Leaves ovate-lanceolate or oblong, thick, not cordate at base, about 2' long; panicles terminal, laxly many-flowered, expanded; stems 2°-4° high.—Cherry Creek, near Denver, *Dr. Smith*. Cañon City, *Brandegee*.

**OXYBAPHUS HIRSUTUS**, Sweet. *DC. Prod.*, 13, 2, p. 433. Very densely pilose with long, spreading, articulated hairs; leaves sessile, ovate, angulate-dentate or repand; involucre pubescent-tomentose.—Chiann Cañon, *Porter*. Wet Mountain Valley, *Brandegee*.

**OXYBAPHUS ANGUSTIFOLIUS**, Sweet. Stems glabrous, ascending, slender, 1°-6° high; leaves glabrous, linear, usually elongated, 2'-4' long, thick, glaucous; flowers loosely paniced; peduncles and involucre pubescent; involucre with 5 triangular, ovate, acuminate lobes, 3-5-flowered, becoming 5" long in fruit; perianth short, sub-campanulate or rotate-funnel-form, scarcely exceeding the involucre, white or pink, the limb 1½" long; stamens exerted; fruit hoary-pubescent, 2½" long.—*Hall & Harbour*, 482. Denver and Colorado Springs, *Porter*. Cañon City, *Brandegee*. *Dr. Smith*; *B. H. Smith*.

<sup>1</sup> **MIRABILIS**, L. Involucre herbaceous, scarcely changed in fruit, calyx-like, of united leaves, 5-lobed, 1-2-flowered. Calyx tubular, or more or less broadly funnel-form. Stamens almost always 5, united within the persistent base of the calyx. Stigma capitate, granulated. Fruit indurated, smooth, ovoid, not angled and scarcely or not at all ribbed. Seed straight, with an incurved embryo, inferior radicle, and foliaceous cotyledons.—Herbs, with jointed stems, opposite leaves, and flowers solitary in the axils, or in crowded terminal clusters.

*ALLIONA*<sup>1</sup> *INCARNATA*, L. *DC. Prod.* 13, 2d pt., p. 434. Stem herbaceous, prostrate, elongated, whitish, mostly woolly; leaves petioled, unequal in the same pair, obtuse at each end or obliquely subcordate at base, margin sinuate, whitish-villose; peduncles solitary; lobes of the involucre lanceolate, acute, reflexed after flowering.—Cañon City, 1873, *Greene*.

*ABRONIA*<sup>2</sup> *FRAGRANS*, Nutt. Viscid-pubescent; stems numerous from a perennial root, ascending  $\frac{1}{2}$ °–1 $\frac{1}{2}$ ° high; leaves oblong or ovate, truncate or more or less cuneate at base; obtuse or acutish; peduncles, mostly solitary, elongated; bracts of the involucre large, broadly ovate, white and scarious, obtuse or acute, 4"–9" long; stamens unequal; stigma clavate; fruit 3"–6" long, coriaceous, narrowly 1–2 winged or wingless, not crested; seed 1 $\frac{1}{2}$ " long.—*Hall & Harbour*, 572. Plains near Denver, *Dr. Smith*; *B. H. Smith*. Near Colorado Springs, *Porter*. Monument Park, *Coulter*.

*ABRONIA* *CYCLOPTERA*, Gr. *Sill. Jour.*, (N. S.), 15, p. 319. Glandular-pubescent; stems prostrate or ascending, 6'–18' long; leaves oblong, ovate or ovate-lanceolate, cuneate at base, obtuse, 1'–2' long; peduncles short; involucre of 5 ovate, acuminate bracts, 2"–5" long, 8–20 flowered; flowers bright rose-color, 6"–12" long, tube pubescent; stamens 3–5; fruit 7"–12" long, 4"–10" wide, including the 2–4 (usually 3) large semi-orbicular, membranous, strongly reticulated, pinkish-purple wings; seed 2 $\frac{1}{2}$ "–4" long.—*Hall & Harbour*, 573. Upper Arkansas, *Porter*. Grape Creek, Fremont County, *Coulter*.

### CHENOPODIACEÆ.

*TELOXYS*<sup>3</sup> *CORNUTA*, Torr. *Bot. Whipl.*, *P. R. R.*, p. 129. Glabrous, 12'–15' high, very much branched; leaves repand-dentate and pinnatifid; segments of the calyx acute, short beaked on the back; calyx beset with minute, elevated glands; flowers minute, terminal and sessile in the forks of the slender, dichotomous branchlets; the terminal ones soon fall away, leaving slender, persistent, awnlike pedicels; seed orbicular, thick, rounded on the margin and closely covered with the utricle which strongly adheres to its surface.—Mountains west of Denver, *Dr. Smith*; *B. H. Smith*. Pueblo, *Greene*.

*CYCLOLOMA* *PLATYPHYLLUM*, Moq.—Near Denver and Colorado Springs, *Porter*.

*CHENOPODIUM* *ALBUM*, L.—Exceedingly variable.—Cañon City, *Bran-degee*. Denver and Colorado Springs, *Porter*. Mount Elbert near Twin Lakes, at 10,000 feet altitude, *Coulter*.

<sup>1</sup>*ALLIONA*, Linn. Involucre gamophyllous, 3-cleft, 3-flowered. Perigonium very small, limb 4-lobed. Stamens 4, freely included. Style simple; stigma capitate. Fruit covered with the indurated base of the perigonium, spinulose on the back. Embryo plicated. *De Candolle*.

<sup>2</sup>*ABRONIA*, Juss. Involucre perfect, of 5–15 distinct leaflets, the head many flowered. Calyx salver-form, with orbiculate lobes. Stamens 5, included, adnate to the tube. Style included; stigma capitate or linear-clavate. Perfect fruit 5-winged. Seed cylindrical, smooth. Embryo by abortion monocotyledonous, infolding the central mealy albumen.—Low herbs, with thick opposite petioled unequal leaves; peduncles axillary and terminal, and flowers in solitary involucre heads.

<sup>3</sup>*TELOXYS*, Moq. Flowers perfect, bractless. Calyx 5-parted, segments subconcave, at length subcarinate, never appendiculate. Stamens 5, subperigynous. Filaments compressed, thickish, subdilated below. Anthers ovate-globose. Staminodia none. Nectary small, annular, depressed, somewhat fleshy. Ovary superior, depressed. Style terete, thickish. Utricle depressed. Calyx angulate, involute, not entirely closed. Pericarp distinct, membranaceous. Seed horizontal, lenticular, strongly depressed. Testa crustaceous. *DC. Prodr.*, 13, 2d pt.

**CHENOPODIUM FREMONTII**, Watson. *King's Rep.*, vol. 5, p. 287. More or less farinose, 6'-3° high, diffusely branched; leaves oblong, ovate or broadly triangular, mostly hastate, abruptly attenuate into a slender petiole; panicle loose and spreading, with short bractlets; branchlets very slender; calyx-lobes carinate-cucullate; seed horizontal, smooth and shining.—Colorado Springs, *Porter*. Cañon City, *Brandegee*.

**CHENOPODIUM HYBRIDUM**, L.—*Hall & Harbour*, 485. "Low mountains" Ute Pass, *Porter*. Near Denver, *Dr. Smith*. Twin Lakes, *Coulter*.

**CHENOPODIUM GLAUCUM**, L.—Near Denver, *Dr. Smith*.

**BLITUM CAPITATUM**, L.—Near Denver, *Dr. Smith*; *B. H. Smith*. Colorado Springs, *Porter*. Twin Lakes, Mount La Plata, and Oro City, *Coulter*.

**MONOLEPIS<sup>1</sup> CHENOPODIOIDES**, Moq. *DC. Prod.*, 13, 2d pt., p. 85. (*Blitum Nuttallianum*, R. & S.) Glabrous, or somewhat glaucous and farinose; stems ascending or decumbent, 3'-12' high, branched; leaves  $\frac{1}{2}$ '-2' long, attenuate into the petiole and hastate at base, the lobes acute and entire or the middle one lacinate-toothed; flowers in rather dense clusters in the axils, often reddish, the sepals lance-elliptic, obtuse, sometimes abortive; seed rather acutely margined, minutely tuberculate and not shining,  $\frac{1}{2}$ " in diameter.—*Hall & Harbour*, 486. Colorado Springs, *Porter*. Near Denver and Twin Lakes, *Coulter*.

**ATRIPLEX PATULA**, L.—Cañon City, *Brandegee*. Pueblo, 1873, *Greene*.

**CORISPERMUM HYSSOPIFOLIUM**, L.—Cañon City, *Brandegee*. Near Denver, *Dr. Smith*. Colorado Springs, *Porter*.

**OBIONE<sup>2</sup> CANESCENS**, Moq. *DC. Prod.*, 13, 2d pt., p. 112. Shrubby, 1°-5° high, hoary-canescens and pulverulent, unarmed, branches usually erect and virgate; leaves sessile, oblong or linear-oblong, narrowed at base, obtuse or acutish, occasionally emarginate, entire, 1'-2 $\frac{1}{2}$ ' long and 2''-4'' wide, (sometimes smaller and ovate or obovate;) flowers diœcious, the staminate in dense clusters at the extremities of the branchlets, the pistillate clusters less crowded, axillary; fruit 2''-3'' long, hoary-pubescent, sessile or short-pedicelled, wingless or broadly winged by the more or less dilated margins of the variously toothed bracts.—*Hall & Harbour*, 308. Cañon City, *Brandegee*. Denver and Colorado Springs, *Porter*.

**OBIONE ARGENTEA**, Moq. *DC. Prod.*, 13, 2d pt., p. 115. Annual and herbaceous, 6'-15' high, branching from the base, the branches ascending, densely mealy-canescens, especially when young; leaves rather thick and fleshy,  $\frac{1}{2}$ '-2' long, usually hastate or deltoid, sometimes rhomboidal or ovoid, attenuate into the short petiole, obtuse or acutish, entire or rarely sinuate-toothed; flowers monœcious, in sessile axillary clusters upon the leafy branches; staminate clusters small; bracts somewhat orbicular, united at base, dilated and herbaceous above in fruit, becoming often 2''-3'' in diameter, the margin deeply and acutely toothed and undulate, the sides strongly reticulated, and frequently more or less crested.—*Hall & Harbour*, 484. Cañon City, *Brandegee*. *Meehan*.

<sup>1</sup> **MONOLEPIS**, Schrad. Flowers polygamous, bractless; calyx of a single scale-like sepal, persistent, without appendages. Stamen 1, inserted on the receptacle. Disk and staminodia none. Styles 2, filiform, somewhat united at base, stigmatic on the inner surface. Utricle strongly compressed, naked, rather thick, subadherent to the vertical flattened seed. Testa crustaceous, fragile. Embryo annular, surrounding the copious farinaceous albumen; radicle inferior.—Annual herbs, with alternate petioled leaves and clustered axillary flowers. *Moquin* in *DC. Prod.*

<sup>2</sup> **OBIONE**, Gartn. Pistillate flowers all without calyx and 2-bracted, the bracts more or less completely united and becoming hardened or corky; radicle superior; otherwise as in *Atriplex*.—Monœcious or diœcious herbs or undershrubs, with mostly alternate entire or sinuate-dentate leaves. *Moquin* in *DC. Prod.*

OBIONE SUCKLEYANA, Torr. *Pacif. R. R. Rep.*, 12, 2d pt., p. 47, pl. 4. Annual; stem branching, prostrate; leaves suborbicular, on long petioles, acutely repand-dentate, pale-green on both sides, nearly glabrous; glomerules axillary; monœcious bracts of the sessile fruit deltoid, united to the summit, the margin narrowly winged, crenate-denticulate; male flowers tetramerous.—*Meehan*; in a dry irrigating ditch three miles west of Denver.

EUROTIA<sup>1</sup> LANATA, Moq. *DC. Prod.*, 13, 2d pt., p. 121. White-tomentose, 6'-18' high, woody below, the subherbaceous branches virgate and often simple; leaves numerous, alternate and fascicled, linear-lanceolate, 6''-18'' long, 1''-2'' wide, revolute upon the margins; flowers frequently diœcious; fruiting involucre 2''-3'' long, penicillate with four dense tufts of long, white hairs, (becoming brown in the herbarium, as also the tomentum,) seed minute,  $\frac{1}{3}$ '' long. Known both as "White Sage" and "Winter Fat."—Near Denver and Colorado Springs, *Porter*. Cañon City, *Brandegee*.

SALICORNIA HERBACEA, L.—In dry saline marshes in South Park, *Porter*.

SUÆDA MARITIMA, Dumont.—*Hall & Harbour*, 489; *Meehan*.

SUÆDA DEPRESSA, Ledeb. (*Salsola*, Pursh, *Fl. N. Am.*, 197. *Chenopodiina*, Moq., *DC. Prod.*, 13, 2d pt., p. 164.) Annual, herbaceous, prostrate, very much branched, glabrous, often reddish; stems (3''-6'' long) and branches usually more or less flexuous; leaves mostly flatter and broader than in the last; flowers and seed similar.—*Hall & Harbour*, 488. "South Park and on the plains." South Park, near the salt-works, *Porter*.

SARCOBATUS<sup>2</sup> VERMICULATUS, Torr. (*Fremontia vermicularis*, Torr. *Frem. Rep.*, pp. 95 and 317, t. 3.) Erect, 3°-6° high, diffusely branched, more or less spinose and the rigid divaricate or spreading branchlets spinescent at the extremities; leaves 6''-18'' long, 1''-2'' wide, frequently much smaller and fascicled on the branchlets, scurfy-puberulent when young, becoming glabrous; staminate aments 3''-9'' long, cylindrical or oblong, nearly 2'' in diameter; anthers soon deciduous; winged calyx of the mature fruit 3''-6'' broad; seed 1'' in diameter, with a thin membranous transparent testa.—Near Cañon City, *Redfield*.

<sup>1</sup>EUROTIA, Adans. Flowers monœcious or sometimes diœcious; the staminate flowers glomerate-spicate at the extremities of the leafy branches; the pistillate below them, axillary, sessile, solitary or clustered, 2-bracted; bracts at first free, becoming connate, enlarging and including the flower in a calyx-like tubular involucre, the free summits elongated and narrowed. Calyx of the staminate flowers 4-parted, the lobes equal, membranous. Stamens 4, inserted on a naked receptacle. Fertile flowers without calyx, staminodia or nectariferous disk. Ovary ovoid. Styles 2, capillary, united only at the base, exserted, hirsute. Fruit utricular, membranous, villous, included in the exceedingly hirsute involucre. Seed vertical, compressed, obovate, with a simple membranous testa. Embryo nearly annular, surrounding the small mealy albumen, green; radicle inferior.—Low stellately-pubescent undershrubs, with alternate, short petioled entire leaves. *Ledebour in Flor. Ross.*

<sup>2</sup>SARCOBATUS, Nees. Flowers unisexual, monœcious and diœcious. Staminate flowers in terminal aments. Scales eccentrically peltate, stipate, angular, cuspidate. Stamens 2-4 under each scale, naked, sessile; anthers oblong. Pistillate flowers solitary, axillary. Calyx ovate, compressed, urceolate, contracted at the apex about the style and somewhat bifid, enlarged and thickened in fruit and developing below the middle a broad transverse undulate veined wing. Ovary sessile, very thin and membranous, flattened, orbicular, mostly oblique, terminating laterally and abruptly in the slender included persistent style; stigmas exserted, thick, divaricate, often unequal; ovule on a short funiculus, campylotropous. Seeds vertical, with a double integument; embryo flat-spiral, green; radicle inferior; albumen at the base very small or none.—A spinescent shrub of alkaline soils, with alternate linear fleshy leaves.

## AMARANTACEÆ.

AMARANTUS RETROFLEXUS, L.—Cañon City, *Brandegee*. Plains around Denver, *Coulter*. Introduced.

AMARANTUS ALBUS, L.—Plains around Denver, *Dr. Smith*. Cañon City, *Brandegee*.

MONTELIA TAMARISCINA, Gr.—Around Denver, *Dr. Smith*; *B. H. Smith*. Cañon City, *Brandegee*.

FRELICHTIA FLORIDANA, Moq.—Around Denver, *Dr. Smith*. "Sand hills on the plains," *Hall & Harbour*, 487.

## PARONYCHIEÆ.

PARONYCHIA PULVINATA, Gr. *Proc. Acad. Phil.*, March, 1863, p. 58. Matted-cæspitose from a woody root, forming dense cushion-like tufts, nearly glabrous, occasionally sending out short nearly naked pubescent stems; stipules silvery, broadly ovate, entire, pointless, the uppermost somewhat acute but blunt, 2" long; leaves thick, oblong, obtuse, ciliate-scabrous upon the margin and somewhat minutely glandular-pubescent, 2½"–3" long and 1" wide, bright green and nerveless, equaling the stipules and with them densely covering the short stems; flowers immersed among the leaves, solitary, terminal, sessile; sepals oval, broadly scarious, awned a little below the somewhat arched apex; staminodia 5, similar to the fertile filaments; ovary glabrous, tapering into the rather short style. Alpine.—*Hall & Harbour*, 66; *Parry*, 297. Mount Lincoln, at 13,000 feet altitude, *Coulter*.

PARONYCHIA SESSILIFLORA, Nutt. Root woody, very densely cæspitose, much branched and crowded; branches very dense, 2' high; leaves imbricated, linear-subulate, lowest erect, obtuse, the upper longer, recurved-spreading, acute or mucronate, rather longer than the 2-cleft stipules; flowers terminal, solitary, sessile; sepals arched at the apex within, with divergent setaceous awns rather shorter, oblong-linear, obscurely 3-nerved; sterile setæ as long as the filaments; style as long as the sepals, 2-cleft at the apex.—South Park, *Canby*. Wet Mountain Valley, *Brandegee*.

PARONYCHIA JAMESII, T. & G. Very minutely scabrous-pubescent, cæspitose, much branched from the base, stems 4'–6' high; leaves linear-subulate, obtuse, ½' long, about the length of the internodes, uppermost mucronate; stipules shorter than the leaves, ovate-lanceolate, acuminate or setose; cymes dichotomous, few-flowered, crowded, with a central, sessile flower in each division; sepals minutely hairy at the base, linear-oblong, obscurely 3-ribbed, with very short cusps, arched at the summit within; sterile setæ as long as the filaments; style 2-cleft one-third of its length.—*Hall & Harbour*, 67. South Park, *Canby*. Abundant at the base of the foot-hills near Colorado Springs, *Porter*.

## POLYGONACEÆ.

ERIOGONUM<sup>1</sup> ALATUM, Torr. *Sitgreaves' Rep.*, p. 168, t. 8. Perennial; root stout and blackish; stem erect, 1°–3° high, arising from a short, thick

<sup>1</sup>ERIOGONUM, Michx. Involucre many-flowered, (seldom few, or very rarely 1-flowered,) campanulate, top-shaped, or cylindric, usually 5–8-toothed or lobed, pointless. Flowers jointed upon their pedicels, which are more or less exerted from the involucre in flower; bractlets usually very delicate or very narrow. Calyx 6-parted or deeply 6-cleft. Stamens 9. Achenium triangular, or in a few species 3-winged.—North American herbs or undershrubs, mostly west of the Mississippi.

caudex clothed with the remains of leaves, subflexuous, leafy; branches alternate, erect, paniculate; radical leaves spatulate or oblanceolate, 2'-4' long, 3''-5'' wide, hirsute; peduncles terminal, in threes; flowers yellowish; involucre solitary, campanulate, 5-cleft; perigonia glabrous, segments equal; achenia with 3 prominent wings, 4'' long; seed ovate, triangular.—North Park, *Hayden*. Plains around Colorado Springs, *Porter*. *Hall & Harbour*, 500.

**ERIOGONUM JAMESII**, Benth. *T. & G. Rev. of Erigoneæ, Proc. Amer. Acad.*, vol. 8, p. 155. Stems 5'-12' high, cæspitose, from a branched, few-leaved, woody caudex; radical leaves spatulate-ovate or narrowly lanceolate; cauline leaves in verticils of 3-5, spatulate or oblong, subsessile, white-tomentose beneath; cyme dichotomous, leafy; involucre in the forks or sessile on the branches, many-flowered, loosely silky-villous externally, segments obovate or spatulate, perigonia somewhat petal-like, white or whitish, the 3 interior segments often becoming longer.—Colorado Springs, *Porter*. Cañon City, *Brandegee*.

**ERIOGONUM FLAVUM**, Nutt. *T. & G., l. c.*, p. 156. Perennial, canescent with a silky-woolly or hoary pubescence; stems scapiform, 3'-6' high, from a thick, many-parted caudex; leaves spatulate or oblong-spatulate, becoming more or less glabrate above, radical ones crowded on the caudex; involucre ones about equaling the 2-8 rays, and of the same number; perigonia golden-yellow, 3'' long, silky-villous on the outside, funnel-form at base, somewhat produced into a stipe; ovary hirsute at the apex.—*Hall & Harbour*, 505; *Parry*; *Canby*. Around Denver and Colorado Springs, *Porter*. Plains of the Platte, *Coulter*. Cañon City, *Brandegee*.

**ERIOGONUM HERACLEOIDES**, Nutt. *T. & G., l. c.*, p. 159. Rather slender, 1½°-2° high, woolly, tomentose or webbed; sterile branches decumbent, subcæspitose, fasciculate, leafy at top; flowering branches or scape-like peduncles sometimes naked, most usually with a whorl of leaves in the middle, with a simple or compound umbel for the most part involucre-bracted; leaves spatulate-oblong or oblanceolate, white-woolly beneath or on both sides; involucre 6-8 cleft, the lobes spreading and soon reflexed, with numerous flowers; segments of the pale yellow, very glabrous calyx scarcely longer than the very slender stipe; filaments villous below; ovary more or less finely hirsute toward the top, especially upon the angles.—Pleasant Park, *Coulter*.

**ERIOGONUM UMBELLATUM**, Torr. *T. & G., l. c.*, p. 160. A span to a foot high, woolly, tomentose or webby, or sometimes glabrate; sterile branches decumbent or creeping, often stolon-like, loosely cæspitose, fasciculate-leafy at top; leaves obovate-spatulate or oval, narrowing to a petiole, white-woolly beneath; peduncles scape-like, leafless excepting the involucre of bract-like leaves subtending the simple or rarely subcompound umbel; involucre deeply 6-8 cleft, many-flowered; calyx very glabrous, yellow or sometimes white, the segments 2-3 times longer than the slender stipe; filaments and ovary as in the last.—*Hall & Harbour*, 504; *Parry*. Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. Plains and foot-hills near Colorado Springs, *Porter*. Sierra Madre Range and plains of the Platte, *Coulter*.

Var. **MONOCEPHALUM**, T. & G. Dwarf, depressed, cæspitose; leaves glabrate above or on both sides, the blade ¼'-½' long; scape ½'-3' high, slender, bearing 2-4 capitate involucre with usually 1-3 bracts, or a single larger one, usually naked; flowers smaller.—Twin Lakes, *Coulter*.

**ERIOGONUM (LACHNOGYNA) ACAULE**, Nutt. *T. & G., l. c.*, p. 163. Perennial, matted-cæspitose, white-tomentose; leaves sessile, densely



crowded upon the closely-branched caudex, oblong or sub-linear, margins revolute; heads of 1-5 nearly sessile short 3-5-toothed involucre, sessile among the uppermost leaves, sometimes shortly exsert-pedunculate in fruit; flower with a broad sessile base, the calyx hardly 2'' long, tomentose, 6-parted, with equal oblong segments; filaments pilose only at base; ovary very tomentose with long tangled wool; leaves 2''-3'' long, spreading from the imbricated sheathing base.—Discovered by Nuttall in the Rocky Mountains of Colorado; not seen by us.

**ERIOGONUM (LACHNOGYNA) LACHNOGYNUM**, Torr. *T. & G., l. c.*, p. 163. Branches of the caudex very short and crowded; scape a span to 1° high, slender; leaves lanceolate or lance-oblong, 1' long, acute, petioled, more or less revolutely-margined, silky above, tomentose beneath; calyx silky-wooly, yellow within.—Southern Colorado and New Mexico. Bluffs of the Arkansas at Pueblo, *Greene*, 1873.

**ERIOGONUM (HETEROSEPALA) OVALIFOLIUM**, Nutt. *T. & G., l. c.*, p. 164. Perennial, caespitose, acaulescent, hoary-wooly; leaves oval or somewhat rounded, petioled, crowded upon the numerous short branches of the caudex; scape 2'-8' high, simple, leafless, with a single head (very rarely 2) of few (3-8) closely sessile 5-8-toothed involucre; bracts very small or wanting; calyx with the base not produced, very glabrous, 6-parted, more or less yellow or rose-colored, wholly petaloid, becoming thin and scarious after flowering; segments very unequal, the outer very broadly oval, cordate at base with usually a rather deep sinus, the lobes reaching to the joint or beyond it, the inner narrow, spatulate, emarginate, connivent-erect and involute, each bearing 3 stamens at the claw-like base; ovary glabrous.—Rocky Mountains of Colorado to Utah and Nevada.

**ERIOGONUM MULTICEPS**, Ker. *T. & G., l. c.*, p. 166. Clothed with very white appressed wool; branches of the caudex short, assurgent, leafy; leaves oblong-spatulate or oblanceolate, gradually attenuated into the petiole; scape 3'-5' high; head bracteate; bracts unequal, 1 or 2 of them often surpassing the involucre; flowers small; involucre 5-10, tubulose, 5-toothed; calyx white or brownish yellow, or tinged with red, somewhat woolly; segments obovate-cuneate, retuse; filaments nearly smooth.—Southern Colorado, *Brandege*.

**ERIOGONUM PAUCIFLORUM**, Pursh. *T. & G., l. c.*, p. 166. Becoming smooth, with the aspect of *Armeria*; branches of the caudex very short, crowded; leaves linear or subs spatulate, revolute-margined, attenuated into a petiole, at length nearly smooth; scape 4'-6' high, bearing a single head; involucre 5-10, turbinate-campanulate, 5-toothed; calyx white, glabrous, segments oval; filaments pubescent below.—South Park, *Canby*; *Hoopes*.

**ERIOGONUM MICROTHECUM**, Nutt. *T. & G., l. c.*, p. 170. Shrubby, rather low, (rarely 1° high,) very much branched from the base; tomentum floccose, sometimes rather thin; branches erect or assurgent, but the cyme either crowded or effuse; leaves narrowly oblong and linear; flowers white or rose-colored, rarely dull yellow, seldom over 1'' in length, usually rather thick at base after flowering, glabrous within, the segments obovate, inner ones at least emarginate or retuse; ovary often scabrous above on the angles.

Var. **FENDLERIANUM**, Benth. Leaves broad, 1'-1½' long, 4''-5'' wide; involucre 2'' long, in an ample loose cyme.—Cañon City, *Brandege*. Pueblo, *Greene*.

Var. **EFFUSUM**, T. & G., (*E. effusum*, Nutt., *Pl. Gamb., l. c.*, p. 172.)

More woolly; leaves oblong or linear-oblong, margins more or less revolute; cyme many-flowered, decomposed, effuse-paniculate; rays usually longer; flowers white.—Common on the plains and foot-hills. Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*. Canby. Plains of the Platte, *Coulter*.

*ERIOGONUM BREVICAULE*, Nutt. *T. & G., l. c., p. 172*. Cæspitose; shrubby, the woody leafy branches very short or depressed, bearing a naked elongated herbaceous scape-like peduncle; leaves 1'-2½' long and 1''-5'' broad, linear, oblong-linear or narrowly spatulate-oblanccolate, attenuate into a slender petiole, white-woolly on both sides or becoming glabrous above, the margins at length mostly revolute; scapes rigid, 3'-10' high, the cyme repeatedly unbracted or trichotomous, calyculately bracted at the nodes; peduncles and the 5-toothed oblong or cyathiform-campanulate involucre (1½''-2'' long) glabrous or some glabrate; calyx glabrous within, white or rose-color or sometimes bright yellow, the segments obovate-oblong and nearly equal.—“From the head-waters of the Platte to New Mexico.”

*ERIOGONUM ANNUM*, Nutt. *T. & G., l. c., p. 173*. Covered with a close white wool; stems tall, 1°-3° high, strict, leafy below; leaves oblong, attenuated at the base, numerous, short-petioled; cymes decomposed; flowers numerous; involucre snowy-woolly, glabrous within, teeth 5, short; calyx white, furnished at base with long, delicate, arachnid wool, segments unequal, outer ones much larger, broadly obovate, inner ones oblong; bracteoles slightly plumose.—Plains around Denver, *Dr. Smith*. Around Colorado Springs, *Porter*. Canby. *Hall & Harbour*, 501.

*ERIOGONUM CERNUUM*, Nutt. *T. & G., l. c., p. 182*. Annual, slender, 4'-15' high; leaves radical or sometimes cauline, round or obovate, somewhat long-petioled, floccose-woolly; panicle glabrous, widely spreading, decomposed, usually very-many-flowered; pedicels soon flexed smooth, 2-3 times longer than the campanulate, glabrous, many-flowered involucre; bractlets setaceous, short, subnaked; calyx white or pinkish, glabrous 6-cleft, turbinate and acute at base, the outer segments square, emarginate or retuse, scarcely exceeding the oblong half-as-wide inner ones. Involucre not over 1'' long; flowers scarcely as long and often much shorter, and well marked by the top-shaped base.—*Hall & Harbour*, 503; *Canby*. Upper Arkansas, *Porter*. Cañon City, *Brandegee*.

*ERIOGONUM GORDONI*, Benth. *T. & G., l. c., p. 185*. Glabrous throughout; leaves subcoriaceous, round; peduncles several from the root, short, repeatedly divided above into an ample, loose dichotomous panicle, branches slender, pedicels subcapillary, 9''-14'' long, erect; flowers 2-3, white, very small; involucre turbinate-campanulate, 5-toothed; outer segments of the very smooth calyx ovate, a little longer than the oblong inner ones; bractlets minutely glandulose.—Cañon City, *Brandegee*. Plains about Pueblo, *Greene*.

*ERIOGONUM TENELLUM*, Torr. *T. & G., l. c., p. 186*. Cæspitose from a much branched woody caudex; leaves crowded, ovate or rounded, white-tomentose; scape and spreading panicle smooth; bracts very small; pedicels elongated, erect; involucre 1½''-2½'' long, rather many-flowered; flowers white, the segments retuse, unequal, the outer broad-obovate or rounded; bractlets villous.—“Colorado to New Mexico.”

*OXYRIA DIGYNA*, Campd.—*Hall & Harbour*, 494; *Parry*. Gray's Peak, *Dr. Smith*. Mount Lincoln, at 13,000 feet altitude, and Horse Shoe Mountain, at 11,000 feet, *Coulter*.

*RUMEX VENOSUS*, Pursh. *DC. Prodr.* 14, p. 43. Stem branched, 1°

high; leaves thick, flat, glabrous, petioled, the lowest ovate-subcordate at base, the rest ovate-lanceolate or oblong, acute, attenuate at base; panicle leafy only at base; racemes axillary and terminal, solitary, simple, sessile, the fascicles 3-8-flowered; flowers perfect, on capillary pedicels jointed at the base and equaling the valves; valves equal, orbicular, deeply cordate, entire, closely reticulate-veined, destitute of a callus, becoming greatly dilated. Leaves often 4' long and 1½'-2' wide, on rather short petioles; valves bright rose-color at maturity, 9"-12" in diameter; outer sepals finally deflexed, about equaling the sinus of the valves.—*Hall & Harbour*, 495.

RUMEX LONGIFOLIUS, DC. *Prodr.* 14, p. 44. Stout, 3°-5° high; leaves elongated, acute, undulate, the lowest oblong, subcordate, or obtuse at base, 6'-15' long, 2'-4' wide, long-petioled, the upper lanceolate, attenuate at each end, and the uppermost linear; petioles flat above, with a thin linear margin; panicle simple, leafless above, the racemes sessile; valves about 2½" in diameter, broad-ovate, slightly cordate, obtuse, finely reticulated, subentire, without callosities.—*Hall & Harbour*, 499. Very common on Bear Creek and Horse Shoe Mountain, *Coulter*.

RUMEX SALICIFOLIUS, Weinm.—*Hall & Harbour*, 496 and 498. Cañon City, *Brandegee*. Denver, *Dr. Smith*. Colorado Springs, *Porter*. Oro City and plains of the Platte, *Coulter*.

RUMEX MARITIMUS, L.—"Subalpine," *Hall & Harbour*, 497. Head of Clear Creek, at 10,000 feet altitude, *Coulter*. Pueblo, *Greene*.

RUMEX ACETOSELLA, L.—*Greeley*, *Greene*.

POLYGONUM ERECTUM, L. (*P. aviculare*, L., var. *erectum*, Roth.) *Watson*, *Rev. of Polyg.*, *Am. Nat.*, 7, p. 664. Erect or ascending, glabrous, 1°-2° high or more, pale or yellowish; leaves oblong or oval, 6"-30" long, usually obtuse; flowers mostly 1½" long, on more or less exerted pedicels; sepals rarely 6; stamens 5-6; achenium broadly ovate to lanceolate, dull and granular or nearly smooth.—Around Denver, *Dr. Smith*. Cañon City, *Brandegee*. North Park, *Hayden*. Weston's Pass, *Coulter*. Colorado Springs, *Porter*.

POLYGONUM RAMOSISSIMUM, Mx.—Colorado Springs, *Porter*. On the Platte near Denver, *Coulter*.

POLYGONUM TENUE, Mx.—*Hall & Harbour*, 492; *Meehan*. Colorado Springs, *Porter*. Sierra Madre Range, *Coulter*.

POLYGONUM IMBRICATUM, Nutt. *Watson*, *l. c.*, p. 665. Low, slender, often diffusely branched, 1'-8' high; leaves narrowly linear; spikes dense; bracts loosely imbricated, linear or oblong, 2"-4" long, with sometimes a narrow, scarious margin, acute; stamens 3 or 5; style one-third as long as the ovary. Alpine and subalpine.—*Hall & Harbour*, 493; "Blue River, on the western slope of the Rocky Mountains."

POLYGONUM AMPHIBIUM, L., var. TERRESTRE, Willd.—Near Denver, *Dr. Smith*. Near Colorado Springs, *Porter*.

POLYGONUM PENNSYLVANICUM, L.—*Greeley*, *Greene*..

POLYGONUM INCARNATUM, Ell.—Cañon City, *Brandegee*. Plains of the Platte, *Coulter*.

POLYGONUM VIVIPARUM, L.—*Hall & Harbour*, 491. Near Denver, *Dr. Smith*. Clear Creek Cañon, *Coulter*.

POLYGONUM BISTORTA, L. *DC. Prod.* 14, p. 125. Rhizoma thick and twisted; stems annual, very simple; sheaths long and striately nerved; leaves glabrous or puberulent beneath, the lowest cordate obtuse, with a long-winged petiole, the upper sessile, the highest linear or abor-

tive; spike dense, oblong, obtuse; pedicels exceeding the flowers; stamens exerted.

Var. OBLONGIFOLIUM, Meisn. Stem simple, 6'-2° high; leaves glabrous, the lowest oblong, the blade 3'-8' long, 1'-2' broad, scarcely decurrent by an abruptly attenuate base into a very long petiole; spike oblong,  $\frac{1}{2}$ '-2' long.—*Hall & Harbour*, 490. Gray's Peak, *Dr. Smith*. Sangre de Cristo Pass, *Brandegee*. Mount Lincoln, at 13,000 feet altitude, *Coulter*. *Parry*; *B. H. Smith*. Twin Lakes, *Porter*.

POLYGONUM DUMETORUM, L.—Cañon City, *Brandegee*. Foot-hills near Denver, *Coulter*.

### ELEAGNACEÆ.

SHEPHERDIA CANADENSIS, L.—*Hall & Harbour*, 506. Twin Lakes, *Coulter*.

SHEPHERDIA ARGENTEA, Nutt.—Green Horn River, *Greene*, 1873.

### SANTALACEÆ.

COMANDRA PALLIDA, DC. *Prod.* 14, p. 666. Stems from a woody caudex, herbaceous, striate, erect, 6'-10' high, branched above; leaves alternate, bluish, somewhat punctate on the margin, lower elliptical-oblong, mucronate-acute, 8''-12'' long, 2''-3'' wide, uppermost usually linear-lanceolate, 5''-10'' long, about 1'' wide; bracts linear-lanceolate, 2'' long; pedicels slender, 1'' long; flower as in *C. umbellata*, but the lobes more papillose-velvety, especially on the margin and within; calyx-lobes erect, spreading; fruit 3'' in diameter with a subfleshy epicarp.—*Hall & Harbour*, 507; *Meehan*. Saint Vrain Cañon, *Coulter*.

### LORANTHACEÆ.

ARCEUTHOBIMUM<sup>1</sup> AMERICANUM, Nutt. *Engelm.*, in *Boston Jour. Nat. Hist.*, 6, p. 214. Slender, fasciculately branched, greenish-yellow; flowers often verticillate; male flowers almost always terminal on short branchlets, crowded, rarely axillary; berry  $1\frac{1}{2}$ '' long. On *Pinus contorta*, from Colorado northward and westward; flowers in August and September, maturing its fruit in 12-13 months. Delicately fasciculate, much branched plants, 1' or, 2'-3' high.—*Meehan*. Mount of the Holy Cross, *Coulter*.

ARCEUTHOBIMUM ROBUSTUM, Engelm. in *Revision Arceuth. ined.* Stout, spiked-branched, olive or brownish-green; flowers opposite, spiked; berry  $2\frac{1}{4}$ '' long. On *Pinus ponderosa*, from Colorado southward and westward; flowers in June, maturing in 15-16 months. Stout and darker colored than the last, 3'-4' high; flowers and fruit much larger.—*Hall & Harbour*, 574. *Meehan*; *Woolson*.

### EUPHORBIACEÆ.

EUPHORBIA LATA, Engelm. *DC. Prod.*, 15, 2d pt., p. 18. Canescent with appressed pubescence; stems from a woody rootstock, spreading, short, rigid, dichotomously very much branched, 3'-4' high; lower internodes longer than the leaves, uppermost very short; leaves very short-petioled,

<sup>1</sup> ARCEUTHOBIMUM, M. Bieb. Dioecious. Male flowers mostly 3-parted. Anthers adnate to the middle of the lobes, 1-celled, with one circular opening; pollen grains spinulose. Female flowers mostly 2-parted, inferior; ovary ovoid, compressed. Stigma oval or conic. Fruit ovoid, somewhat compressed, opening at base, on an exert recurved peduncle.—Small yellowish or greenish-brown shrubs, parasitic on *Conifera*, with 4-angled compressed joints; opposite leaves reduced to small connate scales; fructification biennial.

triangular-ovate from a somewhat oblique, abruptly attenuated base, or oblong, obtuse, with revolute margins; stipules triangular-lanceolate, ciliate; involucre axillary, solitary, campanulate, hairy on the outside and in the throat, lobes triangular, elongated; glands ovate with a very narrow lobulate appendage; style short, 2-parted, somewhat thickened at the apex; capsule hirsute with appressed hairs; carpels obtusely carinate; seed oblong, 4-angled, transversely wrinkled.—Purgatory River, *Dr. Bell*.

*EUPHORBIA PETALOIDEA*, Engelm. *DC. Prod.*, 15, 2d pt., p. 28. Glabrous; stems dichotomous, procumbent or ascending; leaves attenuate to the scarcely oblique base, oblong-linear or linear, elliptic, 5''–7'' long, 1½''–2'' broad, obtuse, mucronulate, entire; stipules subulate, somewhat entire; involucre, solitary, on pedicels about their own length, campanulate, lobes hairy beneath the glands within, minutely-ciliate, triangular, acute; glands suborbiculate, concave, with an entire ovate appendage 3 times their breadth; style short, bifid; the carpels of the depressed capsule rounded; seed ovate, acute, obsoletely 4-angled.—*Hall & Harbour*, 512. Cañon City, *Brandegee*. Near Denver, *Dr. Smith*; *B. H. Smith*.

*EUPHORBIA FENDLERI*, T. & G. *DC. Prod.*, 15, 2d pt., p. 38. Glabrous, from a slender, short, somewhat woody root-stock; stems numerous, delicately filiform, rather rigid, erect or decumbent, much branched dichotomously 2'–4' high; leaves 1½''–2½'' long, ovate from a rounded base, obtuse, entire, stipules subulate, often laciniate at base; involucre terminal, solitary, turbinate, slightly bearded in the throat, lobes short, ovate, fimbriate; glands transversely oblong with a very narrow obsolete appendage; style short, divaricate, bifid; capsule 1'' broad, furnished with a small, somewhat 6-lobed calyx; carpels obtusely carinate; seed ovate, 4-angled, irregularly scrobiculate-punctate.—*Hall & Harbour*, 513.

*EUPHORBIA REVOLUTA*, Engelm. *DC. Prod.* 15, 2d pt., p. 46. Glabrous; stem erect, filiform, naked below, much branched above the middle, 4'–5' high; leaves 5''–12'' long, ½'' wide, narrowly linear, entire, obtuse, revolute on the margins, attenuated below, base rather oblique, short-petioled; stipules subulate, entire; involucre very small, uppermost in the forks of the branches and terminal, somewhat truncate, short-campanulate, lobes triangular-lanceolate, ciliate; glands purple, 3 or 4 times broader than the whitish or reddish, oblong appendage; styles short, bifid; capsule glabrous, acute, carinate, ½'' long; seed oblong, sharply 4-angled, sparingly and irregularly rugose.—Cañon City, *Brandegee*.

*EUPHORBIA MACULATA*, L.—Plains near Denver, *Coulter*.

*EUPHORBIA GLYPTOSPERMA*, Engelm.—Cañon City, *Brandegee*. Colorado Springs, *Porter*. *Canby*. Near Denver, *Dr. Smith*.

*EUPHORBIA HEXAGONA*, Nutt. *DC. Prod.*, 15, 2d pt., p. 52. Somewhat hairy with scattered appressed hairs; stem slender, 1°–1½° high, erect, annual; branches opposite and dichotomous, striate-angled, lower ones 6' long; leaves all opposite, short-petioled, linear-lanceolate, attenuate at each end, acute, mucronulate, entire, lower ones with the petiole 1½' long, 2''–2½'' wide; floral ones very narrowly linear; stipular glands minute; involucre hairy without and in the throat, short, many cleft; glands 5, transversely ovate, with a green ovate-triangular, acute appendage, twice their length; styles very short, capitate and somewhat 2-lobed at the apex; carpels of the smooth capsule (2'' long) obtusely carinate; seed ovate, finely scrobiculate and tuberculate.—On the plains, *Hall & Harbour*, 511. Plains near Denver, *Porter*.

*EUPHORBIA MARGINATA*, Pursh.—*Hall & Harbour*, 508. Plains near

Denver, *Dr. Smith*; *B. H. Smith*. Plains of the Platte, *Coulter*. Very abundant on the plains around Colorado Springs, *Porter*.

*EUPHORBIA OBTUSATA*, Pursh.—Cañon City, *Brandegee*.

*EUPHORBIA DICTYOSPERMA*, Fisch. & Meyer.—*Hall & Harbour*, 510. Eastern Colorado, *Porter*.

*EUPHORBIA MONTANA*, Engelm. *DC. Prod.*, 15, 2d pt., p. 148. Perennial, very glabrous, glaucous; stems many from a thick root-stock, ascending, leafy, shortly branched from the upper axils or often simple, 8'-15' high; leaves scattered, rather thick, subsessile, entire, rounded at base, 4"-15" long, ovate, obtuse, the uppermost subverticillate; floral bracts orbiculate, triangular, rarely subcordate, very obtuse, mucronulate, broader than long; inflorescence umbellate, the rays becoming repeatedly dichotomous; involucre turbinate, roughish within, the lobes oblong-linear, velvety; glands transversely oblong, truncate, very shortly 2-horned; styles very short, bifid, thickened at the apex; capsule 2" long, ovate, smooth; seeds oblong, superficially pitted, caruncle shortly conical.—*Hall & Harbour*, 509; *Parry*, 438. Near Denver, *Dr. Smith*; *B. H. Smith*; *Canby*; *Meehan*. Cañon City, *Brandegee*. Colorado Springs, *Porter*. Boulder Cañon, Clear Creek Cañon, and plains of the Platte, *Coulter*.

*TRAGIA NEPETÆFOLIA*, Müller. *DC. Prod.*, 15, 2d pt., p. 933. Low, erect or ascending; petioles 4-10 times shorter than the blade; blade lobate-dentate below, otherwise coarsely dentate; racemes short; bracts lanceolate; divisions of the pistillate calyx ovate or lanceolate; anthers oblong; filaments not thickened at the summit; ovary strigose-hirsute; styles connate about one-third their length, rather shortish, erect-spreading, subacuminate.

Var. *RAMOSA*, Müller. *DC., l. c.*, 934. (*T. ramosa*, Torr., in *Ann. N. Y. Lyc.* 2, p. 245.) Hirsute, erect, much branched, 6'-8' high; stem slender, at length flagelliform-elongated, weak and somewhat twining; leaves triangular-ovate from a cordate base or oftener lanceolate, gradually acuminate, 8"-12" long.—*Hall & Harbour*, 309. Cañon City, *Brandegee*; *Redfield*; *Greene*.

*CROTON (HENDECANDRA) TEXENSIS*, Müller. *DC. Prod.*, 15, 2d pt., p. 692 (*C. muricatus*, Nutt.) Covered with a close, canescent, stellate pubescence, dichotomously branched and spreading, 1°-2° high; leaves petioled, lance-ovate, oblong or linear-lanceolate, obtuse or acute, 1'-1½' long, entire or repand; dioecious, racemes of male flowers short, pedunculate, somewhat interrupted; glands of the disk compressed obovoid, not coherent, shortly adnate to the calyx; filaments pilose; ovary stellate-tomentose, softly muricate; styles twice or thrice dichotomously 2-parted.—On the plains. *Hall & Harbour*, 514. Banks of the Platte, near Denver, *Dr. Smith*; *B. H. Smith*; *Porter*. Cañon City, *Brandegee*.

*ARGYROTHAMNIA*<sup>1</sup> *HUMILIS*, Müll. *DC. Prod.*, 15, 732. (*Aphora humilis*, Eng. & Gr. *Pl. Lind.*, 1, p. 54.) Stem about 1° high, much branched, silky or strigose-pubescent, branches spreading, ascending, compressed, angled; leaves narrowed at the base, spatulate or obovate-lanceolate or linear-lanceolate, acute, entire, sparingly pubescent, with appressed hairs; raceme shortened, much shorter than the leaves, on very short peduncles; pedicels of the male flowers very short, of the fertile thrice shorter than the calyx.—Pueblo, *Greene*.

<sup>1</sup>*ARGYROTHAMNIA*, Müll. *DC. Prod.*, 15. Male calyx valvate; female imbricated. Petals alternate with the calyx-segments; evolute or rarely suppressed. Glands of the disk opposite the divisions of the calyx, alternate with the petals. Female disk hypogonous, free; male free or connate with the staminal column. Stamens central, outer ones opposite the 5 petals; anthers deliscent on each side. Rudiment of an ovary none. Ovules 1 in each cell; carpels 3, 2-valved; seeds globose, not arilled.

## URTICACEÆ.

CELTIS OCCIDENTALIS, L. *Gray's Manual*, p. 443.—Cañon City, *Brandegee*.

URTICA GRACILIS, Ait. *Gray's Manual*, p. 444.—Plains of the Platte, *Coulter*.

URTICA DIOICA, L. *Gray's Manual*, p. 444.—Sierra Madre Range, at 10,000 feet altitude, *Coulter*.

PARIETARIA PENNSYLVANICA, Muhl. *Gray's Manual*, p. 446.—Cañon City, *Brandegee*. *Meehan*.

HUMULUS LUPULUS, L. *Gray's Manual*, p. 446.—*Hoopes*. Along the Platte, *Porter*. In the Sierra Madre Range, at 10,000 feet altitude, *Coulter*. Webster Cañon, *Redfield*.

## CUPULIFERÆ.

QUERCUS ALBA, L., var. GUNNISONI, Torr. *Pacif. R. R. Rep.* 2, p. 130. Shrub 6°–10° high; leaves oblong, somewhat coriaceous, with a minute, yellowish, downy pubescence underneath, 3'–5' long, with 3–4 pairs of rather narrow oblong subequal lobes; lobes subentire, obtuse; fruit on a long peduncle; cup hemispherical, about 5'' broad and 3'' deep; acorn smaller than that of *Q. alba*, usually 9'' long and 5'' in diameter, sometimes much shorter and scarcely exceeding the cup.—There is a great diversity of views among botanists as to the true position of this oak. Mr. Watson (*Amer. Nat.* 7, p. 372) regards it as one of the many varieties of *Q. undulata*, Torr., but it seems so widely different in the shape and section of its leaves and size of the fruit from the figure of that species as given in *Ann. N. Y. Lyc.* 2, pl. 4, that we prefer to retain the old name for the present.—At the base of the foot-hills, covering the dry slopes. The most common scrub-oak. *Canby*; *Hall & Harbour*; *Porter*; *Coulter*.

QUERCUS EMORYI, Torr., in *Emory's Rep.*, p. 152, pl. 9. A low shrub; leaves coriaceous, oblong, on very short petioles, 1'–2' long, variable in size, remotely and repandly toothed, or in the younger ones with deeper and crowded teeth; teeth short, bristle-pointed; glabrous above, yellowish-downy beneath; fruit pedunculate, solitary and in pairs; acorn ovoid or ovoid-oblong, mucronate; the scales appressed.—Cañon City, *Brandegee*.

CORYLUS ROSTRATA, Ait.—*Hall & Harbour*, 516.

## BETULACEÆ.

BETULA OCCIDENTALIS, Hook. *Fl. Bor. Am.*, 2, p. 155. Watson in *King's Rep.*, vol. 5, p. 323, pl. 35. Shrub 8°–12° high; branches dark reddish-brown, sprinkled with resinous warts; leaves 1'–1½' long, 9''–15'' wide, thin, broadly ovate, acute, truncate or cuneate at base, smooth above, lighter colored beneath, petioles, margins and veins somewhat hairy, not punctate, irregularly toothed or serrate, serratures short and glandularly mucronate; petioles slender, 3''–6'' long; fruiting aments cylindrical, 9''–12'' long; peduncles suberect, leafy, 3''–5'' long; scales pubescent, ciliate, the lateral lobes divergent, quadrangular; seeds with wings twice broader than the body.—*Hall & Harbour*, 518; *Canby*; *Porter*. Along the Platte near Denver, *Coulter*.

BETULA GLANDULOSA, Mx.—“Subalpine,” *Hall & Harbour*, 517. Twin Lakes, *Porter*. Sierra Madre Range, *Coulter*.

ALNUS VIRIDIS, Ait.—*Hall & Harbour*, 519.

ALNUS INCANA, Willd.—Ute Pass, *Porter*.

## SALICACEÆ.

*SALIX NIGRA*, Marsh., var. *AMYGDALOIDES*, Anders. *DC. Prod.*, 16, 2d pt., p. 201. Fertile aments spreading, thickish; scales sparingly pilose; leaves broadly lanceolate, long and sharply attenuate-acuminate, often subfalcate, very smooth, glaucous beneath; capsules long-pedicelcd, very glabrous. Resembles *S. lucida*.—A shrub or small tree, common along the Platte.—*Dr. Smith; Porter.*

*SALIX LONGIFOLIA*, Muhl., var. *ARGYROPHYLLA*, Nutt. *DC. Prod.*, 16, 2d pt., p. 214. Leaves and capsules clothed with a silvery-shining tomentum, becoming glabrate with age.—Banks of the Platte, *Dr. Smith; B. H. Smith; Porter.* Twin Lakes, *Coulter.*

*SALIX DISCOLOR*, Muhl.—Twin Lakes, at 10,000 feet altitude, *Coulter.*

*SALIX LIVIDA*, Wahl., var. *OCCIDENTALIS*, Gr. (*S. rostrata*, Richards.)—*Hall & Harbour*, 522. Saint Vrain Cañon, *Coulter.*

*SALIX CHLOROPHYLLA*, Anders.—Twin Lakes and Mount Lincoln, at 11,000 feet altitude, *Coulter.*

*SALIX CORDATA*, Muhl.—*Hall & Harbour*, 524. Near Denver, *Coulter.*

Var. *ANGUSTATA*, Anders.—Bear Creek, 15 miles west of Denver, *Coulter.*

*SALIX GLAUCA*, L. *DC. Prod.*, 16, 2d pt., p. 280. Shrub of variable height, often low; aments leafy-peduncled, cylindrical, thickish, rather dense-flowered; scales acutish or obtuse, fulvous, darker at the apex, villos with long white hairs; capsules ovate-lanceolate, obtusish, densely snowy-tomentose, scarcely pedicelled; pedicel about the length of the nectary; style produced, usually bifid; divisions of the stigmas divaricate; leaves elliptical-lanceolate, mostly silky-villose on both sides, becoming somewhat glaucous beneath, veiny, entire.

Var. *SERICEA*, Anders. Leaves pilose with silvery hairs, broadly oval, ovate, obovate or lanceolate, acute or obtuse, 1'-2' long.—“Subalpine,” *Hall & Harbour*, 523. Gray's Peak, *Dr. Smith.* Mount Lincoln, at 13,000 feet altitude and White House Mountain, *Coulter.* South Park, *Porter.*

Var. *PULLATA*, Anders. Leaves smoother, glaucous beneath.—Ute Pass and South Park, *Porter.* Mount Elbert near Twin Lakes, at 12,000 feet altitude, and Sierra Madre Range, *Coulter.*

*SALIX DESERTORUM*, Richards. *DC. Prod.*, 16, 2d pt., p. 281. Low, 20-30 high; aments very short, 6'' long, subglobose, dense-flowered; scales pale rose-color, densely white-villose; capsules ovate, conic, white-woolly, sessile; style 2-parted, brown; leaves narrowly oblong, 6''-12'' in length, 2''-4'' wide, obtusish, rigid, more or less white-tomentose beneath, midrib prominent, yellow; staminate aments very small, 2''-4'' long.—Mount Elbert, near Twin Lakes, *Porter.*

*SALIX ARCTICA*, Pall., var. *BROWNEI*, Anders. *DC. Prod.*, 16, 2d pt., p. 286. Dwarf, branches decumbent and much spreading; leaves spatulate-oblong, oblong, or oblong-elliptical, about 1' long; aments lateral and sub-terminal, short, 6''-8'' long, on long, leafy peduncles; capsules mostly grayish-tomentose; style elongated; leaves nearly smooth or hairy, entire or remotely serrulate, pale and very veiny beneath.—*Hall & Harbour*, 520; *Parry.* Gray's Peak, *Dr. Smith.* White House Mountain, at 13,000 feet altitude, *Coulter.*

*SALIX RETICULATA*, L. *DC. Prod.*, 16, 2d pt., p. 301. Decumbent, rather stout; branches leafy at the summit; ament terminal, very long-peduncled, densely flowered, narrowly cylindrical; peduncle leafy; scales yellowish-pink, rounded ovate; capsule oval-ovate, sessile, hoary to-



mentose; nectary somewhat cup-shaped, surrounding the base of the capsule and often exceeding it; style very short or none; stigmas 2-cleft, brown, divaricate; leaves 6''-9'' long, oblong or suborbicular, mostly rounded at the apex, glaucous beneath, reticulately veined, entire, obtuse at base or subattenuate into a long and slender petiole; sterile aments 2''-4'' long and very loosely flowered; fertile aments also short, 3''-6'' long, densely flowered, on long naked peduncles.—Alpine, *Hall & Harbour*, 521. Sangre de Cristo Pass, *Brandege*.

POPULUS TREMULOIDES, Mx.—Known as "Quaking Asp." and very common at middle elevations. *Hall & Harbour*, 527. South Park, *Coulter*. *Dr. Smith*.

POPULUS BALSAMIFERA, L., var. CANDICANS, Gr.—Commonly called "Cottonwood." *Hall & Harbour*, 526; *Dr. Smith*. Chicago Lakes, *Coulter*.

Var. ANGUSTIFOLIA, Watson. *King's Rep.*, vol. 5, 327. (*P. angustifolia*, James. Branches terete, glabrous; leaves ovate-lanceolate, attenuate at base, acute, glabrous, crenate-serrate.—Common along the Platte. *Hall & Harbour*, 525. Upper Arkansas, *Porter*. *Canby*.)

POPULUS ANGULATA, Ait.—Very abundant along the Platte near Denver, *Dr. Smith*.

### CONIFERÆ.

PINUS CONTORTA, Dougl. *DC. Prod.*, 16, 2d pt., p. 381. A low tree, 10°-30° high; bud-scales lanceolate, acute, sublacerate; sheaths short; leaves in pairs, 1'-2' long, numerous, rigid, erect-spreading, semi-terete and deeply channeled, mucronate and subacute, scarcely roughish on the margin; cones 1-4, verticillate, 1'-2' long, 10''-15'' wide, ovoid, subobtuse, straight or curved, persistent; scales 3''-4'' wide, with a shining, pyramidal, 4-sided summit, the transverse ridge acute, mucronate with a deciduous, straightish or incurved spine. *Newberry in Pacif. R. R. Rep. Bot.*, vol. 6, p. 35, pl. 5.

Var. LATIFOLIA, Eng. Mountain form, 15°-25° high; branches short and few, recurved with age; foliage sparse, often profusely cone-bearing; allied to the eastern scrub-pine, *P. inops*, which it closely resembles; known as "Red Pine." Parry remarks: "It is quite abundant on the crest and slopes of dry subalpine ridges, forming the principal part of the forest there and extending to near the snow-line; a symmetrical tree of rapid growth, with slim and tapering trunk a foot in diameter, a smoothish, grayish-brown bark, detached in thin scales, and tough but coarse wood, which is liable to warp, and rarely cut into boards."—Mount of the Holy Cross, *Coulter*. Twin Lakes, *Porter*.

PINUS PONDEROSA, Dougl. *DC. Prod.*, l. c., p. 395. Tall, with wide-spreading or subpendulous branches, ascending at the ends, somewhat twisted; bud-scales lanceolate-acuminate, fimbriate-ciliate on the margin; sheaths rather long; leaves in threes, rather long, 4'-10', and  $\frac{3}{4}$ ''-1'' broad, clustered at the ends of the stout rigid branchlets, scabrous on the margin, rather sharply mucronate; male aments several, fasciated in heads, long-cylindrical, obtuse, straight or curved; antheriferous bracts suborbicular, crenate-dentate; cones 3-4, sessile, subpendulous, straight or conic-cylindric, 3'-6' long, 1 $\frac{1}{2}$ '-2' wide; scales 1'-1 $\frac{1}{2}$ ' long, 6''-9'' wide, the subrhombic summit elevated, radiately cracked, the transverse ridge acute, the micro stout, sharp and recurved; bracts persistent, thickened; seed oval, 3''-5'' long, the wing oblong, obtuse, 1' long.—A stately, symmetrical tree, reaching a height of 70 to 100 feet, with a

light red bark, yellowish-brown within, cracking irregularly and cleaving into small, very irregularly shaped scales; known commonly as the "Yellow Pine," and a most valuable timber-tree. Common through all the lower slopes and less elevated districts of the mountains. *Newberry, l. c., p. 36, pl. 4.—Hall & Harbour; Porter; Coulter.*

*PINUS FLEXILIS*, James. *DC. Prod., l. c., p. 403.* Tree of medium size; lower branches horizontal, upper ones ascending; bud-scales ovate, acuminate, subfimbriate; sheaths 6" long, of several ovate and linear-oblong, obtuse, deciduous scales; leaves 1'-3' (usually 2') long,  $\frac{1}{2}$ " wide, in fives, densely crowded at the ends of the branchlets, rigid, smooth, obtusely mucronate; sterile aments numerous, 3"-5" long, in a thick, subterminal spike; cones resinous, 3-4, oval-oblong to ovate-cylindric,  $2\frac{1}{2}$ '-5' long,  $1\frac{1}{2}$ '-2' broad, obtuse; scales very broad, 8"-15", with a short cuneate base, thick, pitted usually on both sides, the compressed summit terminating in the erect, acute, semicircular, transverse ridge, and a subrhombic, acutish umbo; seed 4"-5" long,  $2\frac{1}{2}$ " wide, pale-colored with a rudimentary wing. Bark thin, scaly, reddish or sometimes gray. Rare.—Divide west of South Park, *Porter. Hall & Harbour, 529.*

*PINUS ARISTATA*, Engelm. *DC. Prod., l. c., p. 400. Trans. Acad. Saint Louis, vol. 2, t. 5 and 6.* A tree of medium size, 40-50° high and 1-2° in diameter; in alpine situations a stunted bush; leaves in fives, crowded, erect, curving, 3-angled, smooth, obtusely mucronate, deep green, sides marked by a longitudinal, white-glaucous stripe 1'-2' long; sterile aments aggregated, oval, bracteate at base; cones horizontal, violet-brown, ovate or ovate-oblong, obtuse, resinous, 3'-4' long,  $1\frac{1}{2}$ ' broad; the apophysis of the scales dark-violet, rhombic, not prominent; transverse ridge acute; umbo small; awn lanceolate-subulate, rather long, straight; seeds obovate-oval, convex on both sides, nearly twice shorter than the obtuse, broadish wing.—A species known only from the alpine regions of the Rocky Mountains of Colorado.—*Hall & Harbour; Parry; Coulter.*

*PINUS EDULIS*, Engelm. *DC. Prod., l. c., p., 398.* A low, round-topped tree, branched from the base or near it, 10°-15° high, very strongly resinous; leaves mostly in pairs, rarely in threes, compressed-triangular, semiterete and when dried appearing channeled, always short, rigid, spreading, curved or straightish, smooth on the margin, mucronate, pungent, green on the back, white-glaucous, 1'-1 $\frac{1}{2}$ ' long (rarely 2'); bud-scales ovate-lanceolate, acute, subentire on the margin, not fimbriate-connected, teeth very short, at length lacerate; sterile aments several, small, oblong, obtusish, densely crowded in a short spike; antheriferous bracts ovate-orbicular, nearly entire; cones sessile, subglobose, 2' long and almost as broad; apophysis of the scales raised-pyramidal, thick, somewhat 3-angled, truncate at the apex, awnless; seeds in each scale 2 or solitary, oblong, very convex, subangled, brown, solid, wingless, 3"-4" in length, edible.—The "Piñon" of the Mexicans. A small, round-topped tree, branched from the base or nearly so and resembling a small apple-tree. The wood is full of resin and extremely slow to decay, thus furnishing excellent fuel for camp-fires. The nutlets, which are about the size of a pea, are agreeable to the taste, with a slight terebinthinate flavor, and are much sought after by the Indians. It abounds in Southern Colorado on the foot-hills and at lower elevations. Its northern limit in Colorado appears to be about ten miles south of Twin Lakes, at the base of the Snowy Range, and at Colorado Springs, east of the mountains. *Hall & Harbour, 532; Porter; Coulter.*

*ABIES ENGELMANNI*, Parry. (*Pinus commutata*, Parl. *DC. Prod., l. c.,*

p. 417.) Known as "White Pine." Dr. Parry found it "composing almost the entire forest growth of the mountain slopes of Middle Park about the head of Grand River ; a magnificent tree, 80 to 100 feet high, with an even, columnar trunk, below, 2-2½ feet in diameter, tapering upwards, of rapid growth ; bark scaly, smooth, and quite thin, of a purplish-brown color, full of tannin. The wood is remarkably white and soft, free from knot and scarcely resinous, preferred for inside work."—A tall tree, 60°-100° high, becoming much dwarfed at higher elevations, pyramidal ; branches verticillate, lower horizontal, the upper ascending, branchlets puberulent ; bark light-reddish ; wood soft, white ; leaves solitary, crowded, turned every way, short, curved or straight, rigid, compressed 4-angled, very short-mucronate, smooth on the angles, white-punctate on the sides beneath the green ; sterile aments thick, ovate or ovate-cylindrical, obtuse, nearly equaling the leaves ; antheriferous bracts almost orbicular, dentate-fimbriate, ovate-cylindrical, obtuse ; scales numerous, imbricated, subcartilaginous, obovate, rhombic, subtruncate or emarginate, crenulate-eroded ; bracts ovate-oblong, obtusish, irregularly dentate, 3 times shorter than the scale ; seeds small, oval, convex on both sides, 1½ times shorter than the obovate wing ; cones 2¾'-3' long, 1'-1½' broad, purplish-brown when mature ; nutlets brown, with an almost violet wing. Closely allied to *A. nigra*, the "Black Spruce" of the East.—*Hall & Harbour ; Parry ; Coulter ; Hoopes ; Meehan.*

*ABIES MENZIESII*, Lindl. (*Pinus*, Parl. *DC. Prod.*, 16, *l. c.*, p. 418.) A tall tree, attaining a height of 100 feet, straight, pyramidal ; branches subverticillate, spreading, upper ones ascending ; leaves solitary, crowded, turned every way, short, curved or straight, rigid, thickish, compressed, 4-angled, mucronate-pungent, marked on each side of the prominent nerve with a white glaucous line ; sterile aments, thick, oblong, obtuse, 9"-12" long ; antheriferous bracts suborbicular, cristate-dentate ; leaves 6"-12" long ; fertile aments oblong-cylindrical, obtuse, curving ; cones solitary or somewhat clustered, subsessile, subnodding, cylindrical or oval, obtuse, 2½'-5' long, 12"-15" wide, light-brown, obtuse ; scales thin, 5"-7" wide, oval or sub-rhombic, more or less elongated above, obtuse or subemarginate and erose-dentate ; bracts small ; seeds 1"-1½" long ; wing obovate, oblong, obtuse, 4"-6" long, pale.—Known as "Balsam." Parry says : "A finely-shaped tree, though of rather stiff outline, of rapid growth ; wood very compact, but rather coarse-grained and pitchy ; the logs taper too rapidly to saw up to advantage." Cones pendulous from the ends of the branches ; leaves stouter than in any other allied species, stiff and very acute, almost spinescent.—*Hall & Harbour*, 533 ; *Hoopes ; Coulter ; Porter.*

*ABIES GRANDIS*, Lindl. (*Pinus*, Parl. *DC. Prod.*, 16, *l. c.*, p. 427.) Tall, pyramidal, with horizontal branches ; leaves 6"-18" long, 1" broad, numerous, in two rows, spreading or erect, rigid, straight or curved, more or less contracted and twisted above the base, obtuse or emarginate, green and subsulcate above, strongly keeled and glaucous beneath ; cones 2½'-3' long, 1½'-2' wide, solitary, erect, oblong, obtuse, greenish ; scales 7"-10" long, 9"-12" broad, horizontal and close-pressed, broad-cuneate and unguiculate, the rounded upper margin subreflexed and usually resinous, pubescent, much exceeding the obovate, toothed, short-mucronate bracts ; seed 3" long, 2" wide, obovate, cuneate, angled ; wing nearly equaling the scale, somewhat 4-sided ; bark rather thin, pale gray or brownish ; wood fine-grained and tough.—Rare in Colorado. Chiann Cañon and Glen Eyrie, *Porter. Parry.*

*ABIES DOUGLASII*, Lindl. (*Pinus*, Parl. *DC. Prod.*, 16, *l. c.*, p. 430.) A

tall, pyramidal tree, with horizontal, drooping branches; leaves solitary, crowded, somewhat 2-rowed, 6''-18'' long,  $\frac{1}{2}$ '' wide, numerous, straight or curved, rigid, flat, linear, obtuse, entire, twisted above the rounded base; sterile aments 6''-8'' long, approximate, the anther-crest short lanceolate, erect; fertile aments purple, the lobed foliaceous bracts long-exserted, usually reflexed; cones  $1\frac{1}{2}$ '-4' long, 1'- $1\frac{1}{2}$ ' wide, somewhat clustered, pendulous, obtusish; scales concave, rounded, entire, pubescent; bracts long-exserted, bifid, the acuminate, suberose, dentate lobes, shorter than the cuspidate midnerve; seed 3'' long, acutely margined, a little shorter than the oblong, obtuse wing.—“Abundant through the eastern mountain district, except on the higher elevations. A very slightly tree, of the average height of 80 feet, with a graceful oval outline; the spreading branches curving upwards at the extremities. Wood of slow growth, but very indifferent, inclined to warp and crack, turning reddish-brown in drying.” Known as the “Swamp Pine.”—*Hall & Harbour*, 534; *Parry*; *Coulter*; *Porter*.

JUNIPERUS COMMUNIS, L., var. ALPINA, L.—*Dr. Smith*; *Hoopes*. Twin Lakes and Long's Peak, *Coulter*.

JUNIPERUS VIRGINIANA, L.—*Hoopes*; *Brandegee*.

### LEMNACEÆ.

LEMNA MINOR, L.—In the Platte, near Denver, *Porter*.

### TYPHACEÆ.

TYPHA LATIFOLIA, L.—Wet Mountain Valley, *Brandegee*.

SPARGANIUM SIMPLEX, Huds.—Wet Mountain Valley, *Brandegee*.

Var. ANGUSTIFOLIUM, Engelm.—*Parry*.

### NAIADACEÆ.

POTAMOGETON NATANS, L.—Denver, *Dr. Smith*.

POTAMOGETON PERFOLIATUS, L., var. LANCEOLATUS, Robbins, *Gray's Manual*, p. 488.—Growing on the bottom of Twin Lakes, *Coulter*. *Brandegee*; *Dr. Smith*.

### ALISMACEÆ.

TRIGLOCHIN PALUSTRE, L.—*Hall & Harbour*, 540. South Park, *Porter*.

TRIGLOCHIN MARITIMUM, L.—*Hall & Harbour*, 541. Cañon City, *Brandegee*. South Park, *Coulter*; *Porter*.

SAGITTARIA VARIABILIS, Eng.—Divide between Denver and Colorado Springs, *Porter*.

### ORCHIDACEÆ.

HABENARIA HYPERBOREA, R. Br.—*Hall & Harbour*, 535. Mount Elbert, near Twin Lakes, at 10,000 feet altitude, Horse Shoe Mountain, and in the Sierra Madre Range, *Coulter*. Ute Pass, *Porter*.

HABENARIA DILATATA, Gr.—*Meehan*. Sierra Madre Range, *Coulter*. Wet Mountain Valley, *Redfield*.

HABENARIA OBTUSATA, Lindl.—*Hall & Harbour*, 536; *Parry*. Twin Lakes, at an elevation of 10,000 feet, *Coulter*.

GOODYERA MENZIESII, Lindl.—Golden, *Greene*; *Redfield*.

SPIRANTHES ROMANZOFFIANA, Cham.—*Hall & Harbour*, 539; *Canby*; *Hoopes*. Wet Mountain Valley, *Brandegee*. *Meehan*. Horse Shoe Mountain, at 11,000 feet altitude, *Coulter*.

LISTERA CORDATA, R. Br.—West of Denver, *Greene*.

CALYPSO BOREALIS, Salisb.—*Hall & Harbour*, 537. South Park; Wet Mountain Valley, *Brandegee*.

CORALLORHIZA MULTIFLORA, Nutt.—Green Horn Mountains, *Greene*

CYPRIPEDIUM PARVIFLORUM, Salisb.—Wet Mountain Valley, *Brandegee*.

CYPRIPEDIUM PUBESCENS, Willd.—Foot-hills near the Platte, west of Denver, *Coulter*.

### AMARYLLIDACEÆ.

HYPOXYS JUNCEA, Smith. Sparingly hairy; leaves filiform; scapes 1-3, filiform, 1-2 flowered; bracts bristle-like, shorter than the villous pedicels, divisions of the perianth oblong, the three exterior ones greenish and hairy without; partitions of the capsule vanishing at maturity; seeds black, minutely pitted. Scape 4'-9' long, at length procumbent. Flowers 9"-12" wide.—Grape Creek, *Brandegee*.

### IRIDACEÆ.

IRIS TENAX, Dougl. ?—*Dr. Smith*; *Brandegee*; *Hall & Harbour*, 542.

SISYRINCHIUM BERMUDIANA, L.—Colorado Springs, *Porter*. Bear Creek, *Coulter*.

### SMILACEÆ.

SMILAX ROTUNDIFOLIA, L.—Colorado Springs, *Porter*.

### LILIACEÆ.

ZYGADENUS GLAUCUS, Nutt.—*Hall & Harbour*, 550; *Canby*; *Porter*. Mount La Plata, at 11,000 feet altitude, and Mount Lincoln, at 13,000 feet, *Coulter*.

ZYGADENUS NUTTALLII, Gr. (*Amianthium Nuttallii*, Gray. Var. *a*. *Ann. N. Y. Lyc.*, 4, p. 123.) Bulb tunicated; stem 8'-20' high, slender, with several elongated narrowly-linear bracteiform leaves, which are semi-amplexicaul or the lower slightly sheathing; lower leaves 2"-4" wide, folded-carinate, usually shorter than the stem, rough on the margin; raceme simple, usually very short, 1'-3' long, rarely 10'; flowers crowded, bracteate, on slender, elongated pedicels; lower bracts usually foliaceous, the upper membranous; sepals 1½"-3" long, ovate-elliptical, very obtuse, abruptly narrowed, and slightly glandular at base; ovary-cells 12-14 ovuled; capsule oblong-ovate, 6" long; seeds 2½" long, oblong.—*Hall & Harbour*, 551. Wet Mountain Valley, *Brandegee*. Clear Creek Cañon, *Coulter*.

STREPTOPUS AMPLEXIFOLIUS, DC.—*Hall & Harbour*, 543. Bear Creek, *Coulter*.

SMILACINA RACEMOSA, Desf., var. AMPLEXICAULIS, Watson. *King's Rep.*, vol. 5, p. 345. (*S. amplexicaulis*, Nutt. *Jour. Acad.*, Phil. 7, p. 58.) Leaves closely sessile and amplexicaul, shortly acuminate or only acute; style at least half as long as the ovary and equaling the stamens. Distinguished at once from the usual form by its less acuminate sessile leaves and longer style and filaments.—Wet Mountain Valley, *Brandegee*. Along the Platte, near Denver, *Coulter*.

*SMILACINA STELLATA*, Desf.—*Hall & Harbour*, 544. Wet Mountain Valley, *Brandegee*. Near Denver, *Dr. Smith*; *B. H. Smith*. Colorado Springs, *Porter*; *Meehan*. Saint Vrain River, Clear Creek and Middle Boulder, *Coulter*.

*LILIUM PHILADELPHICUM*, L.—Bear Creek and Platte River, just within the foot-hills, *Coulter*. Chiann Cañon, *Porter*.

*CALOCHORTUS*<sup>1</sup> *GUNNISONI*, Watson. *King's Rep.*, vol. 5, p. 348, (*C. venustus*, var. Torr. *Bot. Gunnison's Rep. Pac. R. R. Surv.*, 2, p. 130.) Petals rounded at the apex, white above, yellowish-green below the middle and dark purple at base, strongly bearded with longish, gland-tipped hairs, which are also dark purple at base, the densely hairy gland transverse and occupying nearly the whole width of the petal; anthers 5" long, rather exceeding the somewhat dilated filaments, oblong-lanceolate, subcordate at base, narrowed above into an awn-like termination or acute; immature capsule narrowly oblong, attenuate above. Stem 6'–20' high, simple, 1–4 flowered with 1–3 narrowly linear, revolute leaves, 2'–4' long, the radical ones (1–few) longer (8'–12') and usually broader (4").—*Hall & Harbour*, 549; *Parry*. Denver, *B. H. Smith*. Colorado Springs, *Porter*. *Meehan*. Plains of the Platte, Pleasant Park, South Park, and Weston's Pass, *Coulter*.

*LLOYDIA*<sup>2</sup> *SEROTINA*, Reich. *Kunth. Enum.*, 4, p. 244. Stem 1–2 flowered, slender, erect or ascending, 2'–5' high; radical leaves filiform, equaling or longer than the stem, somewhat rigid, triangular, semiterete or teretish, cauline ones short, linear-lanceolate, amplexicaul and somewhat sheathing; sepals 4"–5" long, obovate, with 3 purplish lines.—Alpine. Pike's Peak. *Hall & Harbour*, 552; *Porter*. Gray's Peak, at 1,200 feet altitude, *Coulter*; *Redfield*.

*ERYTHRONIUM GRANDIFLORUM*, Pursh. Leaves 4'–8' long, 1'–2½' wide, oblong or elliptic-lanceolate, somewhat rough-margined, not spotted or punctate; scape 6'–15' high, 1 (or more) flowered; segments yellow, 9"–15" long, narrow-lanceolate, acuminate, reflexed; stigma capitate or more or less 3-cleft and spreading; capsule 9"–18" long, 4"–5" wide, oblong or obovoid, subtriangular, on a short stipe.—White House Mountain, at 13,000 feet altitude, August, in flower, and Sierra Madre Range, at 11,000 feet, in fruit, *Coulter*.

<sup>1</sup>*CALOCHORTUS*, Pursh. (Including *Cyclobothra*, Sweet.) Perianth 6-parted, regular, deciduous, ventricose or broadly campanulate; sepals distinct, convolute in æstivation, the outer smaller, often greenish, oblong or lanceolate, acute or acuminate, spreading, usually beardless, the inner broadly obovate, cuneate and subunguiculate, bearded within and with a glabrous spot or nectariferous pit above the base. Stamens 6, inserted at the base of the sepals. Filaments subulate. Anthers linear-oblong, deeply perforated at the base for the insertion of the filament, erect, versatile. Ovary free, triangular, scarcely attenuate at the apex, 3-celled with numerous horizontal anatropous ovules in two rows. Stigmas 3, sessile or sub-sessile, narrow, folded, recurved, persistent. Capsule triangular, coriaceous-chartaceous, septically 3-valved. Seeds usually in one row, somewhat compressed, angular, with a loose, cellular testa. Embryo straight, terete, eccentric.—Herbs with tunicated bulbs, erect, somewhat branched, leafy, few-flowered stems, narrow and acuminate leaves, and terminal flowers.

<sup>2</sup>*LLOYDIA*, Salisb. Perianth 6-parted, regular, persistent; sepals distinct, subequal, spreading, with a transverse margined nectariferous fold above the base, imbricate in æstivation. Stamens 6, inserted at the base of the sepals, erect-spreading; filaments subulate-filiform; anthers oblong, rounded at the apex, deeply perforated at the emarginate base for the insertion of the filament, erect, versatile, longitudinally dehiscent along each margin. Ovary free, clavate-oblong, triangular, 3-celled, the ovules numerous, in two rows, horizontal, anatropous. Style persistent; stigma rather thick, shortly 3-lobed. Capsule obovate-elliptical, triangular, papyraceous, loculicidally 3-valved at the apex. Seeds in two rows in each cell, flattened, with a brown, membranously margined testa and very small embryo.—Bulbous herbs, stem simple, leafy; leaves narrow and grass-like; flowers erect, white, with purple or greenish veins.

**LEUCOCRINUM**<sup>1</sup> **MONTANUM**, Nutt. Leaves 6'-8' long, 1"-3" wide, flat or somewhat folded toward the base, thick, finely striate-veined, decumbent; outer bracts broad, acute or obtuse, the inner narrower and elongated; flowers 4-8, much shorter than the leaves; peduncles  $\frac{1}{2}$ -1 $\frac{1}{2}$ ' long, all radical, one-flowered; tube persistent, 1'-2' long, filiform, segments of the limb 6"-12" long, oblong-lanceolate, acute; anthers linear, about 2" long; style equaling the filaments; capsule 3"-4" in diameter.—Abundant on the plains east of the mountains. A charming little plant with delicate, snow-white, fragrant flowers which appear in early spring.—*Hall & Harbour*, 548. Colorado Springs, *Porter*. Cañon City, *Brandegee*. Plains around Denver, *Coulter*. Watson in *King's Rep.*, vol. 5, pl. 36.

**ALLIUM CERNUUM**, Roth.—Near Denver, *Dr. Smith*. Colorado Springs and South Park, *Porter*. Cañon City, *Brandegee*. *Hall & Harbour*, 547; *Meehan*; *Canby*. Common on the plains near Fairplay, *Coulter*.

**ALLIUM RETICULATUM**, Fraser. *Watson* in *Rev. King's Rep.*, vol. 5, p. 486. Coats densely fibrous; scape 6'-15' high, subterete; leaves very narrowly linear, elongated; umbel few-many-flowered, spreading; stamens and style shorter than the usually acute (3"-4" long) sepals; capsule crested, crest mostly short; very variable.

Var. *a*, (Watson.) Low, 6'-8' high; sepals 3" long, white or slightly pinkish, acuminate.—*Hall & Harbour*, 545. Wet Mountain Valley, *Brandegee*. Monument Park, *Coulter*.

Var. *β*, (Watson.) Taller, 10'-15' high, slender; bulb less densely fibrous; sepals white or pink, 3"-4" long, acuminate and strongly carinate, sometimes but little exceeding the stamens.—*Hall & Harbour*, 546.

Var. *γ*, (Watson.) Like the last, but the pedicels rather more slender; sepals usually more recurved and the whole lower stem with the bulb thickly fibrous-coated.—Wet Mountain Valley, *Brandegee*. Weston's Pass, *Coulter*.

**YUCCA ANGUSTIFOLIA**, Pursh. *Engelm. Rev. in King's Rep.*, vol. 5, p. 496. Stems none or short; leaves narrowly linear, scarcely narrowed above the broad base, rigid, spiny-pointed, nearly flat above, convex below, with very slender marginal fibres, 1 $\frac{1}{2}$ °-2 $\frac{1}{2}$ ° long; flowers spiked; petals broad-ovate, 1 $\frac{1}{2}$ '-1 $\frac{3}{4}$ ' long; stigmas half as long as the ovary, sessile, erect; capsule cylindric-ovate, thick, obtuse, short-pointed, dry, erect, septically 3-valved from the apex, the valves at last again divided at tip; seeds very thin, smooth, large, 5"-7" in diameter, with a wide margin; albumen not ruminated.—Plains of the Platte, *Coulter*; *Porter*. Along the base of the foot-hills, and called by the Mexicans "Soap Weed."

### JUNCACEÆ.

**LUZULA SPADICEA**, DC., var. **PARVIFLORA**, Ledeb. (*L. parviflora*, Desv., var. *melanocarpa*, Gr. in *Manual*, p. 536.)—*Hall & Harbour*, 555. Mount Lincoln, at 12,000 feet altitude, and Clear Creek Cañon, *Coulter*.

<sup>1</sup> **LEUCOCRINUM**, Nutt. Perianth corolline, salver-shaped, marcescent; tube very slender, elongated; limb 6-parted, regular. Stamens 6, nearly equal; filaments adnate to the tube nearly the whole length, filiform; anthers erect, becoming curved, linear, 2-celled, attached by the emarginate base, introrse, with a lateral dehiscence. Ovary globose-ovate, 3-celled; ovules about 12 in each cell, in 2 rows, horizontal or subpendulous, on short foot-stalks. Style filiform, undivided; stigma dilated into a somewhat triangular cup. Capsule subglobose, obtusely triangular, membranous, loculicidally dehiscent. Seeds 5-6 in each cell, in 2 rows, subglobose.—A perennial acaulescent herb, with a short, thick subterranean root-stock and fleshy spreading elongated rootlets; leaves thick, linear, surrounded at base by membranous bracts; flowers white, peduncled.

*JUNCUS SPICATA*, Desv.—*Hall & Harbour*, 554. Cañon City, *Brandege*. Denver, *Dr. Smith*.

*JUNCUS BALTICUS*, Deth., var. *MONTANUS*, Eng. *Trans. St. Louis Acad.*, vol. 2, p. 442. Sepals of nearly equal length, inner ones more obtuse; anthers 4 times the length of the very short filament; capsule ovate-pyramidal, angled, beaked; seeds smaller, narrower and longer pointed.—Abundant everywhere in damp grounds, on the plains and in the mountains. Near Denver, *Dr. Smith*. *Hall & Harbour*, 567; *Porter*.

*JUNCUS DRUMMONDII*, E. Mey. *Eng. Rev.*, l. c., p. 445. Cæspitose; stems 1<sup>o</sup>–1½<sup>o</sup> high, terete, filiform; sheath bristle-pointed; spathe ½'–1½' long, mostly surpassing the simple, about 3-flowered panicle; sepals lanceolate, acute, or the outer ones acutish and scarcely longer than the inner ones, more than twice exceeding the 6 stamens, 3" or more long; anthers linear, a little longer than the filament; stigmas shorter than the slender, prismatic ovary crowned with a very short style, included; capsule ovate-oblong, triangular, retuse, 3-celled, equaling or a little shorter than the sepals; seeds ovate, striate-reticulate, long tailed, the body 3", including the tails, 1" long.—*Hall & Harbour*, 563.

*JUNCUS HALLII*, Engelm. *Rev.*, l. c., p. 446. (*J. arcticus*, Willd., var. *gracilis*, Hook.?) Cæspitose; stems 6'–12' high, terete, filiform, much longer than the setaceous, terete leaves; leaves 2'–5' long, grooved just above the sheath; spathe scarcely or a little surpassing the subsimple, few-flowered, contracted panicle; sepals lanceolate, acute, 2" long, outer ones a little longer, twice exceeding the 6 stamens; stigma subsessile, equaling the ovate ovary, included; capsule ovate, angled, retuse, 3-celled, scarcely exerted, deep brown; seeds oblong-linear, 5'–6" long, striate-reticulated, long tailed, body 3" long.—Found only by *Hall & Harbour*, near Lake Ranch, Colorado, 562.

*JUNCUS PARRYI*, Engelm. *Rev.*, l. c., p. 446. Cæspitose; stems very thin and wiry, 4'–8' long; leaves sulcate one-half or two-thirds their length, terete above; spathe surpassing the very simple, 1–3-flowered panicle; sepals 2½"–3½" long, lanceolate-subulate, the outer ones longer, bristle-pointed, 3 times longer than the 6 stamens; anthers linear, 2–3 times longer than the filament; stigmas scarcely equalling the linear-prismatic ovary, attenuated into the style, included; capsule prismatic, very acute, brown, exerted, 3-celled; seed oblong, delicately striate-costate, 1" in length, long-tailed, body about 4" in length.—*Hall & Harbour*, 561. *Parry*, 360. White House Mountain, at 11,500 feet altitude, *Coulter*.

*JUNCUS TRIGLUMIS*, L. *Eng. Rev.*, l. c., p. 448. Stem naked; leaves radical, subulate, somewhat terete, channeled at base; flowers capitate in a terminal, erect head, about 3; sepals rather obtuse, shorter than the oblong, obtuse, mucronate capsule; filaments many times longer than the anthers.—*Hall & Harbour*, 557. *Parry*, 395. Alpine.

*JUNCUS CASTANEUS*, Sm. *Eng.*, l. c., p. 448. Stem 2-leaved; radical leaves subulate, the upper part flattened; head terminal, solitary; flowers 2–3; sepals 3" long, lanceolate, acute, shorter than the oblong, obtuse capsule; anthers linear, pointed, half as long as the filaments; stigmas exsert; seeds oblong; body 4"–5" long, with the tailed appendages 1.6" or more long. Alpine.—*Hall & Harbour*, 560. *Parry*, 358.

*JUNCUS VASEYI*, Engelm. *Rev. l. c.*, p. 448. Cæspitose; stems 1<sup>o</sup>–2<sup>o</sup> high, slender, rigid, striate, covered with brown sheaths at base, sometimes leaf-bearing; leaves elongated, setaceous, terete, striate, sulcate toward the base; spathe equaling or rarely longer than the small, contracted panicle; panicle ½'–1' long, green; sepals equal, lanceolate, 2" long, outer



ones subulate-tipped, inner ones broader, mucronate, more than twice longer than the 6 stamens; anthers equaling the filaments; stigma scarcely equaling the ovate ovary with its short style, included; capsule straw-colored, ovate, retuse, 3-celled, equaling or a little longer than the sepals; seeds very slender, body about 3'' long, and with the appendages, 5''-7'' long.—*Hall, fide Engelman.*

*JUNCUS TENUIS*, Willd.—Plains of the Platte, *Coulter*. Cañon City, *Brandegee*.

*JUNCUS BUFONIUS*, L.—*Hall & Harbour*, 559. Upper Arkansas, *Porter*. On the Platte, near Denver, *Dr. Smith*.

*JUNCUS LONGISTYLIS*, Torr. *Bot. Bound Surv.*, p. 223. *Eng. Rev.*, l. c., p. 453. (*J. Menziesii*, Gr. in *Pl. Parry.*, p. 34, and *Pl. Hall & Harbour*, p. 77.) Stems 2° high, cæspitose, stoloniferous, terete, somewhat minutely scabrous above, leafy; leaves flat, grass-like; heads few, clustered in a contracted panicle, 1½'-3' long or rarely single; 3-8 or 12-flowered, flowers 2½''-3'' long, the larger ones greenish, with brown striæ, smooth, pediceled; sepals equal, ovate-lanceolate, very acute or cuspidate, twice longer than the stamens; ovary equaling the stamens and style; stigma exerted; capsule ovate, obtuse, mucronate or rostrate, chestnut-colored, shining; 3-celled, equaling or a little longer than the calyx; seeds oblanceolate or obovate, acute at each end, costate-reticulate, .25''-.27'' long.—The most common *Juncus* in the mountains next to *J. Balticus*, var. *montanus*.—*Hall & Harbour*, 566. Denver, *Dr. Smith*; *B. H. Smith*. South Park, *Canby*. Twin Lakes, *Porter*. Cañon City, *Brandegee*. *Meehan*. Plains of the Platte, *Coulter*.

*JUNCUS ALPINUS*, Vill., var. *INSIGNIS*, Fries. *Eng. Rev.*, l. c., 458, (*J. articulatus*, L., var. *pelocarpus*, Gr.)—*Hall & Harbour*, 558; *Canby*.

*JUNCUS NODOSUS*, L., var. *MEGACEPHALUS*, Torr.—Denver, *Dr. Smith*; *B. H. Smith*. Cañon City, *Brandegee*.

*JUNCUS MERTENSIANUS*, Bong. *Eng. Rev.*, l. c., p. 479. (*J. ensifolius*, Hook. Gr. in *Pl. Hall & Harbour*.) Stem from a thick, creeping root-stock, cæspitose, 7'-14' high, compressed, weak; leaves aversely compressed, usually ½''-1'' wide, sheath auricled; flowers 15-25, dark brown, pediceled, single, rarely 2-3 in a rather loose head, 4''-6'' broad; sepals ovate-lanceolate, the outer acuminate-subulate, the inner obtuse and mucronate or rarely acute and equaling the outer ones, exceeding the 3-6 stamens, equaling the broadly-obovate, obtuse, mucronate capsule; anthers oblong or oblong-linear, usually mucronate, equaling the filament or shorter; style mostly shorter than the obtuse ovary; seeds oblanceolate, obovate, fusiform, short-tailed at each end, reticulate-costate.—*Hall & Harbour*, 565. Cañon City, *Brandegee*. Ute Pass, *Porter*. Mount Lincoln, at 12,000 feet altitude, White House Mountain, at 11,000 feet, and Twin Lakes, *Coulter*. Wet Mountain Valley, *Redfield*.

*JUNCUS XIPHIODES*, E. Mey. *Eng. Rev.*, l. c., p. 481. Stem 1°-4° high, from a thick creeping rhizoma, erect, 2-edged; leaves compressed and equitant; flowers about 1½'' long, pediceled, few or many in few or many heads; sepals lanceolate, subulate-acuminate, equal or the inner ones more obtuse, shorter, nearly twice longer than the 6 (rarely 3) stamens, usually equaling the angular, acute, mucronate or beaked capsule; anthers oblong-linear, almost equaling the filament; ovary ovate, attenuate into the shorter style; stigma subexserted; seeds ovate-oblanceolate, .25''-.26'' long, pointed at each end, reticulated and transversely lined.

Var. *MONTANUS*, Engelm. Lower, ½°-2° high; leaves narrower,

$\frac{1}{2}$ "– $1\frac{1}{2}$ " wide, mostly auricled at base; heads 3–10 flowered, paler, rather numerous and panicled; flowers a little smaller, the inner petals shorter and mostly acute, the outer ones equaling the long-mucronate capsule.—*Hall & Harbour*, 564; *Canby*.

### COMMELYNACEÆ.

COMMELYNA VIRGINICA, L.—Purgatory River, *Dr. Bell*.

TRADESCANTIA VIRGINICA, L.—On the plains, *Dr. Smith*; *B. H. Smith*. Along the Platte, *Coulter*; *Redfield*.

### CYPERACEÆ.

CYPERUS INFLEXUS, Muhl.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*. South Park, *Porter*; *Redfield*.

CYPERUS SCHWEINITZII, Torr.—“Low Mountains,” *Hall & Harbour*, 584. Wet Mountain Valley, *Brandegee*. Colorado Springs, *Porter*; *Redfield*.

HEMICARPHA SUBSQUARROSA, Nees.—Wet Mountain Valley, *Brandegee*.

ELEOCHARIS OLIVACEA, Torr.—Greeley, *Greene*.

ELEOCHARIS PALUSTRIS, R. Br.—Near Denver, *Dr. Smith*.

ELEOCHARIS COMPRESSA, Sulliv.—Pueblo, *Greene*.

ELEOCHARIS ACICULARIS, R. Br.—Near Denver, along the Platte, *Dr. Smith*.

SCIRPUS PAUCIFLORUS, Lightfoot.—*Hall & Harbour*, 582.

SCIRPUS CÆSPITOSUS, L.—*Hall & Harbour*, 583; subalpine.

SCIRPUS PUNGENS, Vahl.—Near Denver, *Dr. Smith*.

SCIRPUS VALIDUS, Vahl.—Near Denver, *Dr. Smith*. Cañon City, *Brandegee*.

SCIRPUS MARITIMUS, L.—Wet Mountain Valley, *Brandegee*.

SCIRPUS SYLVATICUS, L.—Cañon City, *Brandegee*.

SCIRPUS ATROVIRENS, Muhl.—*Hall*.

ERIOPHORUM POLYSTACHYON, L.—Wet Mountain Valley, *Brandegee*.

FIMBRISTYLIS LAXA, Vahl.—*Hall & Harbour*, 581.

ELYNA<sup>1</sup> SPICATA, Schrad. (*Kobresia scirpina*, Willd.) Cæspitose; stems numerous, 1° high, slender, striate-angled; leaves filiform; spike 1' long, somewhat clavate.—South Park, *Hall & Harbour*, 598 and 599.

CAREX NIGRICANS, Meyer. Spike solitary, oblong, staminate at top; stigmas 3 or rarely 2; perigynium ovate, stipitate, ventricose, shining, gradually attenuated into a beak, sometimes few-toothed, nerveless, spreading or at length reflexed, rusty-colored, with an entire obliquely-cut mouth, about equaling the dark-brown, oblong, obtuse scale; the lowest scale rarely subleafy; achenium unequally 3-sided. Roots creeping; culms 6'–12' high.—*Hall & Harbour*, 609.

CAREX PYRENAICA, Wahl. Spike solitary, densely flowered, staminate at top, elliptic, rusty-brown; stigmas 3, rarely 2; perigynium fusiform or lanceolate, gradually attenuate, long-stipitate, nerveless, com-

<sup>1</sup> ELYNA, Schrad. Spikelets 2-flowered, covered by a bract. Scale single, its margins connate at base. Hypogonous setæ none. Pistillate flower of the spikelets below, style 1, stigmas 3. Nut 3-angled, short-mucronate by the persistent base of the style. Upper flower staminate, short pediceled. Stamens 3. *Kösch Fl. German.*

pressed, triquetrous, shining, at length horizontally spreading or reflexed, rusty-colored, the orifice cleft in front with its hyaline margins infolded, longer than the acute-lanceolate or obtuse-oblong rusty-brown scale; lowest scale rarely subleafy; achenium unequally triquetrous. Cæspitose; root fibrous.—*Hall & Harbour*, 608.

CAREX HALLII, Olney. *Hayden's Rep.*, 1871, p. 496. (*C. Parryana*, Boott, in part.) Monœcious or diœcious; sometimes with two erect spikes, one staminate and one pistillate, or with 1–3 spikes all pistillate; terminal spike much the largest, lower one often remote and subtended by a leafy bract; scales lanceolate or lance-ovate, brown, with a white midrib, entire, not ciliate, longer and narrower than the obovate, smooth, many-nerved perigynium; stigmas 3.—*Hall & Harbour*, 617.

CAREX SCIRPOIDEA, Mx.—*Hall & Harbour*, 610. South Park, *Porter and Canby*.

CAREX POLYTRICHOIDES, Muhl.—*Hall & Harbour*, 603.

CAREX AFFINIS, R. Br. "Spike solitary, staminate at top; stigmas 3; scales acute, lanceolate, the lower awned. Near *C. polytrichoides*, Muhl." *Olney in King's Rep.*, vol. 5, p. 362.—*Vasey*, 591.

CAREX OBTUSATA, Lilj. Terminal spike solitary, linear, androgynous, staminate above; stigmas 3; scales shorter than the perigynium; perigynium ovate-elliptical, turgid, shining, with a smooth, terete, acuminate, bifid beak, white and diaphanous at the apex, leaves linear, flat.—*Hall & Harbour*, 606.

CAREX BACKII, Boott.—*Hall & Harbour*, 612.

CAREX FILIFOLIA, Nutt.—Cæspitose; spikes simple, androgynous, staminate above, subcylindric, acute; perigynium subglobose, entire at the orifice; scales retuse; leaves filiformly-involute, shorter than the culm. *Nutt. Gen.*, vol. 2, p. 204.—*Hall & Harbour*, 605. Ute Pass, *Porter*

CAREX PAUCIFLORA, Lightfoot.—*Hall & Harbour*, 607.

CAREX DISTICHA, Hudson.—South. Park, *Porter*.

CAREX CONJUNCTA, Boott.—Along the Platte, *Coulter*.

CAREX MURICATA, L., var. GRACILIS, Boott, in part. Spikes chestnut-colored, narrow, ovate, with 4–6 ovate few-flowered spikelets; leaves lax, long and narrow.—*Hall & Harbour*, 592. Weston's Pass, *Coulter*.

CAREX DOUGLASII, Boott. Root creeping; culm 6'–12' high; spike diœcious, with about 12, sometimes more, ovate spikelets, the upper closely aggregated, the lower occasionally remote and compound; bracts sometimes setaceous, broad at base, sometimes scale-like and mucronate; style exerted, stigmas 2, very long; perigynium elliptic-lanceolate or ovate, tapering to a long serrated bifid beak, shorter than the lanceolate acute scale; achenium orbicular.—Near Long's Peak, *Coulter*.

Var. MINOR, Olney. (*C. petasata*, Dew., in *Hayden's Nebraska Plants*. Spikes small, not closely aggregated; perigynium and scale small.—*Hall & Harbour*, 600.

CAREX SICCATA, Dew.—*Hall & Harbour*, 593.

CAREX MARCIDA, Boott. Culm 1°–2° high, rigid; leaves broad, linear, erect; spike oblong, pale, composed of numerous small ovate aggregated androgynous spikelets, staminate at top, the lower spikelets compound; stigmas 2; perigynium tawny, sub-orbicular, or ovate tapering to a bifid beak, plano-convex, nerved, winged, the upper margins serrated, short-stipitate, nearly equal to the acute ovate scale, which is of a pale straw-color with a white membranous margin; achenium tawny, lenticular, contracted at base.—*Hall & Harbour*, *Greene*.

CAREX TENELLA, Schk.—*Hall & Harbour*, 601.

CAREX CANESCENS, L.—*Hall & Harbour*, 602.

CAREX DEWEYANA, Schw.—*Hall & Harbour*, 596.

CAREX GAYANA, Dew. *Boott, Ill.*, pt. 3, p. 126, t. 411. Spike (sometimes wholly pistillate) ovate, capitate, fuscous-ferruginous; spikelets staminate at the apex or wholly staminate or pistillate, many, closely crowded, lower ones compound; bracts setaceous shorter than the spike; stigmas 2; perigynia somewhat rounded, with a short conic beak, orifice very small, hyaline, deeply cleft before, scabrous on the margins above, shining, spongy, chestnut-colored; scale ovate, acuminate, cuspidate, brown-ferruginous, with a whitish hyaline apex broader and longer than the perigynium.—*Hall & Harbour*, 595.

CAREX STELLULATA, L., var. SCIRPOIDES, Carey.—Wet Mountain Valley, *Brandegee*.

CAREX BONPLANDII, Kunth. Spikes of 8–12 blackish-purple or rusty spikelets, more or less bracted, staminate at base; stigmas 2; perigynium ovate or ovate-lanceolate, gradually tapering to a beak, the orifice entire and deeply cleft in front, wingless, more or less serrate on the margins at the apex, nerved, plano-convex, equaling the ovate subacute scale; achenium oblong-ovate, contracted at base, biconvex and apiculate.

Var. MINOR, Olney. Spikelets small, fewer; bracts scale-like.—*Hall & Harbour*, 591.

CAREX LEPORINA, L. *Fl. Suec.* Root woody-fibrous, spike oblong, tawny-brown, composed of 5–6 (rarely more) nearly round or obovate spikelets, staminate at base, alternately contiguous, sometimes aggregated into an elliptical head, the highest club-shaped; bracts sometimes filiform, not equal to the spikelets; stigmas 2; perigynium ovate, gradually tapering to a beak from an ovate base, the orifice obliquely cut, winged, and serrated upon the margins above the middle, nerved upon both sides, tawny, quite equaling the ovate-lanceolate acute scale, which is whitish-hyaline with tawny margins; achenium oblong, lenticular, stipitate, shining, chestnut-colored, apiculate at the base of the style.—Colorado, at 12,000 feet altitude, *Vasey, fide Olney*.

CAREX FESTIVA, Dew. Cæspitose; spike ovate or nearly round, naked or bracteate, composed of 6–12 nearly round androgynous spikelets, staminate at base, closely aggregated into a head; stigmas 2; perigynium ovate-elliptical, tapering to a beak, the whitish-hyaline orifice obliquely cut anteriorly and finally bidentate, slightly nerved on both sides, winged, serrated on the margins above the middle, rusty-tawny, a little exceeding or about equaling the lanceolate obtuse whitish-hyaline rusty-margined scale; achenium oblong-obovate, abruptly apiculate, rusty-colored.—*Hall & Harbour*, 589 and 590. Ute Pass, *Porter*. White House Mountain and Mount Lincoln, at 12,000 feet altitude, *Coulter*. Breckenridge, *Brandegee*. Gray's Peak, *Dr. Smith*. Pike's Peak, *Canby*.

CAREX STENOPHYLLA, Wahl. Cæspitose, 4'–6' high, stoloniferous from the base; spikes androgynous, staminate above, aggregated in an ovate or oblong head; stigmas 2; perigynium ovate, convex on the back, 9–11-nerved, serrulate-scabrous on the margin; beak white-membranaceous at the apex, emarginate on the back; scales acute; culm smooth, somewhat scabrous above.—*Hall & Harbour*, 597.

CAREX ATHROSTACHYA, Olney. Root fibrous; culm 10–20 high, leafy; spike ovate, straw-colored, rusty-tinged, composed of 8–20 crowded spikelets, the lowest sometimes forming a remote distinct head; bracts 3–5, leafy, involucre-like, expanded at base into a hyaline

margin, the lowest much longer than the culm; stigmas 2; perigynium ovate-lanceolate, tapering into a long bifid beak, spongy at base, winged, serrate and waved on the margins, slightly nerved, shorter than or nearly equaling the ovate-lanceolate acuminate scale, which is membranous with bright rusty-colored margins.—Colorado, 587, *Vasey*.

CAREX ADUSTA, Boott.—*Hall & Harbour*.

CAREX STRAMINEA, Schk.—Denver, *B. H. Smith*. Near Colorado Springs, *Porter*.

CAREX TENERA, Dew. Culm 15'–30' high, slender, somewhat 5-sided, leafy towards the base; leaves much shorter than the culm; spikelets 3–5 small, somewhat clavate, distant, nodding or erect; perigynia ovate, compressed, beaked, subulate, nerved, ciliate-serrate, longer than the oblong-lanceolate scale.—The erect form, No. 14 of *Olney's Carices Bor.-Am.*—*Hoopes*.

CAREX LIMULA, Fries., (not of Gray's *Manual*.) Culm 2°–2½° high, acutely angled; leaves erect, flat, rough on the margins, the sheathing base-leaves not fibrillose; spikelets erect, 3–4, the terminal one (or sometimes two) staminate, the remainder pistillate, often with staminate flowers at the apex, oblong, cylindrical, the lowest pedunculate; bracts leafy, surpassing the culm, with small blackish auricles; stigmas 2; perigynium oblong, compressed, faintly nerved, exceeding or equaling the black oblong single-nerved scale; achenium obovate, compressed—Colorado, at 11,300 feet altitude, *Vasey*, 582.

CAREX JAMESII, Torr. Whole plant glaucous; culm 8'–20' high; leaves broad, leathery, shorter than the culm, amplexant at base, the lower spreading and then incurved, with pale sheaths; spikelets 5–6, the lowest sometimes pedunculate or rarely radical on a long peduncle, the two upper ones staminate, blackish-purple, (the stamens brick-colored,) the lower one small; pistillate spikelets 3, sometimes 4, oblong, cylindrical, densely flowered, the uppermost sometimes with a few male flowers; bracts leafy, not usually sheathing, the lowest sometimes short-vaginate and exceeding the culm; stigmas 2; perigynium obovate, *strongly nerved*, glaucous or light-brown, the beak bidentate or emarginate with the mouth slightly ciliated or toothed, longer than the purplish-black scale, which has a greenish-white midrib; achenium orbicular.—Monument Park, *Porter*. Weston's Pass and Twin Lakes, *Coulter*.

Var. *OLNEY*. (*C. Nebraskaensis*, Dew.) Root stoloniferous; culm 16'–24' high; leaves broad, leathery, erect, nearly equaling the culm; spikes rusty-colored; perigynia spreading, shorter than the acute, lanceolate, dark-rusty scales.—*Greene*. Oak Creek, *Brandegee*.

CAREX RIGIDA, Good.—*Hall & Harbour*, 588 in part.

CAREX BUXBAUMII, Wahl.—*Hall & Harbour*, 619.

CAREX ATRATA, L.—*Hall & Harbour*, 588 in part. South Park, *Canby*. Mount La Plata, at 12,000 feet altitude, and Mount Lincoln, at the same elevation, *Coulter*.

Var. *OVATA*, Boott. Spikes 3, oblong (the lower pedunculate with few staminate flowers) dark purple; perigynia glaucous-green.—*Hall & Harbour*, 585. Summit of Pike's Peak, *Canby*.

Var. *NIGRA*, Boott. Spikes subrotund, crowded or aggregated or the lowest distinct, sessile; perigynia oval or elliptical, cylindrically-rostrate, toothed on the margins of the beak, especially above; stigmas 2–3.—*Hall & Harbour*, 577. Gray's Peak, *Dr. Smith*. *Canby*; *Brandegee*; *Meehan*. White House Mountain, at 11,000 feet altitude, *Coulter*.

CAREX ALPINA, Vahl.—*Hall & Harbour*, 618. Chicago Lakes, at 12,000 feet altitude, *Coulter*.

CAREX AUREA, Nutt.—Mount La Plata, at 11,000 feet altitude, *Coulter*.

Var. ANDROGYNA, Olney. Culms short, more rigid; leaves erect, broader; upper spikes more closely aggregated and denser flowered, the upper spike generally androgynous, having more or less fertile flowers at the top.—Colorado, Dudley's Ranch, *E. L. Greene*.

CAREX GEYERI, Boott. (*C. phyllostachya*, Dew., in *Bot. Mex. Bound.*, not of Meyer.) Spike simple, androgynous, the top cylindrical and staminate, pale, at length bright-rusty, with 1-5-pistillate flowers at the base, remote and erect with the rachis; stigmas 3; perigynium oval-trigonal, produced at base, short-beaked, entire at the orifice, whitish-hyaline, membranous, smooth, with two prominent nerves, shorter than the broad-ovate, obtuse or acute sheathing cuspidate or foliaceous scale, which is whitish with a green nerve.—*Hall & Harbour*, 611.

CAREX TORREYI, Tuckerman.—Clear Creek, near Golden City, *E. L. Greene*.

CAREX ROSSII, Boott. Spikelets 4-5, pale, few-flowered, the terminal one staminate, the rest pistillate, each of 3-6 alternate and distinct flowers, the upper 3 spikes approximate, the lower remote, exsertly but unequally long-pedunculate; and upper bract surpassing the culm, the lower sheathed, and all but the lower short-peduncled; stigmas 3; perigynium oval, stipitate, long beaked, bifid, pubescent, nerveless, equaling the ovate-lanceolate acute or cuspidate scale; achenium globose-triangular, obtuse.—*Hall & Harbour*, 620.

CAREX CAPILLARIS, L.—*Hall & Harbour*, 613.

CAREX PENNSYLVANICA, Lam.—Ute Pass, 1872, *Porter*.

CAREX LANUGINOSA, Mx.—South Park, *Canby*. Ute Pass, *Porter*. Cañon City, *Brandegee*. *Meehan*.

CAREX UTRICULATA, Boott.—*Hall & Harbour*, 615; *B. H. Smith*; *Brandegee*.

Var. MINOR, Boott. "Swamps on low mountains," *Canby*.

CAREX LONGIROSTRIS, Torr., var. MINOR, Boott. Culm short; spike shortened; beak shorter.—*Hall & Harbour*, 614.

#### GRAMINEÆ.

ALOPECURUS ALPINUS, Sm. *English Fl.* 1. p. 81. Culm erect, smooth, 6'-1° high; palet about equaling the rather acute glumes; awn exserted more than half its length, slightly bent but not twisted; glumes 3-ribbed, covered on the back with long, dense, white hairs; upper leaf much shorter than its inflated sheath.—*Hall & Harbour*, 683. Gray's Peak, *Dr. Smith*.

ALOPECURUS ARISTULATUS, Mx.—*Hall & Harbour*, 682. Monument Park, *Coulter*. Platte River, near Denver, *Dr. Smith*. Cañon City, *Brandegee*.

PHLEUM ALPINUM, L.—Gray's Peak, *Dr. Smith*; *Meehan*. Twin Lakes, *Porter*. Sangre de Cristo Pass, *Brandegee*. Sierra Madre Range, at 11,000 feet altitude, Weston's Pass and Twin Lakes, *Coulter*.

VILFA CRYPTANDRA, Torr. (*Sporobolus cryptandrus*, Gray.) On the plains near Denver, *Dr. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*. *Hall & Harbour*, 648.

*VILFA AIROIDES*, Trin. (*Sporobolus*, Torr.) Like the last, but the panicle at length much exserted, very open and widely spreading; flowers all on distinct pedicels; sheaths naked at the throat or somewhat bearded; leaves mostly erect and involute.—Cañon City, *Brandegee*. *Hall & Harbour*, 647.

*VILFA ASPERIFOLIA*, Nees & Meyen. Culms branching at base from running root-stocks, decumbent and often rooting, 6'-15' long, glabrous; the smooth, naked sheaths equaling or exceeding the internodes; leaves flat, rough on the margins, 1'-3' long, 1" broad, acuminate, tapering upward from a broad base, erect; branches of the loose, spreading panicle capillary, solitary, axils naked; spikelets less than 1" long, often 2-flowered; glumes slightly unequal, hispid on the back, acute, one-third shorter than the nearly equal palets; lower palet submucronate, the upper obtuse.—Cañon City, *Brandegee*. *Hall & Harbour*, 641; *Redfield*.

*VILFA RAMULOSA*, H. B. K. *Steud. Gram.*, 158. Root annual, fibrous; culms very slender, branching from the base, 3'-10' high; sheaths usually longer than the internodes, glabrous or slightly hairy; leaves flat or convolute, 1'-2' long,  $\frac{1}{4}$ "-1" wide, roughish; panicle elongated and rather narrow, often sheathed at base; branchlets scattered; spikelets scarcely  $\frac{1}{2}$ " long, obtusish, on spreading, finely capillary pedicels; glumes nearly equal; palets obtuse, nearly twice longer.—Divide between Denver and Colorado Springs, *Porter*. *Hall & Harbour*, 643.

*VILFA CUSPIDATA*, Torr.—*Hall & Harbour*, 661.

*VILFA DEPAUPERATA*, Torr. Root perennial, creeping; culms ascending, appressed, branched, slender, often geniculate, glabrous, striate, rather rigid,  $\frac{1}{2}$ °-2° long; leaves 1'-3' long, narrow and usually convolute, recurved or spreading; panicle, very slender, and contracted, 1'-3' long, compound or often nearly simple; spikelets small; glumes unequal, ovate, obtuse or acutish, membranous,  $\frac{2}{3}$  the length of the acute lower palet.—Like the former, but differs in its short obtuse glumes, smaller flowers, narrower involute leaves and more slender habit.—*Hall & Harbour*, 660. South Park, *Canby*. Wet Mountain Valley, *Brandegee*. Divide between Denver and Colorado Springs, *Porter*.

*VILFA TRICHOLEPIS*, Torr. *Pacific R. R. Rep.*, vol. 4, p. 155. Culms erect, simple, terete, 9'-18' high, tufted; nodes distant; sheaths glabrous; ligule truncate; leaves  $\frac{1}{2}$ " broad, glabrous; branches of the oblong, rather dense panicle alternate, naked in the axils; branchlets flexuose; pedicels longer than the spikelets; glumes nearly equal, acutish,  $\frac{1}{4}$  shorter than the nearly equal pilose palets; lower palet 3-nerved.—*Hall & Harbour*, 631. Pike's Peak, *Canby*. South Park, *Porter*.

*AGROSTIS SCABRA*, Willd.—Mt. Elbert, at 10,000 feet altitude, and Sierra Madre Range, *Coulter*. Twin Lakes, *Porter*. Cañon City, *Brandegee*.

*AGROSTIS EXARATA*, Trin. *Steud. Gram.*, 165. Root biennial, fibrous; culm simple, erect, 1°-2° high; ligules obtuse, 1"-2" long; leaves flat, linear, (1"-3" wide, 2'-4' long,) the radical ones narrower, somewhat scabrous; panicle usually contracted and dense, 2'-4' long, the rays 3-5 or more at each axil, semi-verticillate, flowering from the base, erect; glumes acute or sub-acuminate, scabrous on the back, slightly unequal, 1"-2" long; lower palet usually nearly a half shorter, erose-truncate, very rarely awned above the middle, glabrous or a little hairy at base, the upper one a little smaller than the ovary.—Colorado, *Vasey*.

*AGROSTIS CANINA*, L.—*Hall & Harbour*, 671.

*AGROSTIS VULGARIS*, With.—Cañon City, *Brandegee*. *Hoopes*.

MUHLENBERGIA PUNGENS, Thurber, *Proc. Acad. Phil.*, March, 1863, p. 78, *Note*. Culm from a creeping root-stock, 1°–1½° high; leaves rigid, convolute, pungent, spreading, 1'–1½' long, less than 1" wide; ligule short, ciliate; panicle 3'–4' long; branches solitary, scattered, naked at base, fasciculately branching; pedicels capillary, minutely scabrous, many times longer than the spikelets, awn 2½" long; glumes almost equal or nearly equal, acuminate or bristly-apiculate, ½ shorter than the flower; palets naked, furnished with a minute rudiment; lower palet scabrous, acute, produced into a long, rough awn, (½'–1') upper palet scarcely shorter; nerves excurrent, two-bristled; stamens 3.—*Hall & Harbour*, 632.

MUHLENBERGIA GRACILLIMA, Torr. *Bot. Whipl.*, *Pacif. R. R. Rep.* 4, p. 155. Cæspitose, glabrous; culm simple, 6'–12' high; leaves very narrow, involute, short, 1'–1½', mostly in radical tufts; ligule elongated, cleft; panicle 5'–6' long, pyramidal, capillary; branches sub-solitary, widely spreading; pedicels nearly twice longer than the spikelet; spikelets lanceolate, mostly purplish, 1½" long; glumes acute, lanceolate, scarcely twice shorter than the palets; lower palet glabrous, 3-nerved, minutely bifid, with a straight awn of equal length; callus naked.—On the plains.—*Hall & Harbour*, 642. Colorado Springs, *Porter*. Cañon City, *Brandegee*.

MUHLENBERGIA GRACILIS, Trin. *Stead. Glum.*, 179. Root fibrous; culm erect, slender, branching from the base, 1°–1½° high, minutely scabrous, as well as the sheaths; node smooth; leaves erect, narrowly linear, 1'–4' long, plane or convolute, rigid, retrorsely scabrous; panicle contracted, 3'–6' long; branches solitary, appressed; pedicels very short or equaling the spikelet; lower glume 1-nerved, acute, upper 1-nerved, erose-obtuse or acute, sometimes bearing an awn, twice longer than the palets or a little shorter; lower palet wholly pilose, or the middle of the back and margins, bearing an awn 4"–9" in length, upper one on the nerves short-pilose half-way up.—*Hall & Harbour*, 664; *Canby*; *Brandegee*; *Meehan*. Ute Pass and South Park, *Porter*.

MUHLENBERGIA TEXANA, Thurb. in *Gram. Mex. Bound. ined.* "Culms geniculately decumbent, branching; panicle ovoid, few flowered, rays solitary or in pairs, naked below, pedicels equaling or twice as long as the spikelets; glumes shorter than the floret, carinately 1-nerved, setaceous mucronate; palets pilose, the lower terminated by an awn thrice its length and equaled or exceeded by the upper one; callus conspicuous, glabrous.—This species, which seems to be very common in Texas and Arizona, is quite distinct in habit from others of the genus. The slender and branching culms are from one to two feet long, often decumbent for their whole length and geniculate at the nodes; sheaths usually shorter than the internodes, mostly smooth; ligule ½" long, lacerate; leaves (except in specimens from the arid table-lands of Arizona) plane, 1'–1½' long, 3" wide at base, setaceous acuminate at apex, and scabrous, especially above; panicle about 3' long and 2' broad, green or dark-red, included at base except when old, its branches naked below for ½ or ½ their length and 1–3 flowered; spikelets 1½" long; glumes narrowly lanceolate, upper slightly longer.—Texas, *Bigelow*; *Parry*; *Wright*, 734. Arizona, *Hayes*; *Coues*; *Palmer*." Fremont County, Colorado, *Brandegee*; *Greene*.

MUHLENBERGIA SYLVATICA, T. & G., var. (?) SETIGLUMIS, Watson, *King's Rep.* Culms 1° high, nearly erect; panicle contracted nearly as in *M. glomerata*; the branches solitary and densely flowered, mostly to the base; glumes attenuate into a scabrous bristle, 2½"–3" long; the palet,



with its awn, about twice longer.—Denver, *Dr. Smith*. Cañon City, *Brandegee*.

VASEYA<sup>1</sup> COMATA, Thurber. *Proc. Acad. Phil.*, March, 1863, p. 79. Culms 1°–2° high, erect, slender, from a creeping rhizoma, retrorsely pubescent at the nodes; sheaths scabrous, as long as the internodes; ligule short, fringed; leaves 3'–4' long, dull green, rough on both sides; panicle lead-colored, 3'–4' long; branches solitary, appressed, densely flowered; spikelets short-pedicelcd, compressed, 1½" long, pubescent; glumes narrow, very acute, serrulate on the keel, lower one a little longer; awn rough and flexuose, purplish, 3"–4" long.—*Hall & Harbour*.

CALAMAGROSTIS CANADENSIS, Beauv.—Cañon City, *Brandegee*. Twin Lakes and Sierra Madre Range, *Coulter*.

CALAMAGROSTIS STRICTA, Trin.—Cañon City, *Brandegee*. Divide between Denver and Colorado Springs, *Porter*.

CALAMAGROSTIS SYLVATICA, DC. *Gray, Proc. Am. Acad.* 6, p. 80. Root creeping; culm simple, erect, rather rigid, glabrous or scabrous below the panicle; leaves mostly revolute, scabrous; panicle contracted, 2'–4' long, the branchlets erect; glumes ovate-lanceolate, sharply acuminate, about 3" long; lower palet scabrous, rather rigid, awned near the base, hairs about one-fourth as long as the palet; rudiment elongated, plumose; awn bent and twisted, exceeding the glumes.—Denver, *Dr. Smith*; *B. H. Smith*; *Canby*. Cañon City, *Brandegee*. Along the Platte, *Coulter*.

CALAMAGROSTIS LONGIFOLIA, Hook.—Near Denver, *Dr. Smith*. Colorado Springs, *Porter*. Sierra Mojado, *Brandegee*.

ORYZOPSIS MICRANTHA, Thurber. (*Urachne micrantha*, Trin.) "Leaves linear-setaceous, convolute; branches of the panicle in pairs, many-flowered; spikelets shining, florets smooth, a little shorter than the linear, acutish glumes, awn about thrice longer than the glumes; cells of the anthers naked at the apex."—*Steud. Glum.*, 122.—*Hall & Harbour*, 634. Chiann Cañon and Glen Eyrie, *Porter*.

ERIOCOMA<sup>2</sup> CUSPIDATA, Nutt. Perennial; culms 1°–2° high, simple, rather rigid and somewhat scabrous; sheaths scabrous, equaling the internodes, the upper ones often dilated; leaves narrow, convolute, elongated, (2'–18';) panicle frequently included at base, dichotomously branched, the spikelets solitary upon capillary peduncles; glumes 2½"–4" long, usually more or less purple, pubescent; outer palet deep brown, 1½" long, the nearly straight triquetrous awn 1½"–2" long.—*Hall & Harbour*, 633. Cañon City, *Brandegee*. On the plains and in the mountains, *Porter*. Platte River, near Denver, *Dr. Smith*.

STIPA MONGOLICA, Turcz. (*Ptilagrostis Mongolica*, Griseb. in *Ledeb. Fl. Ross.*)—Slender, 1° high, with filiform leaves and a loose few-flowered panicle; the membranous glumes obtuse, about 2" long, sub-equal, pur-

<sup>1</sup>VASEYA, Thurber. Spikelets 1-flowered, membranous-herbaceous, in a narrow crowded panicle. Glumes 1-nerved, equaling or exceeding the flowers, nearly equal, the lower usually a little longer. Callus oblique, densely bearded with silky hairs equaling the flower. Palets equal, the lower 3-nerved, attenuate into a long awn, the upper acuminate. Stamens 3. Ovary stipitate. Stignas plumose with long simple hairs. Perennial from running root-stocks.

<sup>2</sup>ERIOCOMA, Nutt. Spikelets 1-flowered, in a loose, open panicle. Glumes thin, nearly equal, strongly 3-nerved, subventricose at base, attenuate-rostrate above, somewhat exceeding the persistent flower. Callus short, thick. Palets rigid, coriaceous, the outer oval, densely covered throughout with long, white, silky hairs, and terminated with a short, stout deciduous awn, the upper included, narrower, scarcely shorter. Stamens 2–3; anthers oblong-linear, bearded at the apex. Scales conspicuous, nearly equaling the oblong seed.

plish, and the scarcely shorter hairy palet ending in a bent plumose awn, 6" in length.—*Hall & Harbour*, 648.

*STIPA SPARTEA*, Trin.—Colorado Springs, *Porter*. South Park, *Canby*. *Meehan*. Wet Mountain Valley, *Redfield*.

*STIPA VIRIDULA*, Trin., *Steud. Gram.*, 129. Culms stout, strict, and with the narrow sheaths scabrous or sometimes glabrate, 1°–3½° high, the nodes naked; leaves elongated, mostly narrow and involute, 1"–3" broad, scabrous; panicle narrow, contracted, 3'–10' long, the erect branches 2–3 together, flowering from the base or some of them naked below; glumes nearly equal, 3"–4½" long, narrowly acuminate; lower palet 2½"–3" long, short-pilose at the obtusish base, appressed-pubescent above, and with a pilose crown at the apex; awn about 1' long, twisted and geniculate, minutely scabrous.—*Hall & Harbour*, 626. Near Denver, *Dr. Smith*. Cañon City, *Brandegge*. Colorado Springs, *Porter*.

*ARISTIDA PURPUREA*, Nutt. *Steud. Gram.*, 134. Perennial; culms 6'–15' high, simple, erect, slender, mostly glabrous; sheaths narrow, scabrous, exceeding the internodes, pilose at the throat; leaves very narrow, convolute, ½'–10' long; panicle slender, erect or flaccid, 3'–6' long, loosely few-flowered; glumes purplish, the upper 6"–9" long, about twice exceeding the lower, and longer than the flower, bifid and shortly awned; flower densely short-pilose at the pointed base, scabrous above, 6" long, the awns equal or nearly so, separate to the base, not jointed, 1"–2" long, scabrous.—*Hall & Harbour*, 652. Near Denver, *Dr. Smith*. Cañon City, *Brandegge*. Colorado Springs and South Park, *Porter*.

*ARISTIDA OLIGANTHA*, Mx.—Cañon City, *Brandegge*.

*SPARTINA CYNOSUROIDES*, Willd.—Near Denver, *Dr. Smith*.

*SPARTINA GRACILIS*, Trin., *Steud. Gram.*, 214. Culms 1°–3° high, exceeding the spreading distichous leaves, which are very rough upon the margins, mostly convolute, the upper ones distant and shorter; ligules ciliate; spikes 4–10, oblong, mostly sessile, appressed to the nearly smooth rachis; glumes very unequal, the lower acuminate, the upper acute and equaling the obtusish palets, 4" long, the glumes and lower palet ciliate, hispid upon the keel.—*Hall & Harbour*, 639. Cañon City, *Brandegge*. South Park, *Porter*. In saline soils.

*PLEURAPHIS*<sup>1</sup> *JAMESII*, Torr. *Steud. Gram.*, 218. Roots perennial, creeping; culms 1°–1½° high, branching at base, erect, slender, slightly scabrous, hairy at the nodes, with the leaves glaucous; sheaths close, scabrous, hairy at the throat, the ligule laciniate; leaves 1'–6' long, mostly convolute, rigid, scabrous, the upper ones short and pungent; spike 2'–3' long, erect, the internodes of the flexuous rachis shorter than the erect (4" long) spikelets; flowers short-pedicelod or nearly sessile in the glumes; glumes of the perfect spikelet ciliate, carinate, cleft nearly to the middle, the lobes 1-nerved on the inner margin, with 3–5 intermediate bristles, the central one longer; palets exceeding the glumes, the lower 3-nerved, bifid at the apex, short-cuspidate, the upper a little shorter, 2-nerved and slightly bifid; scales linear, entire; glumes of the sterile spikelets equaling the palets, the lower ciliate, slightly 2-cleft,

<sup>1</sup> *PLEURAPHIS*, Torr. Flowers spicate; the spikelets sessile by threes at each joint of the rachis, surrounded at base by an involucre of soft, spreading hairs; the lateral ones staminate, the central perfect. Glumes of the perfect spikelets 2, 1-flowered, equal, narrow-cuneate, deeply 2-cleft, 3–5 bristled; palets membranous, the lower short-awned at the apex. Glumes of the sterile spikelets 2, 2-flowered, lanceolate, inequilateral, the lower 1-awned upon the back; palets membranous, awnless. Stamens 3, with very short filaments. Germ ovate; styles 2, distinct, the elongated stigmas simply plumose.

awned above the middle, the outer side 2-nerved, the inner margin much narrower and infolded, the upper glume emarginate or erose, cuspidate with a strong mid-nerve, the broader outer side also 2-3-nerved; palets emarginate or irregularly toothed at the apex, the lower 3-nerved, the upper 2-nerved.—*Greene*.

*BOUTELOUA OLIGOSTACHYA*, Torr.—*Hall & Harbour*, 636. Near Denver, *Dr. Smith*. *B. H. Smith*. Colorado Springs, *Porter*. Cañon City, *Brandegee*. Common on the plains.

*BOUTELOUA HIRSUTA*, Lag.—South Park, *Canby*.

*BOUTELOUA CURTIPENDULA*, Gray.—*Hall & Harbour*. Colorado Springs, *Porter*.

*BUCHLOE*<sup>1</sup> *DACTYLOIDES*, Engelm.—*Trans. Saint Louis Acad.*, vol. 1, p. 432, pl. 12 and 14. Densely tufted, spreading by stolons, forming broad mats; culms 3'-6' long; flowering stems of the male plant 4'-6' long, glabrous or slightly hairy; leaves 2'-4' long,  $\frac{1}{2}$ "-1 $\frac{1}{2}$ " wide, nearly smooth; sheaths striate, glabrous, strongly bearded at the throat; spikes 3"-6" long; spikelets alternate in 2 rows, uppermost abortive, bristle-form, 2"-3" long; lower glume ovate lanceolate, with a scarios margin; upper glume twice longer, ovate; lower palet convex, 3-nerved, upper one 2-nerved, two minute scales at the margin and inside of the lower palet; stamens 3. Stems of the female plant much shorter than the leaves, 1 $\frac{1}{2}$ '-2' high; heads 3"-3 $\frac{1}{2}$ " long; glumes becoming ligneous; spikes or heads usually 2; at maturity becoming thick, extremely hard, including the loose grain.—The celebrated "buffalo-grass," known to hunters and trappers as one of the most nutritious grasses, on which for a part of the year subsist and fatten the immense herds of buffalo and the cattle of the hunter and emigrant. It extends on the elevated plains from the British Possessions southward and westward into Mexico and New Mexico. Nuttall, who had only the male plant, referred it to the genus *Sesleria*, and described it as *S. dactyloides* (*Gen.* 1, p. 64.) Steudel founded another genus on the female plant, *Antephora axilliflora*, (*Glum.* 1, p. 111.) The true relationship between them was first detected by Dr. Engelmann, and clearly set forth by him in his masterly article in the *Trans. Saint Louis Acad.* Plains around Denver, *Dr. Smith*. *Hall & Harbour*, 637.

*MUNROA*<sup>2</sup> *SQUARROSA*, Torr. *Bot. Whipl.*, *Pacif. R. R. Rep.* 4, p. 158.

<sup>1</sup> *BUCHLOE*, Engelm. Flowers diceious, heteromorphous.—*Male plant*. Spikes 1-sided 2-ranked; spikelets 2-3-flowered. Glumes 2, 1-nerved, lower much smaller. Palets 2, of equal length, longer than the glumes; lower one 3-nerved, mucronate; upper one 2-nerved. Squamulae in pairs, truncate, emarginate. Stamens 3; anthers linear. Rudiment of an ovary none.—*Female plant*. Spikes 1-3, short, capitate, oblique in the involucre sheaths of the upper leaves; spikelets 1-flowered, crowded, upper floret abortive, withering. Glumes 2; lower glume of the lowest spikelets 1-3 nerved, lanceolate-subulate, with an herbaceous tip, or 2-3-cleft, lower side adnate to the back of the upper glume; lower glumes of the other spikelets (internal as to the head) free, much smaller, membranaceous, ovate-lanceolate, acute, 1-nerved; upper glumes (external) connate at the base with the thickened rachis, at length like a hard, woody involucre, ovate, nerveless, pale, trifid at the herbaceous, nerved tip. Lower palet (internal as to the head) shorter, 3-nerved, herbaceous, tricuspidate; upper palet shorter, 2-nerved. Squamulae as in the male flowers. Rudiments of the stamens 3, minute. Ovary lenticular, glabrous, very short-stipitate; stigmas much longer than the 2 erect terminal styles, plumose with simple hairs, exsert from the apex of the flower. Caryopsis free, included in a horny, at length deciduous head, sublenticular, flat on the outside, (toward the lower palet,) convex on the inner side.

<sup>2</sup> *MUNROA*, Torr. Spike capitate, leafy; spikelets 3, 2-6-flowered; flowers sessile; 2-ranked; terminal one abortive. Glumes 2, subopposite, much shorter than the flowers, mucronate. Palea 2, herbaceous, rigid, in the lowest spikelet naked, mucronate or short-awned, not keeled, equilateral, in the uppermost spikelet bearded toward the base; caryopsis very smooth, covered by the upper palea.

Annual, creeping, very much branched from the base; branches fasciculate, 3'-8' long; leaves 1'-2' long, flat, 1''-2'' wide, somewhat pungent, scabrous on the margin; spikelets mostly 3, closely approximated; 3-4 flowered; glumes almost unilateral, linear-lanceolate, carinate; palets 2-3 times longer than the glumes, lanceolate, acute, upper one bicarinate, rather obtuse.—On the plains, *Hall & Harbour*, 638. Colorado Springs, *Porter*. Denver, *Dr. Smith*. Cañon City, *Brandegee*.

LEPTOCHLOA FASCICULARIS, Gr.—*Hall & Harbour*, 644.

TRICUSPIS PURPUREA, Nutt.—*Hall & Harbour*, 645.

TRICUSPIS MUTICA, Torr. *Bot. Whipl.* p. 156. Cæspitose, glabrous, 1° high; culm rigid, terete, erect, very simple; leaves convolute-filiform, 3'-6' long; panicle terminal, much exerted, racemose, 3'-6' long, the short, appressed branches bearing 3-5 spikelets; spikelets rather terete, 5-8-flowered, glumes unequal, 1-nerved, rather acute, scarcely half the length of the spikelets; lower palet awnless, entire or bifid, long ciliate on the margin and back; upper palet  $\frac{1}{3}$  shorter than the lower, notched at the apex, plumose on the margin; style short; stigmas plumose, purple.—Cañon City, *Greene*, 1873.

TRICUSPIS ACUMINATA, Munro, in *Herb. Thurb.* "Culms cæspitose, simple, usually with but a single node, which bears a very short leaf; panicle dense, ovoid; spikelets sessile, 8-12 flowered, the rachis easily disarticulating; glumes acuminate, 1-nerved, the upper subaristate and with the palets carinately compressed; lower palet 3'' long, acuminate, membranaceous, 3-nerved, marginal nerves terminating at the scarcely bifid apex, the central one prolonged into a seta  $\frac{1}{4}$  the length of the palet, which is densely silky below and somewhat pilose above the marginal nerves, with a conspicuously silky tuft near the base; upper palet ovate, obtuse,  $\frac{1}{3}$  shorter than the lower; stamens 3; ovary stipitate; styles plumose with simple hairs; squamulæ 2, fleshy, truncate; seed fusiform, smooth, shining and translucent, except the scutellum, which is nearly half its length.—This exceedingly neat and interesting species is apparently a perennial, forming tufts with culms 6' to 1° or more high, somewhat rigid, compressed, and often geniculate at base; nodes red; sheaths much shorter than the internodes, with a pilose tuft at the throat; ligule minute, lacerate; the pale-green leaves plane or canaliculate, rigid, distinctly 3-nerved, pubescent, scabrous on the margins, obtuse and mucronulate at apex; radical leaves 2' and those of the culm  $\frac{1}{2}$ ' long; panicle 1'-2' long with a few erect 1-3 flowered branches, whitish or with a very slight purple tinge; the broad palets (at least when dry) nearly colorless, with green nerves and beautifully silky hairs upon the lower portion and marginal nerves; upper palet bicarinate, ciliate on the nerves and conformed to the lower one.—The plant has something of the habit of *Tricuspis (Uralepis) avenacea*, Kth., and has been mixed with it by collectors, but is readily distinguished by its larger and many-flowered spikelets and its carinate, acuminate, and mostly entire lower palet.—Texas, *Linheimer*, 738; *Bigelow*; *Wright*, 781, 782, (in part) and 2058. New Mexico, *Fendler*, 915." Cañon City, Colorado, *Brandegee*; *Greene*, 1873.

GRAPHEPHORUM(?) FLEXUOSUM, Thurber *Proc. Acad. Phil.*, March, 1863, p. 78, *Note*. Culm 3° high, smooth; sheath surpassing the internodes, furnished with a ring of hairs instead of a ligule; leaves 1 $\frac{1}{2}$ ° long, 2'' broad, setaceous-acuminate; panicle loosely-flowered; branches scattered, the lowest distant, about 4' long, naked below, branchlets few, capillary; spikelets ovate, compressed, 3-6-flowered, 2 $\frac{1}{2}$ ''-3'' long, twice or four times shorter than the pedicels; glumes membranaceous, 1-nerved,

acute, half shorter than the spikelet; lower palet carinate, 3-nerved, (with prominent lateral nerves,) scabrous-pubescent, erose-denticulate at the apex, mucronate, villous at base, upper one about as long, conspicuously 2-keeled, 2-toothed; stamens 3; ovary stipitate; squamulae 2, obliquely truncate; caryopsis free.—*Hall & Harbour*, 635.

*KOELERIA CRISTATA*, Pers.—Near Denver, *B. H. Smith*. Colorado Springs, *Porter*. Monument Park, Twin Lakes, and on the Upper Arkansas, *Coulter*. *Hall & Harbour*, 650.

*MELICA BULBOSA*, Geyer. (*M. poaeoides*, Torr. *Bot. Whipl.*, not Nutt.) Gray in *Proc. Am. Acad.*, vol. 8, p. 409. Culms erect, slender,  $1\frac{1}{2}^{\circ}$ – $2^{\circ}$  high often enlarged and bulb-like at base, slightly scabrous above, nodes, naked; sheaths longer than the internodes and scabrous, the ligules usually long and lacerated; leaves scabrous, mostly flat and elongated, 1"–2" wide; panicle narrow and often interrupted, the branches unequal and erect, subscabrous, rarely spreading; spikelets erect and scarcely secund, 3–5-flowered, usually more or less purple; glumes obtuse or acutish, glabrous, 5-nerved; lower palet about 4" long, 7-nerved, puberulent on the back, membranous-margined, rather obtuse, upper palet pubescent on the nerves erose-truncate; grain 2" long.

Var. Culms slender, little enlarged at base,  $1^{\circ}$  high; leaves narrow and revolute; panicle narrow; spikelets 10–15; glumes longer, more acute; lower palet obscurely 5-nerved, upper palet not pubescent on the margins.—*Ute Pass and Twin Lakes, Coulter*.

*MELICA MUTICA*, Walt., Gr., var. *PARVIFLORA*, *Porter*. Culms  $2^{\circ}$  high; panicle narrow,  $1^{\circ}$  long; flowers 3–4, smaller; leaves narrower; spikelet much exceeding the larger glume; pedicels below the flowers more hairy.—*Glen Eyrie, Porter. Meehan*. Sierra Madre Range, *Coulter*.

*GLYCERIA PAUCIFLORA*, Presl. *Steud. Gram.*, 285. Roots creeping; culms  $1^{\circ}$ – $3\frac{1}{2}^{\circ}$  high, smooth, nodes naked; sheaths and the broad linear leaves (3'–12' long) scabrous; panicle loosely spreading, the slender flexuous branches in pairs, divided, scabrous; spikelets narrow-oblong, 2" long, 4–6-flowered, often purplish; glumes rounded, unequal, the lower obscurely 3-nerved, scarious on the margin, lower palet truncate-obtuse, the apex minutely serrulate and distinctly scarious, 5-nerved, the upper one emarginate.—*Hall & Harbour*, 662. Cañon City, *Brandegee*.

*GLYCERIA AQUATICA*, Sm.—*Hall & Harbour*, 629. Monument Park, *Coulter*.

*GLYCERIA AIROIDES*, Thurber. (*Poa airoides*, Nutt. in *Gen.* 1, p. 68.) Culm  $4^{\circ}$ – $5^{\circ}$  high, erect; leaves with very long sheaths, short and acute; panicle erect, attenuated; branches semi-verticillate, few and capillary; spikelets oblong, obtuse, nearly sessile, or upon short peduncles, 4–6-flowered; glumes very unequal, shorter than the palets; flowers distinct, somewhat cylindric, obtuse, shining, purplish, scarious, and often lacerate at the point, obsoletely 5-nerved, inner valve scabrous on the margin.—*Hall & Harbour*, 630. South Park, *Porter. Canby*.

*GLYCERIA DISTANS*, Wahl.—Colorado, *fidè Watson*.

*CATABROSA*<sup>1</sup> *AQUATICA*, Beauv. (*Glyceria*, Presl., *Steud. Gram.*, 286.)

<sup>1</sup>*CATABROSA*, Beauv. Spikelets 2–3-flowered; flowers equal, perfect. Glumes membranous, colored, unequal, shorter than the flower, concave, the lower oblong, 1-nerved, the upper obovate, 3-nerved, erosely dentate at the apex, or both nerveless. Palets membranous, equal in length, the lower 3-nerved and 3-keeled, truncate-obtuse, the upper 2-nerved and 2-keeled, rounded and somewhat 3-lobed. Stamens 3. Styles 2; very short; the stigmas plumose. Scales 2, shorter than the ovary. Grain oblong, free, shortly pedicelled.—Glabrous, creeping aquatics, with flat leaves, elongated membranous ligules and diffusely branched panicles with semi-verticillate branches; flowers jointed at base and deciduous.

Culms 4'-2° high, rather stout, ascending; leaves 2'-6' long, 2"-4" wide, scabrous on the margin; panicle uniform, branchlets numerous, divided; glumes ½" long, purplish; flowers 1" in length, light-brown in color.—*Hall & Harbour*, 663. Wet Mountain Valley, *Brandege*.

BRIZOPYRUM SPICATUM Hook, var. STRICTUM, Gray. (*Uniola stricta*, Torr. *Steud. Gram.*, 281.) Spikelets many-flowered, and the panicle mostly rather loose and elongated, 1½'-3½' in length; culms ½°-2° high; pistillate spikelets 4"-8" long, 4-13-flowered, the lower palet acutish or almost acuminate; staminate spikelets 4"-9" long, 6-18-flowered, slender-pedicel and often somewhat nodding.—*Hall & Harbour*, 640. South Park, *Porter*.

POA ALPINA, L.—*Hall & Harbour*, 674. Mt. Lincoln, at 12,500 feet altitude, Weston's Pass, at 11,000 feet, and White House Mountain, at 11,500 feet, *Coulter*.

POA CÆSIA, Sm., var. STRICTIOR, Gr.—On Pike's Peak, *Canby*. Along the foothills, *Coulter*.

POA SEROTINA, Ehrh.—*Hall & Harbour*, 672. Ute Pass, *Porter*. Weston's Pass, *Coulter*.

POA TENUIFOLIA, Nutt. Tufted, 1°-2° high; culm slender, erect, glabrous or with the sheaths and leaves more or less scabrous; leaves narrowly linear, 1'-6' long; ligules short; panicle erect, narrow and rather close, 2'-6' long, the branchlets 2-5 together and scabrous; glumes 2"-2¼" long, acute or acutish, a little scabrous on the mid-vein, 3-4-flowered; lower palet 2" long, obtuse, nearly glabrous, puberulent or somewhat pubescent at base, but little compressed; flowers readily separating at the joints.—*Hall & Harbour*, 668 and 675.

POA ANDINA, Nutt. In dense perennial tufts, glabrous excepting the more or less scabrous panicle; culms 4'-2° high, slender, erect; leaves very narrow, 1'-3' long, mostly revolute; ligules ½"-2" long, acuminate; panicle narrow or linear, strict, 1'-2½' long, the branches 2-3 together; spikelets 2-3 flowered; glumes 1½"-2" long, acute or acutish, a little scabrous on the midvein; palets 1½" long, pubescent, villous at base, the lower one obscurely nerved, but little compressed.—Near Long's Peak, June, at 8,000 altitude, and Mount Lincoln, at 13,000 feet, *Coulter*.

ERAGROSTIS PURSHII, Bernh.—Near Denver, *Dr. Smith*.

FESTUCA OVINA, L. *Meehan*. Cañon City, *Brandege*. Clear Creek, *Porter*. Denver, *Dr. Smith*.

Var. DUR IUSCULA, Gr.—*Hall & Harbour*, 665. Twin Lakes, *Porter*. East River, Taylor River, and White House Mountain, at 13,000 feet altitude, *Coulter*.

Var. BREVIFOLIA, Watson. (*F. brevifolia*, Br., *Steud. Gram.*, 313.) *King's Rep.*, vol. 5, p. 389. Tufted; culms low and slender, 4'-8' high; leaves setaceous and sheaths glabrous, the uppermost leaves often very short and the sheath rather loose; panicle racemose and nearly simple, erect, 1'-2' long; spikelets 1'-4'-flowered; flowers terete, somewhat scabrous, about 2" long, twice the length of the awn.—*Hall & Harbour*, 666. *Parry*, 373. Near Denver, *Dr. Smith*. Twin Lakes, *Porter*. Along the Platte, *Coulter*.

BROMUS KALMII, Gr., var. Culm 12'-18' high, smooth; sheaths and leaves minutely scabrous; panicle 6' long, compound, branches minutely downy; spikelets 1' long, canescent with short appressed silky hairs

7-9-flowered; glumes 3"-4" long, each 3-nerved, obtuse; lower palet 5" long, 7-nerved, awn 1½" long.—Twin Lakes, *Porter*. Buffalo Peaks and Sierra Madre Range, *Coulter*.

*BROMUS CILIATUS*, L.—Divide between Denver and Colorado Springs, *Porter*. Wet Mountain Valley, *Brandegee*.

*PHRAGMITES COMMUNIS*, L.—Near Denver, *Dr. Smith*.

*TRITICUM REPENS*, L.—*Hall & Harbour*, 655. Denver, *Dr. Smith*. *B. H. Smith*. Cañon City, *Brandegee*. *Meehan*. Along the Platte and on Weston's Pass, *Coulter*. Known as "blue-joint."

*TRITICUM CANINUM*, L.—*Hall & Harbour*, 680.

*TRITICUM STRIGOSUM*, *Steud. Gram.*, 347. (*Bromus*, *Bieb. T. agilopoides*, *Turcz.*) Resembling the last, but glaucous, the leaves narrow and revolute; spike narrow-linear, with the spikelets shorter than the joints or but little exceeding them; glumes obtuse or acutish, or sometimes acuminate.—*Hall & Harbour*, 657. Ute Pass, *Porter*. Plains of the Platte, *Coulter*. *Canby*.

*LEPTURUS PANICULATUS*, *Nutt.*—Denver, *Dr. Smith*. Colorado Springs, *Porter*. Fremont County, *Brandegee*.

*HORDEUM JUBATUM*, L.—Denver, *Dr. Smith*. *B. H. Smith*. Colorado Springs and South Park, *Porter*. Cañon City, *Brandegee*. Plains of the Platte, *Coulter*. A common and showy grass, the panicles often being purplish.

*HORDEUM PRATENSE*, *Huds.*—Colorado Springs and South Park, *Porter*. Plains of the Platte, *Coulter*.

*ELYMUS CANADENSIS*, L.—Colorado Springs, *Porter*.

*ELYMUS CONDENSATUS*, *Presl. Steud. Gram.*, 351. Culm stout, 3<sup>o</sup>-8<sup>o</sup> high, roughish-puberulent and short-pubescent at the nodes or nearly glabrous; spike 3'-15' long, erect, exserted, or sheathed at base, sometimes close-paniculate; spikelets 2-6 together, 3-10-flowered, puberulent or nearly glabrous, exceeding the internodes of the pubescent rachis; glumes setaceous-subulate from a very narrow base, 4"-5" long; flowers 4" long, acute or short-awned, or barely acutish, the upper palet 2-toothed.—*Hall & Harbour*, 654.

*ELYMUS SITANION*. *Schult.*, (*Sitanion elymoides*, *Raf.*, *Steud. Gram.*, 351, and *Polyantherix Hystrix*, *Nees. Steud. Gram.*, 356.) Culms 4'-2<sup>o</sup> high, tufted, and with the leaves and sheaths glabrous or somewhat pubescent or scabrous; spike erect, 1'-3' long, squarrose with its long recurved awns, jointed and fragile at maturity; spikelets in pairs, 2-5-flowered, smooth or puberulent; glumes entire or usually parted to the base and the segments unequally 2-cleft, the divisions long-awned, (1'-3'); flowers 3" long, the awn of the lower palet equaling that of the glumes, with often a subsidiary awn or tooth on each side at the apex of the palet.—*Hall & Harbour*, 679. Cañon City, *Brandegee*. Mountains west of Denver, *Porter*. Twin Lakes, *Coulter*.

*DANTHONIA SERICEA*, *Nutt.*—*Hall & Harbour*, 622; *Meehan*. Ute Pass, *Porter*. Along the Platte, *Coulter*. Wet Mountain Valley, *Redfield*.

*AVENA STRIATA*, *Mx.*—*Hall & Harbour*, 623.

*TRISETUM SUBSPICATUM*, *Beauv.*—*Hall & Harbour*, 625; *Canby*. Gray's Peak, *Dr. Smith*. Sangre de Cristo Pass, *Brandegee*. Mount Lincoln, at 13,000 feet altitude, Weston's Pass, Twin Lakes, Divide at the head of Lake Creek at 12,000 feet altitude, and White House Mountain, at 12,000 feet, *Coulter*.

*AIRA CÆSPITOSA*, L.—South Park, *Porter*. Near Denver, Mount Lin-

coln at 12,000 feet, Weston's Pass, Twin Lakes and Sierra Madre Range, *Coulter*.

AIRA DANTHONIOIDES, Trin. *Steud. Gram.*, 221. Annual, glabrous; culms very slender, 3'-3° high, geniculate at base; sheaths smooth, exceeding the internodes; ligules elongated; leaves short ( $\frac{1}{2}$ '-4') and very narrow or convolute-setaceous; panicle diffuse, the capillary branchlets 2-4 together and naked below; glumes 2-flowered, with the plumose rudiment of a third, 2''-3'' long, exceeding the flowers; lower palet truncate and denticulate, 1''-1 $\frac{1}{2}$ '' long, awned below the middle, the awn 2''-4'' long, geniculate; grain free, flattish, not grooved.—Summit of Gray's Peak, *Dr. Smith*.

HIEROCHLOA BOREALIS, R. & S.—*Hall & Harbour*, 628. Cañon City, *Brandege*. Clear Creek cañon, *Coulter*.

PHALARIS ARUNDINACEA, L.—Cañon City, *Brandege*.

PASPALUM SETACEUM, Mx.—*Hall & Harbour*, 653.

BECKMANNIA<sup>1</sup> ERUCÆFORMIS, Host. *Steud. Gram.*, 15. Culms stout, 1°-3 $\frac{1}{2}$ ° high, erect from an ascending base, with the sheaths glabrous; ligules elongated; leaves linear, 4'-8' long and 2''-6'' wide, flat, acute, scabrous; panicle 4'-12' long, erect, strict, secund, the short, crowded branchlets densely flowered from the base, glabrous; spikelets sessile, imbricately arranged in two rows, nearly orbicular, 1 $\frac{1}{4}$ '' in diameter, the upper rudimentary floret minute, stipitate.—*Hall and Harbour*, 658. Near Denver, *Dr. Smith*.

PANICUM CAPILLARE, L.—Cañon City, *Brandege*.

PANICUM VIRGATUM, L.—Near Denver, *Dr. Smith*.

PANICUM AMARUM, Ell.—Cañon City, *Brandege*.

PANICUM PAUCIFLORUM, Ell.—Cañon City, *Brandege*.

PANICUM CRUS-GALLI, L.—Near Denver, *Dr. Smith*. Cañon City *Brandege*.—Introduced.

SETARIA VIRIDIS, Beauv.—Cañon City, *Brandege*.—Introduced.

SETARIA ITALICA, Kunth.—Cañon City, *Brandege*.—Introduced.

CENCHRUS TRIBULOIDES, L.—Cañon City, *Brandege*.

ANDROPOGON FURCATUS, Muhl.—Divide between Denver and Colorado Springs, *Porter*.

ANDROPOGON SCOPARIUS, Mx.—Cañon City and Wet Mountain Valley, *Brandege*.

ANDROPOGON ARGENTEUS, Ell.—*Hall & Harbour*, 651. Cañon City, *Brandege*.

SORGHUM NUTANS, Gray.—Cañon City, *Brandege*.

### EQUISETACEÆ.

EQUISETUM ARVENSE, L.—Near Denver, *Dr. Smith*. Clear Creek, *Coulter*.

EQUISETUM PRATENSE, Ehrh.—Mt. Lincoln, Twin Lakes and Sierra Madre Range, *Coulter*.

<sup>1</sup> BECKMANNIA, Host. Panicle racemose, contracted. Spikelets compressed, 2-flowered, the upper floret an abortive rudiment. Glumes 2, obovate, compressed boat-shaped, subcoriaceous, equal, a little shorter than the flower, pointless. Palets membranous, the lower ovate, concave, acutish, mucronate, 3-nerved, the upper 2-nerved, bifid. Stamens 3. Styles 2, with elongated plumose stigmas. Scales 2, bifid, glabrous. Grain free, glabrous.—A coarse perennial aquatic.



*EQUISETUM LÆVIGATUM*, Braud.—Near Denver, *Dr. Smith; Porter*. Saint Vrain Cañon and Clear Creek, *Coulter*.

*EQUISETUM VARIEGATUM*, Schleicher.—Clear Creek, near Denver, *Coulter*.

### FILICES.

*POLYPODIUM VULGARE*, L.—*Hall & Harbour*, 694. Grand Cañon of Arkansas, *Brandegee*.

*PTERIS AQUILINA*, L.—Along the Platte, and in the Sierra Madre Range, at 10,000 feet altitude, *Coulter*. Wet Mountain Valley, *Brandegee*.

*CHEILANTHES FENDLERI*, Hook. *Spec. Fil.*, 2, p. 103. Small; caudex creeping, scaly; stipes sparse, scattered, slender, brown, scaly with subulate, appressed scales, on the main and secondary rachises the scales more copious, broader, ovate-acuminate, white, glossy brown at the base; fronds 2'-3' long, ovate-lanceolate, subcoriaceous, pale-green, glabrous on both sides, tripinnate; primary pinnules ovate-lanceolate, obtuse, pinnules rather large for the size of the frond, convex, broad-connate, sessile, somewhat decurrent, retuse at the apex, entire or 2-3-lobed, the margin of the lobes merely incurved, scarcely confluent and forming the involucre.—*Hall & Harbour; Brandegee; Canby*. Chiann Cañon and Glen Eyrie, *Porter*.

*CHEILANTHES TOMENTOSA*, Link.—Grand Cañon of the Arkansas, *Brandegee*.

*CHEILANTHES LANUGINOSA*, Nutt.—*Meehan*. Grand Cañon of the Arkansas, *Brandegee*. Chiann Cañon, *Porter*.

*CHEILANTHES EATONI*, Baker. *Syn. Fil.*, p. 140. Stipes tufted, 3'-6' in length, wiry, erect, densely clothed with pale brown, linear-subulate scales; fronds 3'-8' in length, 1½'-2' broad, ovate-lanceolate, tripinnatifid; lower pinnæ distant, alternate or opposite, deltoid; pinnules linear-oblong, pinnatifid; rachis rigid, covered with scales like the stipe, which also cover thickly the midrib of the pinnæ beneath, texture coriaceous, upper surface densely clothed with a white woolly tomentum, lower also densely matted, the margin of the segments incurved.—Grand Cañon of the Arkansas, *Brandegee*.

*NOTHOLÆNA FENDLERI*, Kunze. Stipes densely tufted, 2'-4' long, wiry, chestnut-brown, naked, the scales linear, bright-ferruginous; frond 2'-3' each way, deltoid, tripinnate, all the rachises very zigzag; pinnæ, pinnules, and segments all stalked, deltoid; lobes close, oblong, blunt, not more than 1" long, ½" broad; texture subcoriaceous, upper surface naked, lower covered with a fine white powder.—Abundant throughout Fremont County, *Brandegee*. Chiann Cañon and Glen Eyrie, *Porter*.

*PELLÆA GRACILIS*, Hook.—Ten Mile Cañon, below Breckenridge, *Brandegee*.

*PELLÆA ATROPURPUREA*, Link.—Glen Eyrie, *Porter*.

*PELLÆA WRIGHTIANA*, Hook. (*P. (Allosorus) mucronata*, Eaton. *Sill. Jour.*, July, 1856.) Stipes tufted, 2'-4' long, strong, erect, naked, dark-brown, polished; fronds 3'-6' long, 1'-3' broad, deltoid, bipinnate; pinnæ spreading or erect-patent, rigid, 1' or more long, with several distant, linear, oblong pinnules, sterile ones flat, ovate, fertile ones narrowed, revolute on the margins, 3"-4" long, with a sharp, mucronate point; rachis chestnut-brown, polished like the stipe; texture coriaceous, both surfaces naked, pale glaucous-green; involucre broad, coriaceous, rolled permanently over the sori.—Cañon City and vicinity, *Brandegee*.

*CRYPTOGRAMME ACROSTICHOIDES*, R. Br. (*Allosorus acrostichoides*,

Spreng.)—*Hall & Harbour*, 688; *Parry*. Wet Mountain Valley, *Brandegee*. Sierra Madre Range, Gothic Mountain and Mountain of the Holy Cross, *Coulter*.

*ASPLENIUM SEPTENTRIONALE*, L. Fronds many from tufted root-stocks, 3'-5' high, on very long stipes, erect; pinnae 2-4, narrow, linear, erect, entire at base, with 2-several setaceous divisions at the summit.—*Hall & Harbour*, 689. Grand Cañon of the Arkansas, *Brandegee*; *Redfield*.

*ASPLENIUM TRICHOMANES*, L.—Grand Cañon of the Arkansas, *Brandegee*.

*ASPLENIUM EBENEUM*, Ait.—Green Horn Mountains, *E. L. Greene*.

*ASPLENIUM FILIX-FÆMINA*, Bernh.—*Hoopes*.

*PHEGOPTERIS DRYOPTERIS*, Fée.—*Hall & Harbour*, 695.

*ASPIDIUM FILIX-MAS*, Swartz. *Hall & Harbour*, 687. Grand Cañon of the Arkansas, *Brandegee*. Along the foot-hills west of Denver, *Coulter*.

*CYSTOPTERIS FRAGILIS*, Bernh.—*Hall & Harbour*, 690; *Canby*. South Park, *Porter*. Wet Mountain Valley, *Brandegee*. Bear Creek, near Denver, Mount Lincoln, at 12,000 feet altitude, Twin Lakes and White House Mountain, *Coulter*.

*WOODSIA SCOPULINA*, Eaton. Root-stock short, creeping; stalks 2'-4' high, chaffy at the base, stramineous, puberulent, like the rachis and under surface of the frond, with minute flattened hairs and stalked glands; fronds lanceolate, 4'-8' long, pinnate; pinnae numerous, 8"-10" long, pinnatifid with 10-16 short ovate or oblong crenulate or toothed divisions; indusium very delicate, deeply cleft into lacinia, which terminate in short hairs composed of irregular cylindrical cells.—Colorado, *vide D. C. Eaton*.

*WOODSIA OREGANA*, Eaton. *Canby*. Chiann Cañon, South Park and Upper Arkansas, *Porter*. *Meehan*. Wet Mountain Valley, *Brandegee*. Long's Peak and Twin Lakes, *Coulter*. Grand Cañon of the Arkansas, *Redfield*.

*BOTRYCHIUM VIRGINICUM*, Swartz.—Grand Cañon of the Arkansas, *Brandegee*.

### LYCOPODIACEÆ.

*LYCOPodium ANNOTINUM*, L.—White House Mountain, *Coulter*.

*SELAGINELLA RUPESTRIS*, Spring.—Sierra Madre Range, *Coulter*. On rocks, in Glen Eyrie and South Park, *Porter*.

### MUSCI.

BY LEO LESQUEREUX, ESQ.

The mosses here enumerated and described were collected in Colorado Territory, by Elihu Hall in 1865, Major Downie in 1868, Prof. Thos. C. Porter, and by the assistants of Dr. F. V. Hayden and myself in 1872 and 1873. A few mentioned in Hayden's Report of 1872, from the mountains north of Colorado, and in Watson Catalogue, from Utah and the Uintas, all species likely to be found in Colorado Territory, are added. Considering that none of the botanists who have gathered these materials made in their researches a specialty of this class of plants, which mostly grow in deep and dark ravines of difficult

access, and that, too, the eastern slopes of the Rocky Mountains are mostly bare of trees and deprived of atmospheric humidity, the essential food of the mosses, this catalogue is already remarkably rich and interesting in many points.

SPHAGNUM ACUTIFOLIUM, Ehrh., var. TENERUM, Sulliv. & Lesqx. *Musc. Bor.-Am. No. 11.*

*Hab.*—Uinta Mountains, *Porter*. Colorado, *Hall*; *Downie*.

PHASCUM CARNIOLICUM, Web. & Mohr.—A very rare species, found as yet in Carniola and Sardinia only.

*Hab.*—Western plains of Kansas; upon silex. *Hall*.

PHASCUM CUSPIDATUM, var.  $\delta$ . PILIFERUM, Schreb.

*Hab.*—Along the Platte. *Hall*.

WEISIA CRISPULA, Hedw.—Immature specimens.

*Hab.*—Low mountains. *Hall*.

WEISIA CIRRHATA, Hedw. This form approaches the former species. By its capsule and its annulus it is referable to *W. cirrhata*; the leaves, however, are longer, their borders scarcely reflexed, and the articulations of the pale red teeth less marked than in the normal form. An species propria?)

*Hab.*—Mountains. *Hall*.

GYMNOSTOMUM RUPESTRE, Schwægr.

*Hab.*—Glen Eyrie, 1872. *Porter*.

DICRANUM GRACILESCENS, Web. & Mohr.

*Hab.*—On wet rocks; high mountains. *Hall*.

DICRANUM VIRENS, Hedw.

*Hab.*—On stones in alpine brooks, near snow-range; not rare.

DICRANUM PELLUCIDUM, Hedw., var. FAGIMONTANUM, Brid.—The same remarkable variety as found in Vermont.

*Hab.*—Mountains; (coll. 1873).

DICRANUM VARIUM, Hedw.

*Hab.*—Base of the mountains. *Hall*.

DICRANUM FUSCESCENS, Turn.

*Hab.*—Twin Lakes, in pine woods. *Downie*. (Expl. 1873.)

DICRANUM MUHLENBECKII, Bryol. Eur.

*Hab.*—Roots of trees, pine-region; not rare.

DICRANUM RHABDOCARPON, Sulliv.

*Hab.*—Alpine; moist places on the ground. *Hall*; *Downie*. A rare species, found in good fruiting specimens, which confirm Sullivan's diagnosis, made from specimens too old, in *Contrib. to Bry.* 1, p. 172, pl. iii.

CAMPYLOPUS HALLI, (*sp. nov.*) Plantæ caespitosæ, colore lutescente-virides, sericeo-nitentes; caulis vix pollicaris, pluries dichotomus, basi nudus (non radiculosus). Folia stricta, erecto-subaperta lanceolata, tubulosa, e toto lævia, integerrima, nervo latissimo foliam integram equidem ad basim occupante, cellulis alaribus paucis, rufescentibus quadrato inflatis.

*Hab.*—Mountains. *Hall*.

CAMPYLOPUS FRIGIDUS, (*sp. nov.*)

Priori nervo dilatato affinis; differt foliis angustis, longioribus, linearibus, canaliculatis, margine versus apicem denticulatis, dorso scabris.

As in the former species the medial nerve fills the whole leaf except only four alar cells at the base; these cells are round. Two other forms,

one differing from this species by its reflexed leaves, and another with a narrower medial nerve and broader leaves, are considered as mere varieties.

*Hab.*—Near snow-range, on the ground. *Hall.*

PHAROMITRIUM SUBSESSILE, Schp. *Synops. Musc.*

*Hab.*—Sand-hills on the plains. *Hall.* Moist sand, base of the hills near Point of Rocks. *Lesquereux*; (also Explor., 1873).

POTTIA CAVIFOLIA, Hedw.—On the Platte near the mountains. *Hall.*

POTTIA HEIMII, Schp. *Synop. Musc.*

*Hab.*—Mountains of Colorado; sandy ground. *Hall*; (also Explor. of 1873.)

ANACALYPTA LATIFOLIA, Schwægr.

*Hab.*—Tops of rocks in the mountains, *Downie.* Uinta Mountains, *Watson's Catalogue.*

DIDYMODON RUBELLUS, Bryol. Eur.

*Hab.*—On stone and ground, plains and mountains; common.

DISTICHIMUM CAPILLACEUM, Bryol. Europ.

*Hab.*—Base of overhanging rocks, high mountains; not rare.

DISTICHIMUM INCLINATUM, Bryol. Eur.

*Hab.*—Same stations as the former; Bear River Cañon, Uinta Mountains; *Watson's Catalogue.*

CERATODON PURPUREUS, Brid.

*Hab.*—Everywhere on humected rocks and ground, collected by all the explorations.

LEPTOTRICHUM GLAUDESCENS (Hampe,) Hedw.

*Hab.*—Mountain slopes near Twin Lakes. *Downie.*

DESMATODON LATIFOLIUS, Bryol. Europ.

*Hab.*—Mountains of middle altitude in Colorado. *Hall.*

DESMATODON LATIFOLIUS, var.  $\beta$ . GLACIALIS, Bryol. Eur.

*Hab.*—High mountains near Twin Lakes. *Downie.* (Also in Explor. 1873.)

DESMATODON SISTYLIUS, Bryol. Eur.

*Hab.*—Near snow-range; mountains of Colorado. *Downie.*—A very rare and fine species, mostly of the glacial regions, like the following one. Both are known from the Dofrafield Mountains of Norway.

DESMATODON LAURERI (Schultz). Bryol. Eur.

*Hab.*—The same locality as the former. *Downie.*

BARBULA RIGIDA, Schultz.

*Hab.*—Plains along the Platte; only found sterile. *Hall.*

BARBULA SUBULATA, Brid.

*Hab.*—Near Salt Lake, on rocks; *Watson's Catalogue.*

BARBULA MUCRONIFOLIA, Schwægr.

*Hab.*—Middle elevations; on rocks and banks. *Hall.*—The moss referred to the former species is probably the same as this, which is found all through the Rocky Mountains, and has been distributed in Drummond's collections as *B. subulata*, which, however, chiefly inhabits the plains.

BARBULA RURALIS, Hedw.

*Hab.*—Low mountains, on dry rocks, &c.; common.

GRIMMIA CONFERTA, Funk.

*Hab.*—Rocks base of the mountains. *Hall.* (Also Explor. of 1873.)

GRIMMIA APOCARPA, Hedw.

*Hab.*—Same localities as the former; more common.

GRIMMIA PLAGIOPODIA, Hedw.

*Hab.*—On rocks; in the mountains. *Hall.*

GRIMMIA TRICHOPHYLLA, Grew.

*Hab.*—Shaded rocks, in low mountains. *Hall.*

GRIMMIA OVATA, Web. and Mohr.

*Hab.*—On rocks, mountain region. *Hall.*

GRIMMIA OVATA, var.  $\beta$ . AFFINIS, Bryol. Eur.

*Hab.*—Same localities as the former. *Hall*; (also Explor. 1873.)

GRIMMIA LEUCOPHLEA, Grev.

*Hab.*—On flat sand rocks, from the plains to the mountains, (Explor. of 1873.); also abounds at Point of Rocks, Wyoming. *Lesquereux.*

GRIMMIA CALYPTREATA, Hook.

*Hab.*—Dry rocks in low mountains. *Hall.*

This moss on the eastern side of the Rocky Mountains is rarely as well developed as in California, and the Sierra Nevada Mountains. The peristomes are low and the stems slender.

RACOMITRIUM HETEROSTICHUM, Brid.

*Hab.*—Humected rocks in the mountains. Found in poor specimens by *Hall*; (also in Explor. of 1873.)

HEDWIGIA CILIATA, Ehrh.

*Hab.*—On rocks, near the base of the mountains; not rare.

ZYGODON LAPPONICUS, Bryol. Europ.

*Hab.*—Near Sand Lake?, in poor specimens; (Explor. 1873.)

ORTHOTRICHUM HUTSCHINSLE, Smith.

*Hab.*—On rocks, borders of creeks, base of the mountains; common.

ORTHOTRICHUM ANOMALUM, Hedw.

*Hab.*—Same stations as the former; more rarely found. *Hall.*

ORTHOTRICHUM HALLII, Sully. & Lesqx., in *Sulliv. Icones, Supplement*, Pl. 45.

Orthotricum strangulato affine; differt foliis superne valde utra facie papillois; capsula sicca cylindrica, sub ore haud vel vix constricta; calyptra lata capsulam totam tegente, etc.

*Hab.*—On rocks in the mountains. *Hall.*

ORTHOTRICHUM UTAHENSE, Sulliv. Mss.

Priori affine sed robustior; foliis latioribus valde papillois; capsula stomatibus immersis.—The specimens (too old) have not any capsule with the peristome.

*Hab.*—Ogden Cañon, on shaded perpendicular rocks. *Lesquereux.*

ORTHOTRICHUM SPECIOSUM, var. Nees.

A fine variety with slender stems and male plants entirely covered with thick male buds. The habitat is as remarkable as the form of the plants, it being, as indicated by Hall, upon rocks on low mountains, while in the plains the species is only found upon trees.

ENCALYPTA COMMUTATA, Nees & Hornsch.

*Hab.*—High cliffs, near Twin Lakes. *Downie.*

ENCALYPTA VULGARIS, Hedw.

*Hab.*—Slopes and fissures of rocks; low mountains; common.

ENCALYPTA STREPTOCARPA, Hedw.—Sterile.

*Hab.*—Glen Eyrie. *Porter.*

ENCALYPTA RHABDOCARPA, Schwægr.

*Hab.*—Same locality as the former; less frequent.

ENCALYPTA RHABDOCARPA, var.?

Foliis piliferis, areolatione compacta, papilloso-rugosa; capsula sub-

striata sicca plicato-striata, apophysata; peristomio nullo; calyptra longiori fusca, apice rugosa.

This form is referable, by its leaves and the ribbed capsule, to *E. rhadocarpa*; by the absence of peristome to *E. vulgaris*, and by the apophysate capsule to *E. apophysata*, N. & H. It is apparently a new species. The specimens, however, are too few and incomplete for a satisfactory diagnosis.

*Hab.*—High mountains. Mixed with *Desmatodon sistylius*.—*Downie*.

DISSODON FRÆLICHIANUS, Frœl.

A fine and rare species found in good specimens.

*Hab.*—Mountains of Colorado. *Hall*.

DISSODON HORNSCHUCHII, Grev., Arn.

*Hab.*—Near Twin Lakes. *Downie*.

TAYLORIA SPLACHNOIDES, Hook.

*Hab.*—Same locality as the former. *Downie*.

PHYSCOMITRIUM TETRAGONUM, Brid.

*Hab.*—Moist sandy soil on the plains. *Hall*. A very rare species, found only once before in this country.

PHYSCOMITRIUM PYRIFORME, Brid.

*Hab.*—Moist ground, on the plains and in the mountains.

FUNARIA HYGROMETRICA, Hedw.

*Hab.*—Humected rocks and ground; common.

FUNARIA HYBERNICA, Hook.

*Hab.*—Mountains of Colorado; (Explor. of 1873.)

LEPTOBRYUM PYRIFORME, (Linn.,) Schp.

*Hab.* Wet ground, under the shade of pines; common.

WEBERA ELONGATA, Schwægr.

*Hab.*—High mountains; fissures of rocks. *Hall*.

WEBERA NUTANS, Schreb.

*Hab.*—Shaded ground in the mountains; not rare.

WEBERA CRUDA, Schreb.

*Hab.*—At the base of overhanging rocks and fissures; not rare.

WEBERA LUDWIGII, Spreng.

*Hab.*—High mountains; sandy soil along rivulets. *Hall*; *Downie*. (Expl. of 1873.)

BRYUM PENDULUM, (Hornsch.,) Schp.

*Hab.*—On the ground, low mountains; common.

BRYUM PENDULUM, var. MONTANUM. Forma normali differt; capsula graciliori, obovato-pyriformi, opereulo longiori acutiusculo; areolationis foliorum ductibus intercellularibus crassioribus, margine foliorum vix conspicuo concolore, nervo viridi in acumine longiori producto.—It is apparently a distinct species.

*Hab.*—Mixed with *Pottia Heimii*.—High mountains. *Downie*. It is also in the collections of 1873, by Dr. Hayden's assistants.

BRYUM INTERMEDIUM, Web. & Mohr.

*Hab.*—Fissures of humected rocks; not rare.

BRYUM CIRRHATUM, Hoppe & Hornsch.

*Hab.*—Grassy slopes and fissures of rocks, Twin Lakes. *Downie*.

BRYUM BIMUM, Schreb.

*Hab.*—Wet meadows; common.

BRYUM MUHLENBECKII, Bryol. Eur.

*Hab.*—Rocky Mountains; from specimens in Sullivan's herbarium com-

municated by General Palmer. This species is often confounded with *Bryum alpinum* from its close likeness to it.

*BRYUM CÆSPITICIMUM*, Linn.

*Hab.*—Dry ground; common everywhere.

*BRYUM ARGENTEUM*, Linn.

*Hab.*—Same localities as the former; rare in the Rocky Mountains.

*BRYUM PSEUDO-TRIQUETRUM*, Hedw.

*Hab.*—Springs on rocks. *Downie*.

*BRYUM ROSEUM*, Dill.

*Hab.*—Shade of pine woods in cañons. Explor. of 1873.

*ZIERIA DEMISSA*, (Hornsch.) Schp.

*Hab.*—Fissures of rocks; high mountains near Twin Lakes; rare. *Downie*.

*MNIUM CUSPIDATUM*, Hedw.

*Hab.*—Shaded wet places; low mountains. *Hall*.

*MNIUM SERRATUM*, Schrad.

*Hab.*—Sandy ground, springs and borders of streams; not rare.

*MNIUM SPINOSUM*, Voit.

*Hab.*—Mountains of middle altitude, under pines. *Downie*.

*MNIUM SPINULOSUM*, Bryol. Eur.

*Hab.*—Same places as the former; in open pine woods. *Hall*.

*MNIUM PUNCTATUM*, Linn.

*Hab.*—Springs in low mountains; sterile. *Hall*.

*AMBLYODON DEALBATUS*, Pal. Beauv.

*Hab.*—Boggy ground; plain and mountains. Twin Lakes. *Downie*.

*MEESIA ULIGINOSA*, Hedw.

*Hab.*—Moist earth; fissures of rocks. *Hall*.

*AULACOMNIUM PALUSTRE*, Schwægr.

*Hab.*—Boggy places, plains and mountains; common.

*BARTRAMIA ITHYPHYLLA*, Brid.

*Hab.*—Fissures of shaded rocks, middle altitude; not rare.

*BARTRAMIA FONTANA*, Brid.

*Hab.*—Everywhere along streams and on wet rocks, with its numerous varieties, *gracilis*, *alpina*, *falcata*, &c.

*TIMMIA MEGAPOLITANA*, Hedw.

*Hab.*—Shaded banks and wet fissures of rocks; not rare.

*TIMMIA AUSTRIACA*, Hedw.

*Hab.*—Same positions, at greater altitude; rare. *Hall*; *Downie*.

*POGONATUM URNIGERUM*, (?) Linn.

Specimens too young and incomplete. May represent *P. capillare*, Brid., which is closely allied to *P. urnigerum*. Indeed, both species are considered by many as the same.

*Hab.*—Twin Lakes. *Downie*.

*POGONATUM ALPINUM*, Roehl.

*Hab.*—Wet rocks, waterfalls, &c., middle stations.

It is mostly represented in the Rocky Mountains in its var. *δ. brevifolium*, Schp.

*POLYTRICHADELPHUS LYALLII*, Mitten.

*Hab.*—Pine-woods, middle region. *Hall*.

*POLYTRICHUM GRACILE*, Menzies.

*Hab.*—Swampy ground in the mountains. *Hall*.

POLYTRICHUM PILIFERUM, Schreb.

*Hab.*—Upon earth covering sand-rocks; common.

POLYTRICHUM PILIFERUM, var. LÆVIPILOM.

*Polytrichum lævipilum*, Hampe.

*Hab.*—The same localities as the normal form, ascending, however, to a higher altitude. *Hall*.

POLYTRICHUM JUNIPERINUM, Hedw.

*Hab.*—Slopes in the mountains, on moist ground.

It is common, mostly represented by its alpine form, var. *S. alpinum*, Schp.

FONTINALIS ANTIPYRETICA, Linn., var.

*F. Neo-Mexicana*, Sulliv. & Lesqx.

*Hab.*—Creeks and rivulets, attached to rocks. *Hall*.

DICHELYMA CAPILLACEUM, Bryol. Eur.

*Hab.*—Swift-running streams; rare. *Hall*; (and Explor. of 1873).

THUIDIUM BLANDOWII, Web. & Mohr.

*Hab.*—Pine-woods near Twin Lakes. *Downie*.

THUIDIUM ABIETINUM, Bryol. Eur.

*Hab.*—Glen Eyrie, along with *Hypnum rugosum*, Ehrh. *Porter*.

HYPNUM (ELODIUM) PALUDOSUM, Sulliv.

*Hab.*—Swamps in the Parks. *Hall*.

CLIMACIUM DENDROIDES? Web.

*Hab.*—Boggy places in the mountains, sterile. It has been collected by both Hall and Downie in the same undeterminable state of growth. The leaves are shorter and more closely imbricated than in *C. Americanum*, Brid.

PYLAISÆA INTRICATA, (Hedw.,) Schp.

*Hab.*—On trees, base of the mountains. The specimens are without fruit, and the species somewhat uncertain.

HYPNUM (BRACHYTHECIUM) LÆTUM, Brid.

*Hab.*—On the ground, shaded, grassy banks. *Downie*.

HYPNUM (BRACHYTHECIUM) ALBICANS, Neck.

*Hab.*—On rocks, Uinta Mountains. *Watson's Catalogue*.

HYPNUM (BRACHYTHECIUM) COLLINUM, Schp.

A variety merely differing from the European form by its conical operculum. As the specimens have a single ripe capsule, it cannot be ascertained if this character is merely casual.

*Hab.*—Grassy banks in the mountains. *Hall*; *Downie*.

HYPNUM (BRACHYTHECIUM) CAMPESTRE, Brch. & Schp.

*Hab.*—Borders of Sand Lake; sterile. (Explor. of 1873.)

HYPNUM (EURYNCHIUM) STRIGOSUM, Hoffm.

A diminutive form, closely resembling *H. diversifolium*.

*Hab.*—Roots of pines; hills and low mountains. *Hall*.

HYPNUM (EURYNCHIUM) DIVERSIFOLIUM, Bryol. Eur.

*Hab.*—Bark of dead pines in the Uintas. *Watson's Catalogue*.

HYPNUM (PLAGIOTHECIUM) NITIDULUM, Wahl.

The form is exactly corresponding with the European specimens and differs from the North American eastern specimens; referable to a different species.

*Hab.*—Moist shaded banks, pine region. *Downie*.

HYPNUM (PLAGIOTHECIUM) LÆTUM, Schpr.

*Hab.*—Same stations as the former. *Hall*.



HYPNUM (LIMNOBIUM) EUGYRIUM, Schpr.

*Hab.*—On stones, in mountain streams. *Hall.*

HYPNUM (AMBLYSTEGIUM) SUBTILE? Hoffm.

It is apparently the species. The capsule is too old for positive determination.

*Hab.*—Upon stones, in dry creeks. *Hall.*

HYPNUM (AMBLYSTEGIUM) SERPENS, Linn.

*Hab.*—Wet ground, near springs and shaded banks. *Hall.*

HYPNUM (AMBLYSTEGIUM) RADICALE, Brid.

*Hab.*—Decayed wood, in cañons. *Hall.*

HYPNUM (AMBLYSTEGIUM) ORTHOCLADON, Beauv.

*Hab.*—On stones, borders of shaded springs. *Hall.*

HYPNUM (CAMPYLIIUM) HISPIDULUM, Brid.

*Hab.*—Roots of trees, low mountains. *Hall.*

HYPNUM ADUNCUM, Hedw. var.  $\gamma$ . *polycarpum*, Schpr.

*Hab.*—Twin Lakes. *Downie.*

HYPNUM FLUITANS, Dill.

*Hab.*—Same as the former; sterile. *Downie.*

HYPNUM UNCINATUM, Hedw.

*Hab.*—Decayed wood, moist ground, &c.; common.

HYPNUM FILICINUM, Linn.

*Hab.*—Rocks humected by springs. *Hall.*

HYPNUM (RHITIDIUM) RUGOSUM, Ehrh.

*Hab.*—Dry ground, mountains of middle altitude; common.

HYPNUM (DREPANIUM) REPTILE, Michn.

*Hab.*—Root of trees in pine woods, same altitude. *Hall.*

HYPNUM (DREPANIUM) PALLESCENS, Schpr.

*Hab.*—On the bark of dead pines, Uinta Mountains. *Watson's Catalogue.*

HYPNUM (DREPANIUM) CUPRESSIFORME, Hedw.

*Hab.*—On trunks of dead pines; not rare.

HYPNUM (DREPANIUM) IMPONENS, Hedw.

*Hab.*—On decayed wood, base of the mountains. *Hall.*

HYPNUM (CTENIDIUM) MOLLUSCUM, Hedw.

*Hab.*—Humected perpendicular rocks, in cañons. *Hall.*

HYPNUM GIGANTEUM, Schpr.

*Hab.*—Hot Springs, National Park. (Explor. of 1872.)

HYPNUM NITENS, Schreb.

*Hab.*—Low grounds, in boggy places. *Hall; Downie.*

## LICHENES.

By HENRY WILLEY, Esq.

DACTYLINA MADREPIFORMIS, Wulf.—Horse Shoe Mountain, at 11,000 feet altitude, July 18. (1.)

CETRARIA ISLANDICA, Ach.—An infertile fragment. (2.)

USNEA TRICHODEA, Ach. (3.)

THELOSCHISTES PARIETINUS, (L.) (4.)

PARMELIA KAMTSCHADALIS, Eschw., var. AMERICANA, Nyl.—Horse Shoe Mountain, at 11,000 feet altitude.—Infertile. (5.)

- PARMELIA CAPERATA, Ach.—Infertile. (6.)  
 PARMELIA CONSPERSA, Ach. (7.)  
 PARMELIA OLIVACEA, Ach., var. EXASPERATA, Dw. (8.)  
 PARMELIA LANATA, Nyl.—Mount La Plata, at 14,200 feet altitude, August 3. Infertile. (9.)  
 UMBILICARIA CYLINDRICA, Ach. (10.)  
 UMBILICARIA RUGIFERA, Nyl. (11.)  
 PELTIGERA APHTHOSA, Hoffm. (12.)  
 PELTIGERA CANINA, Hoffm. (13.)  
 SOLORINA BISPORA, Nyl. *Syn. p.* 331. White-House Mountain, at 13,800 feet altitude, August.—Perhaps, as Nyl. observes, only a variety of *S. saccata*, from which it differs in its more urceolate apothecia and thekes containing only two spores, which in the specimens before me measure .054 to .110 mm. long and .027 to .040 mm. wide. New to this continent. (14.)  
 COLLEMA PULPOSUM, Ach.—Infertile. (15.)  
 PLACODIUM CORALLOIDES, Tuck.—A small, infertile fragment. (16.)  
 PLACODIUM ELEGANS, DC. (17.)  
 PLACODIUM CALLOPISMUM, Ach. (18.)  
 PLACODIUM VITELLINUM, (Ehrh.,) Ach. (19.)  
 PLACODIUM CERINUM, Ach., var., STILLICIDIORIUM, Ach.—On mosses. (20.)  
 PLACODIUM BOLACINUM, Tuck.? White House Mountain, at an elevation of 13,000 feet, August. (21.)  
 LECANORA STRAMINEA, Wahl.—A small, infertile fragment. (22.)  
 LECANORA MURALIS, (Schreb.,) Schær. (23.)  
 LECANORA RUBINA, Ach. (24.)  
 LECANORA ——— ?. A very small and imperfect specimen, belonging to the section *Squamaria* and distinguished chiefly by its large spores, which are from 4 to 8 in the thekes, and measure from .019 to .027 mm. long by .007–.008 mm. wide. I cannot refer it to any described species. (25.)  
 LECANORA SUBFUSCA, Ach. (26.)  
 LECANORA VARIA, Fr. (27.)  
 LECANORA BRUNONIS, Tuck.?—White House Mountain, at 13,000 feet altitude, August.—The very small fragment seems to belong here, but the spores are at length 4-locular, .015 to .018 mm. long by .004 to .005 wide. (28.)  
 LECANORA CINEREA, (L.) (29.)  
 LECANORA CALCAREA, (L.,) Somf.—White House Mountain at 13,000 feet altitude, August.—The specimens are elegantly effigurate. This form has before occurred, I believe, on this continent only in Greenland. (30.)  
 LECANORA CHLOROPHANA, (Wahl.,) Ach.—The specimens mostly dealbate. (31.)  
 LECANORA XANTHOPHANA, Nyl. (32.)  
 LECANORA CERVINA, (Pers.,) Somf. (33.)  
 RINODINA OREINA, (Ach.,) Mass. (34.)  
 RINODINA SOPHODES, (Ach.,) Mass. (35.)  
 STEREOCAULÓN PASCHALE, Laur.? Infertile. (36.)

- STEREOCAULON CONDENSATUM, Laur.? Infertile. (37.)
- CLADONIA PYXIDATA, Fr. (38.)
- CLADONIA FURCATA, Flk., var. RACEMOSA, ib. (39.)
- CLADONIA VERMICULARIS, Ach.—Head-waters of Platte River, at 10,000 feet altitude.—Spermatogones and spermatia similar to those described by Nylander, have occurred to me in White House Mountain specimens of this plant. (40.)
- LECIDEA CONTIGUA, Fr.—White House Mountain, at 13,000 feet altitude, August. (41.)
- LECIDEA CONTIGUA, Fr.?, with smaller apothecia.—Mount La Plata, at 14,000 feet altitude. (41a.)
- LECIDEA CONFLUENS, Schær.—White House Mountain, at 13,000 feet altitude. (42.)
- LECIDEA ENTEROLEUCA, Fr.—On twigs; the thallus lutescent. (43.)
- LECIDEA ATRO-BRUNNEA, (D.C.), Schær.—Mount La Plata, at 14,000 feet altitude. (44.)
- LECIDEA LUGUBRIS, (Somf.), Nyl.—White House Mountain, at 13,000 feet altitude. (45.)
- LECIDEA LAPICIDEA, Ach.—A single small specimen. (46.)
- BUELLIA ALBO-ATRA, (Hoffm.) Nyl.—White House Mountain, at 13,000 feet altitude. (47.)
- BUELLIA GEOGRAPHICA, (L.) Th. Fr. (48.)
- STAUROTHELE UMBRINA, (Wahl.) Tuck.—A few traces of this lichen occurred on fragments of rocks with other lichens. (49.)
- VERRUCARIA PYRENOPHORA, Nyl.?—A single small specimen. Spores 2-locular, .027-.32 mm. long by .012-.14 wide.—White House Mountain, at 13,000 feet altitude. (50.)
- VERRUCARIA ———? Thallus hardly any. Apothecia sessile, globose, with a depressed article; perithecia black, entire; paraphyses indistinct. Reaction with iodine various, red. Spores 2-val., 4-pluri-locular, irregularly muriform, colorless or slightly fuscous, .027-.36 mm. long by .015-.18 wide. The very small quantity of this which occurred is hardly sufficient for its determination. It is perhaps new. (51.)
- VERRUCARIA ———? Parasitic on a sterile thallus, which is perhaps that of *Buellia epigwa*. Apothecia minute, emergent; paraphyses distinct capillary, not colored by iodine. Spores 4-several, acutely ellipsoid, constricted in the middle, 4-locular, submuriform, colored, .029-.38 mm. long by .008-.12 mm. wide. (52.)
- ENDOCOCCUS ERRATICUS, (Mass.) Nyl. Parasitic on *Placidium elegans*. The internal characteristics appear to agree with this species. Paraphyses deficient. Reaction with iodine various, red. Thekes ventricose, polysporous. Spores 2-locular, colored, .008-.11 mm. long, by .004-.5 mm. wide. New to this continent. (53.)

## FUNGI.

BY CHARLES H. PECK, ESQ.

AGARICUS LACCATUS, Scop. Pileus thin, convex, sometimes expanded; even or slightly umbilicate, smooth, or minutely scaly, hygrophanous when moist dull reddish-yellow, or reddish flesh-colored, sometimes striatulate on the margin, when dry pallid or pale dull ochraceous; lamellæ broad, rather thick and distant, not decurrent, flesh-colored; stem

slender, firm, fibrous, stuffed, equal, concolorous. Plant very variable, 1-6 inches high; pileus .5-2 inches broad.—Twin-Lake Creek, August.

*AGARICUS VELUTIPES*, Curt. Cæspitose; pileus fleshy, thin on the margin, convex, smooth, very viscid, dull yellow with a brownish disk or bright reddish-yellow; lamellæ close, rounded behind, slightly attached, yellowish; stem equal or slightly tapering upward, hollow or stuffed, generally velvety and brown, sometimes pale yellow and primrose. Plant 1-2 inches high; pileus 5-1.5 broad.—Twin-Lake Creek, August.

*AGARICUS ILLICITUS*, Peck. Pileus fleshy, firm, broadly convex or expanded, smooth, hygrophanous, very dark brown when moist, paler when dry; lamellæ close, broad, tapering outwardly, plane or ventricose, rounded behind, with a very slight decurrent tooth, pale dingy brown; stem firm, equal, hollow, scabrous, distinctly striate at the top, paler than the pileus. Plant 1.5-2 inches high; pileus 1-1.5 inches broad.—Twin-Lake Creek, August.

\* *AGARICUS*.——? Twin-Lake Creek, August.

\* *LACTARIUS*.——? Twin-Lake Creek, August.

*LENZITES SEPIARIA*, Fr. Pileus coriaceous, tough, dimidiate, often elongated, zoned, strigose-tomentose, brown, generally paler or yellowish on the margin; lamellæ rather thick, slightly branched or anastomosing, yellowish, inclining to brown.

Var.  $\beta$ . *POROSA*.—Lamellæ abundantly anastomosing and forming pores.—Mount of the Holy Cross and Twin-Lake Creek, August.

*DACRYMYCES STILLATUS*, Nees. Subrotund, convex, often plicate, yellow or orange, color persistent; spores multiseptate.—White House Mountain, August.

*PUCINIA PORTERI*, Peck. (*n. sp.*) Spots none; sori amphigenous, crowded or scattered, rotund, rather small, prominent, brown; spores oblong or obovate-oblong, constricted in the middle, about .0016 inch long, .0007-.0009 inch broad; peduncles hyaline, one-half to twice the length of the spore. On leaves of *Veronica alpina*. Twin Lakes, July. The sori, which are about .018 inch in diameter, occupy the whole under surface of the leaf, being so closely placed as to appear almost confluent. In some instances they appear suffused by a cinereous hue, due, perhaps, to the germination of the spores. The sori on the upper surface of the leaves are scattered and comparatively few. The species seems to be related to *P. brunnea*, Billings, from which it may be separated by its amphigenous habit and hyaline peduncles. Dedicated by its discoverer, John M. Coulter, to Prof. T. C. Porter.

*PEZIZA VULCANALIS*, Peck. *Hayden's 6th Ann. Rep.*, 1872. Cup fleshy, funnel-form, stipitate, crenate on the margin, smooth when fresh, rugulose and more or less brown when dry; hymenium pale orange; stem slender, solid, smooth, brown; asci cylindrical; paraphyses slightly thickened at the tips; spores elliptical, smooth, 0.0004-0.0006 inch long, 0.0003 inch broad. Plant, 6-10 lines high; cup 4-6 lines broad.—Ground. Twin-Lake Creek, August.

*PEZIZA SCUTELLATA*, L. Cups scattered or gregarious, sessile, shallow or plane, vermilion, externally paler and hispid, with straight brown or black hairs; asci cylindrical; paraphyses clavate at the tips; spores elliptical, .0008 inch long. Plant usually about one-fourth of an inch in diameter, the hymenium fading in drying.—Twin-Lake Creek, August.

\*Not in determinable condition.

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DEPARTMENT OF THE INTERIOR.  
UNITED STATES GEOLOGICAL SURVEY OF THE TERRITORIES.  
F. V. HAYDEN, U. S. GEOLOGIST-IN-CHARGE.

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MISCELLANEOUS PUBLICATIONS—No. 5.

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DESCRIPTIVE CATALOGUE

OF

THE PHOTOGRAPHS

OF THE

UNITED STATES GEOLOGICAL SURVEY

OF

THE TERRITORIES,

FOR

The Years 1869 to 1873, inclusive.

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W. H. JACKSON,  
PHOTOGRAPHER.

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WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1874.

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

THE PHOTOGRAPHY

W. H. JACOBSON

WASHINGTON  
GOVERNMENT PRINTING OFFICE

## PREFACE.

It has been customary, heretofore, merely to catalogue the results of each season's operations in a few pamphlet pages of numbers and titles only, but the increasing interest in, and demand for the more striking views, calls for a complete descriptive account of the collection, and I have endeavored, in the following pages, to supply as much information as the somewhat limited space allows. The descriptions are mainly compiled from the reports for the corresponding years.

The collection, thus far, numbers upward of thirteen hundred landscape negatives, the greater portion of them of subjects that had never been taken, and probably will not be for many years to come, or until the country has advanced into civilization. By no other means could the characteristics and wonderful peculiarities of the hitherto almost unknown western half of our continent be brought so vividly to the attention of the world. That they are appreciated, the demand for them, from all quarters of the globe, amply testifies.

It is not to be expected that they should possess uniform excellence, as the conditions under which they were made were as variable as the winds, and the difficulties encountered and surmounted in obtaining many of the most valuable views, are almost incredible. As a whole, however, their excellence is quite marked, and is a triumph over difficulties.

The Indian catalogue includes a list of over one thousand subjects and sixty-six tribes, representing nearly every portion of the western Territories, and their value to the ethnography of the aborigines will soon be very great. They are mostly studies of their habits and costumes, taken in their own villages and among their own mountains, showing their every-day life. They are fast passing away or conforming to the habits of civilization, and there will be no more faithful record of the past than these photographs. To their future historian they will prove invaluable.

The subjects made under the direction of this survey formed the nucleus, to which has been added nearly one thousand negatives through the munificent liberality of Wm. Blackmore, esq., a wealthy English gentleman, deeply interested in ethnography. The addition is especially valuable as it embraces many other collections, dating back twenty years.

Especial attention is being paid to the subject each season, and additions made to the collections upon every opportunity.





# 1869 SERIES.

(8×10.)

The Union Pacific Railroad, Salt Lake City and Valley, and the Black Hills of Wyoming; embracing the more prominent pictorial features of the route of the great national highway. Photographed immediately upon the completion of the road in the summer of 1869.

- No. 1. NORTH PLATTE RIVER, looking north from bridge.
- No. 2. BRIDGE ON THE NORTH PLATTE, near its intersection with the South Platte.
- No. 3. WIND-MILLS AT NORTH PLATTE STATION. At this point the Platte runs through an almost entirely treeless plain, with but very few objects in nature to relieve the dead monotony, so the wind-mills that occur at nearly all the stations, for the purpose of raising water to the tanks, form a very prominent feature in the landscape. The river is very wide, shallow, and swift, running over bars and quicksands, with many little willow-covered islands.
- The north and south forks rise respectively in the north and south Parks of Colorado, and flow some 1,200 miles to their junction with the Missouri.
- The bridge and station are about 290 miles west of Omaha, and have an altitude of 2,789 feet above the sea.
- No. 4. SHERMAN STATION, upon the broad, plateau-like summit of the Black Hills, 8,242 feet above the sea, and 2,170 above Cheyenne, only 33 miles to the eastward. Sherman, so named from the commander of the United States Armies, enjoys the distinction of being the most elevated railway station in the world.
- No. 5. REED'S ROCK, near Sherman, forms an excellent illustration of the style of weathering of the granites characteristic of this region. These massive piles, like the ruins of old castles, are scattered all over the summits of the Black Hills, and the difference in the texture of the rock is such as to give a most pleasing variety. They were once angular, cube-like masses, and have been worn to their present form by the process of disintegration by exfoliation.
- No. 6. GRANITE CUT, near Dale Creek Bridge, about three miles west of Sherman. The road has been drilled and blasted through a close, compact, and massive granite that is susceptible of a high polish, much like the Scottish syenite.
- No. 7. DALE CREEK BRIDGE, over Dale Creek, a small tributary of the Cache La Poudre flowing into the South Platte. The bridge is a wooden frame-work structure 650 feet long and 127 high, the largest of its kind on the road.
- No. 8. DALE CREEK CAÑON, a view looking south from near the bridge. A characteristic view of the summit of the Black Hills, showing the rounded granite forms and scattered pines, the deep cañon with its pleasant vale and sparkling trout-streams glittering in the sunlight.

- No. 9. VALLEY OF THE NORTH PLATTE, near Fort Fred Steele, the second crossing of the river, 696 miles west from Omaha, and having an altitude of 6,840 feet. Unlike itself out upon the plains, it is here a deep, clear, cold stream, not far from its sources among the perpetual snows of Long's Peak.
- No. 10. GREEN RIVER BUTTE, near view.
- No. 11. GREEN RIVER BUTTE, from across the river.
- No. 12. TEA-POT ROCK, near Green River Station.
- No. 13. GIANT'S CLUB, near Green River Station.
- No. 14. ROCK FORMS, near Green River Station.
- No. 15. PETRIFIED FISH CUT, near Green River Station.
- No. 16. BURNING ROCK CUT, near Green River Station.

Views along the West bank of Green River between the Station and Burning Rock. The above group (10 to 20) represents the curious and unique scenery of Green River at the point where the railroad crosses it 845 miles west from Omaha and 6,140 feet above tide-water.

The formation which gives this region its characteristic features is known as the Green River shales, from the sediments being arranged in regular layers, mostly quite thin, but varying from the thickness of a knife-blade to several feet.

This laminated character, with the variations in shade and color, give to the hills the peculiar banded appearance, as shown in all the pictures of the above series.

In 10 and 11 we have the Castellated Butte, so prominent a landmark to all travelers, having an elevation of some 800 feet above the river. The upper portion, or Castle, is 200 feet high. Nos. 12, 13, and 14 are excellent examples of the curious and fantastic shapes which the shales have assumed in the process of weathering, suggesting the titles which have been given them. They have an average height of 200 feet.

No. 15 is so called from the thousands of perfect and beautiful impressions of fish which are shown on the thin slabs of shale; sometimes a dozen or so within the compass of a square foot. Impressions of insects and water-plants are found, and also a remarkable specimen of a feather of a bird.

No. 16 is a view a short distance west of the preceding ones, where the road is cut through thin layers of a sort of cream-colored, chalky limestone, interspersed with layers of a dark brown color, so saturated with petroleum as to burn with a good deal of freedom. This cut is called the Burning Rock, from the fact that during the progress of the work the rocks became ignited and burned for some days, illuminating the labors of the workmen by night, and filling the valley with dense clouds of smoke by day.

The remaining views are glimpses along the west bank of Green River between the places described above, showing to good advantage the wall-like and castellated forms on the opposite side of the river.

- Nos. 21, 22. WASATCH, UTAH, 966 miles west from Omaha, altitude 6,879 feet, on the divide between Echo Cañon and Bear River.

From this point the descent is very rapid into the famous cañon. Two miles farther on we come to and pass slowly over an immense trestle-work, as shown in—

- No. 23, being 450 feet long and 75 feet high.

A short distance farther and we shoot into—

- No. 24. **TUNNEL No. 2**, the longest on the road, 770 feet in length, cut through reddish and purplish indurated clays, of the Wasatch group of Miocene Tertiary. Descending rapidly we reach—
- Nos. 25, 26. **CASTLE ROCKS**, at the head proper of Echo Cañon, 975 miles west from the Missouri and 6,290 feet elevation.
- Nos. 27, 28. **TOWER ROCKS**, or pinnacles upon the face of the castle. The rocks bear a remarkable resemblance to some old dismantled fortress, with its towers, crumbling walls, and immense embrasures.

- They are of massive red sandstone from 500 to 800 feet high, which have weathered into these curiously castellated forms.
- No. 29. **PULPIT ROCK**, at the mouth of Echo Cañon, 991 miles from Omaha, and 5,540 feet above the sea. The railroad sweeps around it in a graceful curve, and so near that one might reach from the car-window and touch it. The isolated rounded mass above, which seems to stand alone and almost ready to tumble into the valley below, is yet quite firmly seated on its bed of sandstone. It is said that once upon a time Brigham Young held forth to his flock from this rock during their pilgrimage hither. This view shows admirably the coarse conglomerate or pudding-stone, characteristic of all the Echo Cañon rocks.

- No. 30. **SENTINEL ROCK**, one of the most remarkable landmarks in the cañon. It is a regular obelisk of conglomerate, standing near the junction of Echo with the Weber Cañon. It is about 250 feet in height, and affords another excellent illustration of the peculiar style of weathering, by which rocks assume curious forms. This column has been very aptly called the "Dog's Head," to which it will be seen at a glance that the summit bears a resemblance.

The peculiar form of stratification, with the varied structure, sometimes a firm sandstone, then a pudding-stone, is remarkably well displayed in this vein.

The same variations of structure, on a still larger scale, may be seen in—

- No. 31. **THE GREAT EASTERN**, a perpendicular bluff 1,000 feet in height, bearing a strong resemblance to the prow of an enormous steamship. In this the inclination of the strata is well shown. The base is composed of fine sandstone, running into a coarse conglomerate above.
- No. 32. **LOOKING DOWN ECHO** from above the Great Eastern, and about two miles above the mouth of the cañon, giving a general view. On the right the high perpendicular walls, with the strata dipping down westward, cleft by deep gorges, leave the intermediate portions standing out like huge castles, massive in form and a vivid red in coloring. On the left the hills are equally high, but run off into more rounded forms, and in the spring-time are clothed with a bright contrasting green.
- No. 33. **A STUDY AMONG THE ROCKS OF ECHO**, a mass of débris which has fallen from the overhanging walls.
- No. 34. **THE AMPHITHEATER**, an immense semicircular wall of 1,000 feet in height, three miles above the mouth of the cañon, showing the largest and most perfect wall-surface of any portion of the cañon.

Leaving Echo, and turning down Weber Cañon, we glide

smoothly and swiftly along, passing the wonders of the "Narrows," the "1,000-mile Tree," "Devil's Slide," &c., (see stereoscopic views,) reaching the main Wasatch range, and pass through the lower Weber Cañon. Half way through we come to—

No. 35. THE DEVIL'S GATE.

Nos. 36-39. DEVIL'S GATE BRIDGE. Not the least attraction to the traveler is the roar of the waters of the Weber as they roll over the immense masses of rock, with the rush and roar of a mountain-torrent. For four miles we are inclosed with nearly perpendicular walls of gneiss, 2,000 feet in height, forming the central portion of the Wasatch Mountains; the river rushing through it at right angles. The rocks are beautifully banded everywhere. There are also coarse aggregations of quartz and feldspar all along the sides of this channel; and high up on the steep mountain-flanks are vast deposits of bowlders and fine sand.

Soon we emerge from the partial darkness into a broad, fertile valley; and glancing back from—

No. 40. UINTA, we have a view of that portion of the Wasatch range through which we have just passed.

Nos. 41-43. GREAT SALT LAKE CITY, UTAH. A view looking south from the bluffs just north of the city, giving a bird's-eye view of it, and a view of the Wasatch Mountains in the distance.

In the center of the first view are grouped the many fine buildings of President Young. The one with the many gable windows is the "Lion House," the abode of his numerous wives, while the one just to the left of it is the "Bee-Hive" House, his own private residence. The houses are so called from the emblems placed on them. Plainly visible are many others of the finest private and public buildings.

In the second view the eye catches at once the glistening white dome of the great Mormon Tabernacle. In No. 43 are the suburbs to the southwest, with glimpses of the Jordan, and the Oquirrh Mountains.

No. 44. THE GREAT MORMON TABERNACLE. Near view of a most conspicuous building, that always attracts the eye of the traveler as he enters the city. The building is oblong in shape; 250 feet in length by 150 in width. The great dome is supported upon forty-six pillars, which serve as a sort of wall, from which the roof springs in an unbroken arch. This building will seat 7,000 persons, and 10,000 may be gathered within its walls upon extraordinary occasions.

No. 45. CORINNE, UTAH, at the head of Salt Lake, and on Bear River, near its entrance to the lake; an important place on the railroad, as being the point of departure for Montana, Idaho, &c. Here the stages and freight-teams depart upon their long journeys, and their arrival and departure create considerable stir in the otherwise very quiet little place.

# 1869 SERIES.

## STEREOSCOPIC VIEWS.

Views of the Union Pacific Railroad from Cheyenne to Promontory Point, including studies among the Black Hills of Wyoming, and Great Salt Lake City.

As the stereographs are but duplications of the larger ones in the preceding series, no detailed description will be given, except in those cases where they are the only representation of the scene.

In referring back for description, the subject will be found under the same general titles as below.

From the wear and tear of long use, and unimportance, many of the negatives have been withdrawn from the list, leaving the numbers in a somewhat chaotic condition; but, as many of the views have become well known by their numbers, it was deemed best to retain them.

No. 60. DEPOT AT CHEYENNE, 516 miles west from Omaha; 6,041 feet elevation.

Nos. 65, 66. PROMONTORY POINT, the spot where the track-layers met and laid the "last rail;" elevation, 4,905 feet.

No. 67. THE ORIGINAL DEPOT AT PROMONTORY; a primitive state of affairs, incident upon the rapid construction of the road.

Nos. 68, 69. STREET VIEWS IN CORINNE, UTAH.

No. 71. UINTA, UTAH, mouth of Weber Cañon.

Nos. 77-80. DEVIL'S GATE, Weber Cañon.

Nos. 81-85. DEVIL'S GATE BRIDGE, looking down and up, and from above and below.

No. 86. EAST FROM DEVIL'S GATE.

No. 87. WESTWARD OF TUNNEL NO. 4; a rock, cut of 150 feet—in Weber Cañon.

No. 88. WEST FROM THE MOUTH OF TUNNEL NO. 4.

No. 89. WEST FROM THE SUMMIT OF THE RIDGE THROUGH WHICH TUNNEL NO. 4 IS CUT, looking over Round Valley, to the Wasatch Mountains, in the distance.

No. 90. EAST OF TUNNEL NO. 4.

Nos. 91-95. VIEWS BETWEEN TUNNELS NOS. 3 AND 4, a space of about half a mile, but full of grand and picturesque beauties.

Nos. 96, 97. TUNNEL NO. 3, FROM THE EAST; a cut of 550 feet through solid limestone.

Nos. 98, 99. THE 1,000-MILE TREE, a solitary pine in Wilhelmina Pass, or the narrows of Weber Cañon, marking the 1,000th mile west of Omaha.

No. 100. SECTION-MEN; a group of railroad laborers on a hand-car.

Nos. 100, 102. THE DEVIL'S SLIDE, Weber Cañon, three miles below the 1,000-mile tree; two parallel ridges of limestone from 50 to 250 feet in height, running up the mountain side for 1,000 feet.

No. 103. WILHELMINA PASS, or the Narrows; the entrance to Weber Cañon proper, seven miles below the mouth of Echo Cañon.

No. 104. PULPIT ROCK, mouth of Echo Cañon.

No. 105. DEATH ROCK, mouth of Echo Cañon.

No. 106. SENTINEL ROCK, mouth of Echo Cañon.

No. 107. THE GREAT EASTERN, mouth of Echo Cañon.

- Nos. 108, 109. LOOKING DOWN IN ECHO CAÑON, near the mouth.  
 No. 110. CAMP VIEW; under the rocks of Echo.  
 No. 111. LOOKING DOWN THE CAÑON, from above the Great Eastern.  
 Nos. 112, 113. STEAMBOAT ROCK.  
 Nos. 114, 123. STUDIES AMONG THE GREAT ROCKS that have fallen from the cliffs of Echo Cañon.  
 Nos. 124, 125. THE AMPHITHEATRE, Echo Cañon.  
 No. 126. CASTLE ROCKS, from the station.  
 No. 127. TOWER ON CASTLE ROCK.  
 No. 128-129. CASTLE ROCK, near view.†  
 No. 130. CASTLE ROCK, distant view.  
 No. 131. WALLS OF CASTLE ROCK.  
 No. 132-133. TUNNEL No. 2 at head of Echo Cañon, 770 feet through soft sandstone and clay.  
 No. 134-137. HIGH TRESTLE-WORK; 600 feet long, 75 feet high; between Tunnel No. 2 and Wasatch.  
 No. 138-139. EICHAR'S CUT, between tunnel No. 2 and Wasatch.  
 No. 140. HIGH TUNNEL below tunnel No. 2.  
 No. 141. MOUNTAIN CEDAR.  
 No. 142. CUT NEAR WASATCH.  
 No. 143-145. "THE OLD Z," or a portion of the track at the head of Echo before the completion of the tunnel.  
 No. 146. WASATCH, UTAH.  
 No. 147-150. NEEDLE ROCKS, near Wasatch, on the old stage-road.  
 No. 151-155. BIRDS-EYE panoramic view of Great Salt Lake City.  
 No. 156. MAIN STREET, Great Salt Lake City.  
 No. 157. THE TABERNACLE.  
 No. 158. THE OLD TABERNACLE.  
 No. 159. SIGNS OF THE MORMON CO-OPERATIVE INSTITUTION.  
 No. 161-162. TOWER ON CASTLE ROCK, Echo Cañon.  
 No. 163. REED'S ROCK, near Sherman Station.  
 No. 164. GREEN RIVER BUTTE.  
 No. 168. TEAPOT ROCK, Green River.  
 No. 169. VIEW ON THE WEST BANK OF GREEN RIVER.  
 No. 172. BURNING ROCK CUT, Green River.  
 No. 174. VIEW ON THE WEST BANK OF GREEN RIVER.  
 No. 175. GREEN RIVER BUTTE AND BRIDGE.  
 No. 176. GREEN RIVER BUTTE AND BRIDGE, near view.  
 No. 177. PETRIFIED FISH CUT, Green River.  
 No. 178. GIANT'S CLUB, Green River.  
 No. 179. WEST BANK OF GREEN RIVER.  
 No. 181. EAST FROM GREEN RIVER.  
 No. 182-183. SHERMAN STATION, summit of Black Hills.  
 No. 184. DALE CREEK CAÑON.  
 No. 185. DEVIL'S GATE OF DALE CREEK.  
 No. 187. BRIDGE ON THE NORTH PLATTE, first crossing.  
 No. 188-191-192-194. DALE CREEK BRIDGE, Black Hills.  
 No. 195. THE NORTH PLATTE, at Fort Fred. Steele.  
 No. 196-199. DALE CREEK BRIDGE, Black Hills.  
 No. 200-249. ARE OF INDIAN SUBJECTS which have been incorporated into the Indian catalogue in this same volume.  
 The following fourteen views are among the curiously eroded granites in the Black Hills, about five miles north of Sherman Station.  
 No. 250-251. THE PIONEER'S HOME.  
 No. 252-258. VIEWS ABOUT THE HEAD OF CROW CREEK.  
 No. 259-264. ROCK STUDIES, head of Crow Creek.

## 1870 SERIES.

(6½ × 8½.)

A series of views made during the summer of 1870, commencing at Cheyenne, about August 1st, and terminating at Colorado City, November 10th, covering a great portion of the little known, but extremely picturesque and interesting scenery of the Black Hills of Wyoming, the North Platte and Sweetwater Rivers; South Pass, and the Mauvais Terres, about Fort Bridger; thence into the Uinta Mountains; down Green River; through Bridger's Pass, to Fort Sanders, and from there along the foot-hill ranges to Pike's Peak, in Colorado. The very limited time given for preparation, the lateness of the season and the large extent of territory covered, rendered the work extremely arduous. Nearly all the views were obtained while upon "side-trips," a small detachment visiting the more interesting portions of the surrounding mountains, or cañons, while the main train pursued its way along the valleys.

No. 47. **CAMP NEAR CHEYENNE**, at Fort D. A. Russell. The rendezvous camp where the survey was organized and equipped for field-service.

No. 48. "**HOGBACKS.**" A very characteristic feature of the foot-hill ranges of the Rocky Mountains are the Hogback ridges, extending along the whole eastern face. Our view shows one just north from Horse Creek, which has been cut at right angles by the mountain streams. It is composed of the triassic and carboniferous beds, with a trend north and south. Between it and the granites which rise up into the main range a valley has been scooped out by some erosive force, from five to ten miles in width, extending from the head of Crow Creek to the Chugwater.

No. 49. **LOOKING OUT UPON THE PLAINS**, from near the head of Horse Creek, the shore-line and bed of an ancient lake, showing the effects of the erosive force from the mountains plainwards.

No. 50-52. **CASTELLALED ROCKS** on the Chugwater. A very conspicuous feature which we notice in descending the valley of the Chug is the high wall of lower cretaceous sandstone, which stretches away toward the northeast like a huge wall; and the jointage is so regular that it presents the appearance of a massive mason work, gradually falling to decay. The sides of these sandstone walls are from 40 to 60 feet perpendicular, sometimes overhanging, and large masses have broken off and fallen to the base. Their most striking feature, however, is to weather into most picturesque castellated forms. The valley of the Chug is 100 miles long, and is a favorite place to winter stock.

No. 53. **LARAMIE RIVER AND VALLEY**, looking northeast.

No. 54. **BAD LANDS** on Laramie River. From the Chug, we cross table-like plains for ten miles, and descend to the beautiful valley of the Laramie. The tertiary rocks near the crossing have weathered into quite remarkable architectural forms, much like those of White River. The texture is similar also, with

marls and calcareous concretions, passing up into fine sandstones, which decompose so readily that the valleys and the hills are covered with loose sand.

No. 55. GRANITE ROCKS, near eastern base of Laramie Peak. As we approach the base of the mountains, the red feldspathic granites rise in thick picturesque ridges, 50 to 100 feet high, like ruined walls, lending a peculiar as well as picturesque appearance to the landscape.

The granites afford most excellent rock studies of their kinds. The tendency to weather into rounded forms by exfoliation and the jointing are finely shown. The principal lines of fracture are mostly continuous, and have a strike east and west, while the other set trend nearly north and south.

The tendency to exfoliate by the stripping off of their concentric layers has enlarged the openings, sometimes several feet. The granites are thus divided in regular rhomboidal masses, many of which have fallen down at the foot of the ridges, and by exfoliation have become so rounded that they appear like immense transported boulders.

The texture of the rock is an aggregate of large crystals of reddish feldspar, with quartz and mica, the feldspar so predominating that it gives the character to the rock.

No. 56. LARAMIE PEAK. View from a distance.

No. 67. LARAMIE PEAK. Near view from the head of Bitter Cottonwood Creek. The valley of this little stream, of which the view gives us a good idea, is a series of beautiful park-like openings, extending away up into the mountains, and is a favorite resort of the wild game so plentiful in this region. The peak itself, which is the highest point north of Long's Peak, is a little less than 10,000 feet in height, but usually retains no snow upon its summit after May.

It is just about the center of the range, and rises far above it, a most prominent land-mark for a great distance in any direction.

No. 60. THE FOOT-HILLS of the main peak, and characteristic of the rest of the range.

Nos. 62, 63. CAMP ON THE LA BONTA.

No. 64. COTTONWOODS ON THE LA BONTA.

No. 65. FORD ACROSS THE LA BONTA. A very pleasant and picturesque feature of the La Bonta are the beautiful meadow-like valleys, covered with a luxuriant growth of grass, while all about are dry, parched, sage-covered hills, and the magnificent cottonwoods, with wide-spreading branches and dense foliage.

No. 66. NATURAL BRIDGE in the Cañon of the La Prele; view from below.

No. 67. NATURAL BRIDGE. La Prele Cañon; view from above. A most marvelous natural curiosity, rivaling its famous namesake in Virginia.

It is situated in La Prele Cañon, about ten miles south from Fort Fetterman, on the North Platte. The cañon is formed by the passage of the creek through a long ridge that extends from La Bonta to the Red Buttes. Where the La Prele emerges from the cañon, it cuts through the limestone and



red beds at right angles, forming a regular gorge, with walls from 50 to 150 feet in height.

At the head of this gorge the stream has at some time changed its bed, passing directly through a point of rocks that extend across the channel. The old bed is now overgrown with trees and bushes, but is 50 feet higher than the present one. The stream must have changed its course, bringing its waters against this rock, and, finding a fissure opening through it, gradually wore its present channel.

It is as perfect a bridge as could be desired. The opening beneath is about 150 feet wide and 50 feet high.

The arch above forms a perfect span from a great tower on one hand to the old bed of the creek on the other.

- No. 68. **FORT FETTERMAN**, named for Bvt. Lieut. Col. Wm. I. Fetterman, killed at the Fort Phil. Kearney massacre, December 21, 1866.

Established July 19, 1867, and garrisoned by four companies of infantry. Is situated at the mouth of La Prele Creek, 135 miles north from Cheyenne, and 70 miles from Fort Laramie.

- No. 69. **FORT LARAMIE**, named after an old trapper, was established in 1849, and was once a trading post of the Northwestern Fur Company. It is noted as being the place where many important treaties have been made with the Indians. Situated on the Laramie River, about two miles above its junction with the North Platte, and on the line of the old overland road to Oregon and California.

- No. 70. **CAMP ON THE BOX ELDER**. Twelve miles west from Fort Fetterman, and but a short distance above its junction with the Platte. Contrasting well with the rugged features of the ridge are the terrace-like benches or tables, remnants, probably, of some higher levels not swept away.

- Nos. 71, 72. **BOX ELDER CAÑON** affords a good section through the main ridge, being a much more regular gorge than the cañon of the La Prele.

It is from 600 to 800 feet in depth, entirely of erosion, and so narrow that it is difficult to pass through it on foot, the side-walls being perpendicular and sometimes overhanging.

The predominating rocks are calcareous sandstones and some layers of quite fine limestones, with a great variety of texture.

- No. 73. **CAMP ON THE NORTH PLATTE**, near old Fort Caspar, thirty-four miles from Fort Fetterman.

- No. 74. **BAD LANDS**, near Caspar Mountain. There is here a considerable area covered with light gray sandstones, which have weathered into most unique forms. They resemble the ruins of some old village, portions of the stone walls, with the chimneys, remaining.

- No. 75. **VIEW FROM CASPAR MOUNTAIN**. This mountain is an immense table that has been lifted nearly horizontally out of the plain some 800 or 1,000 feet. Our view is taken from it, looking out upon the plains toward the Platte, showing the gradual dying away of the hog-backs and terraces into the level valley.

- No. 76. **RED BUTTES** and the North Platte River.

- No. 77. **CAMP AT RED BUTTES**. Our camp at the Red Buttes was pleasantly located on the broad grassy bottoms of the Platte,

in a sort of amphitheater, with the red beds rising to a great elevation all around. The Red Buttes are so called from the high ridges, or groups of ridges, on the south side of the Platte, their basset edges bearing eastward toward our camp, and of a bright brick-red in color.

As we approach them from the east, in the afternoon, the rays of the setting sun greatly heighten their effect and bring them out in strong relief, so that we can readily see why they have been such prominent land-marks and have so long attracted the attention of the traveler.

No. 78. JACKSON CAÑON. A dry gorge, cut down perpendicularly through the limestones some 300 or 400 feet.

No. 79. VIEW WEST ACROSS THE NORTH PLATTE, from above Jackson Cañon, and showing very distinctly an amphitheater, or upheaved ridge of the red beds, forming a half-circle.

No. 80. A group of all of the members of the survey, made while in the camp at Red Buttes.

No. 81. VIEW FROM THE SUMMIT OF INDEPENDENCE ROCK, looking down the Sweetwater Valley, and showing very plainly that all this portion of the valley was at one time the bed of a great lake.

Nos. 82, 83. INDEPENDENCE ROCK. A noted land-mark for travelers at the time when this route was used. Its base, bordering the old road, is literally covered with names and dates, many of the former well known in the history of the West, and some of them antedating Frémont's time.

The Sweetwater flows immediately along the southern end of it, although, on the opposite side of the stream another ridge, continuing toward the southwest, was once connected with it. It is a vast and excellent illustration of disintegration, its rounded form resembling an oblong haystack, with layers of rock lapping over the top and sides of the mass. Thin layers have been broken off in part, and huge masses are scattered all around it. On some portions of the sides they lap down to the ground with so gentle a descent that one can walk up to the top without difficulty.

Measured by the odometer, the rock has a circumference of 1,550 yards. The north end is 193 feet in height and the opposite end 167 feet, with a depression in the center of not more than 75 feet in height.

No. 84. DEVIL'S GATE, on the Sweetwater. General view from above.

No. 85. DEVIL'S GATE, on the Sweetwater. View inside the gorge.

Five miles up the valley we come to another well-known locality, the Devil's Gate, a cañon which the Sweetwater seems to have worn through the Granite Range, cutting it at right angles. To one side but a short distance is a low natural depression, a few feet above the present bed of the stream, through which it must have once flowed; and the mind is very much perplexed to account for its digression through this great solid wall of granite rock. The current is not strong, finding its way among the huge masses which have fallen down from above without difficulty, and with a gentle, soothing music not common to mountain streams. The walls are vertical, and on the right side about 350 feet high, the other being a very little lower. The distance through is about 300 yards.

No. 86. VIEW WEST FROM ABOVE DEVIL'S GATE, showing the valley of the Sweetwater, with the Granite Ridges on the left, and the level lake-like valley stretching away to the Seminole Mountains in the distance.

No. 87. THE TWIN PEAKS, with camp in middle distance.

No. 88. THE TWIN PEAKS, near view.

Another conspicuous landmark, fifteen miles above the Devil's Gate, a high peak in the ridge, cleft down the center, dividing it in two nearly to the base.

These views show admirably the lines of fracture or stratification, and their weathering away into cube-like forms. The fissures sometimes are worn away into a width of several feet, and by this means huge masses are detached and left balanced upon the summits of the ridges.

Nos. 89, 90. A continuation of the same ridges, the last showing how the level sage-covered valley of the Sweetwater juts up squarely to them, impressing the mind with the idea of a great sea or lake.

No. 91. MUMMY ROCK, at the Three Crossings of the Sweetwater, a noted station and stopping-place in the days of wagon-trains. These are the last of the granite ridges, and among them we find some very characteristic studies. This rock, which has been carved out of the masses of granite about it by the slow hand of time, readily suggests the name we have given it. It is about 20 feet in height, stands upon a very narrow base, with its sides sloping outward, and upon its shoulders is balanced another rock, forming the head of the mummy.

Nos. 92-96. STUDIES ALONG THE SUMMIT OF THE GRANITE RIDGE, showing the characteristic lines of fracture and exfoliation.

No. 97. THE OLD DESERTED RANCH and station at the Three Crossings of the Sweetwater. In the center of the view are the remains of a watch-tower or lookout, from which the occupants could discern at a distance the approach of trains, or keep a watch upon their unwelcome visitors, the wandering Sioux.

No. 98. THE EMIGRANT'S GRAVE. Scattered along the dreary 1,200 miles from the crossing of the Missouri to the promised land of the Mormon are little mounds of earth covered with slabs of rock, and sometimes with a plain piece of board at the head, with a simple inscription, and occasionally, when near some ranch, surrounded by a fence.

No. 99. ATLANTIC CITY, SOUTH PASS.

No. 100. SOUTH PASS CITY. South Pass is a gradual elevation, gently rolling and table-like, and one can pass the line of separation between the waters of the two oceans without observing it. In 1867 gold was discovered in richly paying quantities, and caused a great "stampede" or flocking together of all the wandering miners from over the whole country. Under this influx of population these two "cities" sprang up and were for a time lively, bustling towns. The gold is found both in quartz and placers, and is still mined with good profit. South Pass City has an elevation above the sea of 7,857 feet, and Atlantic City 7,665.

No. 101. BEAVER DAM GULCH. A stream flowing into the main creek at Atlantic City, the bed of which is completely monopolized by colonies of beavers, which have built a continuous series.

of dams, from bank to bank, for a distance of three or four miles.

No. 102. **THE WIND RIVER MOUNTAINS**, and Fremont's Peak, from the summit of the Foot-Hill Range, north of South Pass, at an elevation of 10,000 feet above the sea. Far above in the distance rise the snow-capped ridges of the axis of the range with Fremont's and Snow Peaks in view. Fremont gives the elevation of Snow Peak as 13,570 feet, and it is the highest in this range. A characteristic feature of these mountains is the dense growth of a species of the nut pine, which furnishes food for innumerable birds and squirrels, and supplies the Indians with their favorite food.

Nos. 103-106. **THE SHOSHONE INDIANS**, which are described in the catalogue of Indians.

No. 107. Camps of the 10th and 11th of September, near Church Buttes.

No. 108. **CHURCH BUTTES**, on the line of the old overland stage-route, about 150 miles east from Salt Lake, and at this point having an elevation of 6,731 feet. This formation is known as the Mauvais Terre, or Bad Lands, and consists of a vast deposit of soft sedimentary sandstones and marly clays in perfectly horizontal strata, containing within their beds some very remarkable paleontological remains. The slow process of weathering has carved the bluff-lines into the most curious and fantastic forms, lofty domes and pinnacles and fluted columns, this portion particularly resembling some cathedral of the olden time standing in the midst of desolation.

Distance lends a most delusive enchantment to the scene, and the imagination can build many castles from out of this mass of most singular formation. A nearer approach dispels some of the illusions, but the mind is no less impressed with the infinite variety of detail and the scattered remains of the extinct life of some far-distant age. This is also the land of the "moss-agate." They are found scattered all over the surface of the country.

Nos. 109, 110. **A VIEW FROM THE SUMMIT** of one of the highest points among the Bad Lands. As far as the eye can reach, upon every side, is a vast extent of most infinite detail. "It looks like some ruined city of the gods, blasted, bare, desolate, but grand beyond a mortal's telling."

Nos. 111-114. **DETAILED VIEWS** of the same region; and we can see in them the very process by which they have been carved into such curious and beautiful forms.

No. 115. **A SAW-MILL IN THE UTAH MOUNTAINS**. The foot-hills of the main range are densely clothed with most excellent pines. Judge Carter, of Fort Bridger, has several steam saw-mills located in the thickest groves, and is producing large quantities of lumber.

No. 116. **CAMP OF THE SURVEY**, on the 16th of September, among the pines of the foot-hills, in the Utah Mountains, at an elevation of nearly 10,000 feet above the sea.

No. 117-119. **THE UTAH MOUNTAINS**. Views from Photograph Ridge, elevation 10,829 feet. One of the grandest and most perfect mountain views in the West. The foreground is a picturesque group of the mountain-pines. In the middle distance, glimmering in the sunlight like a silver thread, is Black's Fork, meandering through grassy, lawn-like parks, the eye follow.

ing it up to its sources among the everlasting snows of the summit-ridge. The peaks or cones in the distance are most distinctly stratified and apparently horizontal, or nearly so, with their summits far above the limits of perpetual snow, and from 1,500 to 2,000 feet above the springs that give rise to the streams below.

They are vast piles of purplish compact quartzite, resembling Egyptian pyramids on a gigantic scale, without a trace of soil, vegetation, or water. One of these remarkable structures stands out isolated from the rest, in the middle of the valley of Smith's Fork, which was estimated to rise 1,500 feet above its base, and so much like a Gothic church did it appear that the members of the survey gave it the name of Hayden's Cathedral. No. 120 is a near and No. 121 a distant view, and they both show with remarkable clearness their horizontal stratification. They are as regular as the steps of a pyramid, and as the snow rests upon each step, it relieves them in the strongest manner.

No. 122. A VIEW NEAR THE HEAD OF THE WEST BRANCH OF BLACK FORK, looking south, and—

No. 123. FROM THE SAME POINT LOOKING WEST, deep down into the valleys, with their silvery streams finding their way down from the lofty, cone-like, snow-capped summits. These two views were made just upon the upper limit of arborescent vegetation; showing in the foreground how the thrifty pines of the plains below up here have a hard struggle for existence, and are dwarfed down to low, trailing shrubs, spread out along the ground, and always toward the east, showing that the winds upon these mountains are mostly from the west.

Nos. 124—126. THE UINTAH MOUNTAINS. A distant view from the foot-hills bordering Bear River.

No. 127. CARTER'S LAKE, Uintah Mountains. A beautiful sheet of water, inclosed on one side by a semicircular wall of sandstones and slates, and on the other by a dense growth of spruce trees. The depression for the accumulation of the waters of this lake was formed by an immense mass of rock sliding down from the ridges above. The side of the mass opposite the ridge, from which it was detached, would be the highest, forming a rim for the depression. Springs of water ooze out from the sides of the ridge, snows melt, and soon a little lake is formed. This one is 350 yards in length and 80 yards wide; elevation, 10,321 feet. There are very many such, all through the mountains, forming a characteristic feature in its scenery.

No. 128. GILBERT'S PEAK. A beautiful and instructive view of one of the highest peaks in the Uintah Range, named in honor of General Gilbert, of the Regular Army. The very plainly-marked strata of red sandstones and quartzites inclines very slightly to the southeast. The lake in the foreground, of about fifty acres extent, has an elevation of 11,000 feet, and the peak rises abruptly from it 2,250 feet.

No. 129. EL CAPITAN, in miniature. A perpendicular limestone bluff, about 500 feet in height, where Henry's Fork breaks out from the mountains into the broad, grassy valleys of the foot-hills.

- No. 130. A CAMP ON HENRY'S FORK, among the big cotton-woods that line all these streams.
- No. 131. A CAMP ON HENRY'S FORK, having as a background a portion of the Hog Backs, which rise ridge by ridge to the distant summits of the quartzite nucleus of the Uintahs. (See also 136, where they are shown on a more extended scale.)
- Nos. 132, 133. BEAVER DAMS on Henry's Fork. This stream was at one time thickly inhabited by beavers, but they have been nearly driven out by the advance of civilization. There are many left, however, in some of the quiet, secluded nooks, and in such a place we found the subject which affords us so excellent an illustration of their habits. They have here constructed a dam across the channel of the fork, about fifty yards in length and from three to five feet in height.
- No. 134. SHOWS HOW THEY CUT DOWN TREES, trim them out, and cut them into convenient lengths suitable for their purpose. The tree at the left is eighteen inches in diameter. The amount of work they do, and the mechanical ingenuity they show in its accomplishment, would hardly obtain credence were it not for the incontrovertible evidence here before our eyes.
- No. 135. QUAKING-ASP GROVE. A beautiful tree scattered all over the higher foot-hills, generally in groves of considerable extent. They form a very pleasant relief to the monotony of the pine-forest growth.
- No. 136. HOG BACKS on Henry's Fork, near its junction with Green River. (See No. 131.)
- No. 137. A NATURAL CAVE near Green River, in an upheaved ridge of limestone. It is full of holes and crevices, that give shelter to multitudes of bats and animals. This cave has also been a favorite resort for Indians, as is shown by traces of fires, the walls of stone laid up for defense, and the chipped flints and arrow-heads scattered about.
- No. 138. A PERPENDICULAR BLUFF of curiously weathered sandstone opposite the cave.
- Nos. 139, 140. THE FLAMING GORGE, a view on Green River, at the mouth of Henry's Fork, of great beauty, and which derives its principal charm from the vivid coloring. The waters of the river are of the purest emerald, with banks and sand-bars of glistening white. The perpendicular bluff to the left is nearly 1,500 feet above the level of the river, and of a bright red and yellow. When illumined by full sunlight, it readily suggests the title given it. It is the entrance or gateway to the still greater wonders and grandeurs of the famous Red Cañon, that cuts its way to a depth of 3,000 feet between this point and its entrance into Brown's Hole.
- No. 141. GREEN RIVER AT BROWN'S HOLE, below the Red Cañon, calm, quiet, and peaceful, recuperating for the still more turbulent passage of the deeper, gloomier, and longer cañons below. The sandy beach at the left shows the foot-prints of numerous deer, bears, and elk that frequent these banks.
- No. 142. A BLUFF OF QUARTZITE, near the mouth of Red Creek, in Brown's Hole.
- No. 143. SCENE NEAR THE HEAD OF RED CREEK, showing a fine exposure of the Tertiary beds.

- No. 144. A VIEW OF THE COAL-BEARING BLUFFS near Point of Rocks, on Bitter Creek, Union Pacific Railroad, 805 miles west of Omaha, and 6,490 feet above the sea. The veins are about five feet thick, cropping out high on the bluff, and with a very slight inclination to the northwest.
- No. 145. CAMP ON THE NORTH FORK OF THE PLATTE.
- No. 146. BLUFFS ON THE NORTH FORK OF THE PLATTE, near the crossing of the old overland stage-road. They are eighty to one hundred feet in height, extending along the east bank of the river, and composed of a grayish-brown sandstone, exhibiting in a remarkable manner the various signs of shallow water depositions, ripple, rain, and mud markings. Broad, flat masses of rock lie at the base of the bluff, fifteen or twenty feet square, with the surface covered with these peculiar markings.
- No. 147. A VIEW ON THE MEDICINE BOW RIVER, on the line of the old stage-road. Elk Mountain shows dimly in the background, through a snow-storm, which was prevailing at the time our view was taken.
- Elk Mountain is the northern spur and highest peak in the Medicine Bow Range. Elevation, 7,152 feet above the sea.
- No. 148. CAMP ON ROCK CREEK, showing a glimpse of Rock Creek Cañon and the snow-clad spurs of the Medicine Bow Mountains.
- No. 149. CAMP FAREWELL, at Fort Sanders, so named as being the last regular camp of the survey of 1870. Showing merely a few of the members, the tents, and animals of the expedition.
- No. 150. THE ROBBER'S ROOST, at Virginia Dale, a stage-station on the line of the old overland route, and which attained an unenviable notoriety during 1860 and 1863, while kept by Jack Slade, a noted desperado of that time.
- No. 151. PLATTE CAÑON. A view from the plains, looking up into the cañon, being the exit of the South Platte from the mountain range that separates South Park from the plains. A rugged, precipitous, and inaccessible gorge.
- No. 152. ROCKS BELOW PLATTE CAÑON. A remarkably expressive view of the upheaved red sandstone, worn by atmospheric agencies into most wonderful forms, the strata standing up at an angle of 60 degrees, and weathered out into a thousand curious pinnacles and serrated ridges.
- No. 153. PLEASANT PARK, a small picturesque valley, lying between the sandstone ridges and the mountains near the Colorado divide.
- No. 154. SODA SPRINGS, on the Fountain qui Bouille, three miles above Colorado City. At the present time (1873) the springs have become a fashionable watering-place, and the encroachments of civilization have nearly obliterated the old natural features of the locality.
- No. 155. UTE FALLS, in Ute Pass, where the Fountain qui Bouille is forced through a narrow, precipitous gorge, about one mile above the springs. Now, these falls are scarcely distinguishable, as a road has been blasted through the massive granite that forms the walls of the cañon, and the accumulation of debris falling into the stream, has changed its character entirely.

- No. 156. PIKE'S PEAK, from near Colorado City, looking up the valley of the Fountain qui Bouille. Elevation of the peak, 13,893 feet.
- No. 157. A VIEW IN THE GARDEN OF THE GODS, showing the central line of the upheaved sandstones, with occasional outcroppings of the white gypsum beds. The views of 1873 show this locality to much better advantage.
- Nos. 158-160. SCENES IN MONUMENT PARK, along Monument Creek, and the small tributaries that flow into it from the west, some of the most singular and unique monument formations to be met with in the whole country, and the three views we have noted give but a faint conception of their beauty. The 1873 series does them more justice. These groups are upon a small tributary of Monument Creek, about nine miles above Colorado City. The stream has cut a little valley through a coarse material with layers of irregular deposition, hardened into a compact sandstone, and then comes a thin layer of iron-stone, or impure limonite, with now and then thin seams of marl or clay, but the whole is a quartzite material, and rather coarse. The light-colored sandstones below are weathered into most singular columnar or monument-like forms, with thin layers of rusty sandstone as a cap, protecting the summit.
- No. 161. A COLLECTION OF BUFFALO, ELK, DEER, MOUNTAIN-SHEEP, AND WOLF SKULLS AND BONES, heaped up in monument form, being all collected near Fort Sanders, and shows the abundance of game that once abounded on these plains.

#### STEREOSCOPIC VIEWS.

Views of mountain scenery in Wyoming Territory, including the Black Hills, Wind River, and Uintah Mountains and Green River.

- No. 265. ROCKS on the Chugwater.
- No. 266. COTTONWOODS on the Laramie River.
- No. 267. LARAMIE BAD LANDS.
- No. 288. VIEW on Laramie River.
- Nos. 269, 270. LARAMIE RIVER AND VALLEY from bluffs.
- No. 271. CAMP on the Bitter Cottonwood.
- Nos. 272, 273. GRANITE ROCKS, at foot of Laramie Peak.
- No. 274. BLACK HILLS near Laramie Peak.
- No. 275. LARAMIE PEAK from the Foot-Hills.
- No. 276. LARAMIE PEAK from the head of Bitter Cottonwood.
- No. 277. LARAMIE PEAK from the head of plains.
- No. 278. CAÑON at base of Laramie Peak.
- No. 279. THE STOP FOR LUNCH on the way to the peak.
- No. 280. CAMP on the La Bonta.
- No. 281. COTTONWOODS on the La Bonta.
- No. 282. PYRAMID ROCK, near the La Bonta.
- Nos. 283-286. NATURAL BRIDGE, near Fort Fetterman.
- Nos. 287-291. BOX ELDER CAÑON, near Fort Fetterman.
- Nos. 292, 293. VIEWS from Caspar Mountain.
- Nos. 294-296. BAD LANDS, near old Fort Caspar.
- Nos. 297-298. CAMP on the North Platte, near Caspar.



- No. 299. NORTH PLATTE RIVER at Red Buttes.  
 Nos. 300, 301. RED BUTTES at North Platte River.  
 No. 302. JACKSON CAÑON, near Red Buttes.  
 No. 303. MEMBERS OF THE SURVEY IN CAMP at Red Buttes.  
 Nos. 304-306. INDEPENDENCE ROCK, on the Sweetwater.  
 No. 307. EAST from Independence Rock.  
 Nos. 308-311. DEVIL'S GATE, Sweetwater River.  
 No. 312. CAMP at the Three Crossings of the Sweetwater.  
 No. 313. OLD RANCH at the Three Crossings of the Sweetwater.  
 No. 314. SOUTH PASS CITY.  
 No. 315. ATLANTIC CITY, South Pass.  
 No. 316. FRÉMONT'S PEAK, distant view in the Wind River Mountains.  
 No. 317. WEST from southern foot-hills of Wind River Mountains.  
 No. 318. EAST from southern foot-hills of Wind River Mountains.  
 No. 319. NORTH from southern foot-hills of Wind River Mountains.  
 No. 320. SHOSHONE VILLAGE, of the Wind River Mountains.  
 No. 321. WAR-CHIEF'S TENT.  
 Nos. 322, 323. SCENES in village.  
 No. 324. WASHAKIE and his warriors.  
 No. 325. CHURCH BUTTES on Black's Fork.  
 Nos. 326-328. BAD LANDS, near Church Buttes.  
 No. 329. CAMP in the Uintah Mountains.  
 Nos. 330-332. UINTAH MOUNTAINS, head of Black's Fork.  
 Nos. 333, 334. UINTAH MOUNTAINS, head of Smith's Fork.  
 No. 335. UINTAH MOUNTAINS, head of Bear River.  
 No. 336. THE OLD MONK, Uintah Mountains.  
 No. 337. CARTER'S LAKE, Uintah Mountains.  
 Nos. 338, 339. GILBERT'S PEAK, Uintah Mountains.  
 No. 340. BLUFF on Henry's Fork.  
 No. 341. CAMR ELLIOTT, Uintah Mountains.  
 No. 342. SPRUCE-TREES, Uintah Mountains.  
 No. 343. PINE-TREES, Uintah Mountains.  
 No. 344. QUAKING-ASP, Uintah Mountains.  
 Nos. 345, 346. BEAVER DAMS on Henry's Fork.  
 No. 347. BEAVERS' WORK in cutting down trees.  
 No. 348. CAMP near mouth of Henry's Fork.  
 No. 349. GREEN RIVER, near mouth of Henry's Fork.  
 No. 350. NATURAL CAVE, mouth of Henry's Fork.  
 No. 351. GREEN RIVER, in Brown's Hole.  
 No. 352. SCENE on Red Creek, near Brown's Hole.  
 No. 353. BLUFF near mouth of Henry's Fork.  
 No. 354. VIEW on Medicine Bow River.  
 No. 355. VIEW on Rock Creek.  
 No. 356. VIRGINIA DALE, Robbers' Roost.  
 No. 357. MOUTH of Platte Cañon.  
 No. 358. ROCKS near Platte Cañon.  
 No. 359. CAMP at Kountz.  
 No. 360. PLEASANT PARK.  
 Nos. 361, 362. SODA SPRINGS, near Colorado City.  
 No. 363. UTE FALLS.  
 No. 364. PIKE'S PEAK.  
 No. 365. VIEW in the Garden of the Gods.

Nos. 366-371. VIEWS in Monument Park, curiously eroded sandstones.

Nos. 372-374. BUFFALO BONES.

No. 375. ANTELOPE.

No. 376. BEAVER.

No. 357. PORCUPINE.

## 1871 SERIES.

(8×10.)

FROM OGDEN, Utah, via Fort Hall, Idaho, to Fort Ellis, Mont., then up the Yellowstone River to the lake, to the Geyser Basins on the head-waters of the Madison. The return route includes views along the Beaver Head River and that portion of Idaho and Wyoming lying between Fort Hall and Evanston, on the Union Pacific Railroad.

The numbers are continued from the previous series:

- No. 165. RENDEZVOUS CAMP, at Fort D. A. Russell, near Cheyenne.  
(See 47.)
- No. 166, 167. FIRST CAMP OF THE SURVEY at Ogden, Utah, close under the Wasatch Mountains. A marked feature in the mountain, included in our view, is an exposure of one thousand feet or so of quartzites and limestone, bent up into an arch, the rocky sides of the mountain being so denuded as to show the stratification very distinctly. Elevation of camp plateau 4,527 feet.
- No. 168. OGDEN CAÑON, three miles above its mouth. A narrow gorge cut through the rocks, with walls 1,500 to 2,000 feet in height, the roadway being built up from the bed of the creek. In the center of the view, a cone-like mass of quartzites, most distinctly and beautifully stratified, stands up at an angle of 55 degrees and 100 feet high. A very interesting geological picture.
- Nos. 169, 170. CAMP NEAR THE HEAD OF CACHE VALLEY, Utah, looking south, seventy-five miles north of Ogden. The valley is about sixty miles in length and seven in width. Is well settled with six or eight Mormon villages, and a total population of some 10,000. Elevation, 4,624 feet.
- No. 171. BEAR RIVER CROSSING, head of Cache Valley, eighty miles from Ogden.
- No. 172. CAMP ON GOOSEBERRY CREEK, north slope of Red Rock Pass, with a view of one of the mountain ridges that separate Cache from Malade Valley. Elevation, 4,706 feet.
- No. 173. Red Rock Pass, Idaho. Elevation, 5,041 feet, one hundred miles from Ogden; the divide between the waters of the Columbia and Salt Lake. The butte on the left is a bright red, ferruginous sandstone, and the other a bluish limestone.
- No. 174. RED ROCK BUTTE, one mile below the pass, 300 feet in height, of carboniferous limestone, a rich red color, due to the presence of oxide of iron.
- No. 175, 176. PORTNEUF CAÑON. Illustrating the immense basaltic overflow, filling the valley as level as a floor, contrasting finely with the bold mountain outlines upon either side. The creek cuts closely up to the beds, exposing an upright wall of columnar basalt for a number of miles.
- No. 177. FORT HALL, Idaho, north from Ogden one hundred and seventy six miles. Elevation, 4,724 feet. Located in a beautiful grassy valley, among the foot-hills, on the south side of Snake River. It is forty miles above the site of old Fort Hall, that was located on the banks of the river.

- No. 178. SNAKE RIVER. Looking up from Taylor's bridge, twenty-six miles west from Fort Hall. The river here rushes through a narrow channel of dark, nearly black basalt. Our view was taken in the spring, when the channel was full. In the fall, when the river is low, it reveals deep cañon-like walls, about 100 feet below the surface.
- No. 179. POT-HOLES. A portion of an old channel of the river through the basalts, and showing how curiously they were hollowed out of the iron-like rock by the action of the water. They exist by thousands on both sides and up and down the river. They are particularly noticeable in this old channel.
- No. 180. PLEASANT VALLEY, Idaho. A small valley, of not more than 200 acres in extent, just south of the main Rocky Mountain divide. It is 275 miles north from Ogden; elevation, 6,236 feet. The divide is four miles to the north, and is but 250 feet higher.
- Nos. 181, 182, 183. RED ROCK MOUNTAINS, from the junction on the overland-stage line, 293 miles from Ogden; elevation of valley, 6,329 feet. They are a portion of the main Rocky Mountains divide, separating Idaho from Montana.
- No. 184. MOUNT GARFIELD. The highest summit in the Red Rock Mountains, being 9,704 feet above the sea.
- No. 185. A VIEW IN THE DEVIL'S PASSWAY, showing a portion of the cañon through quartzites and sand-stone, with a basalt coping.
- No. 186. CAMP ON THE PASSAMIRE, or Stinking Water, one of the main branches of the Jefferson, showing a glimpse of the snow-clad mountains bordering the Madison, among which are its sources.
- No. 187. VIRGINIA CITY, Mont. Elevation, 5,713 feet, near the foot of Alder Gulch, one of the richest placer-mining districts in Montana, discovered in 1863. The town dates its existence from that time. The view is from across the gulch, looking north.
- Nos. 188, 189, 190. HYDRAULIC MINING NEAR VIRGINIA CITY. Alder Gulch is sixteen miles in length, rising in the mountains near Madison River to an altitude of 7,500 feet. The two first views show the manner of washing away the sides of the gulch into the sluice-boxes, where the gold is collected. In No. 190, a flume is laid upon the bed-rock, in the bottom of the gulch, and the waters of the creek brought through it, carrying with its current the auriferous sands.
- No. 191. BRIDGE OVER THE MADISON, about half way between Virginia City and Bozeman. The Madison is one of the three streams that unite to form the Missouri.
- No. 192. FORT ELLIS, Mont. One of the largest and most important military posts in the Northwest, situated on Mill Creek, about three miles above Bozeman, at the head of Gallatin Valley. It is the rendezvous and outfitting point for the exploration of the "Wonder Land" lying beyond.
- No. 193. A GROUP OF THE OFFICERS AT FORT ELLIS, July, 1871.
- Nos. 194, 195. CAMPS OF THE SURVEY, near Fort Ellis, preparatory to moving over on the Yellowstone.
- No. 196. MYSTIC LAKE. A picturesque little sheet of water of about fifty acres extent, the head of Bozeman Creek, and one of the branches of the East Gallatin. It is about twelve miles south

of Fort Ellis, up among the mountains. As it is full of excellent trout, it is a favorite pleasure resort.

- No. 197. MYSTIC LAKE, distant view from the trail. The first glimpse as we approach it.
- Nos. 198, 199. VIEW DOWN THE CREEK a short distance below the lake. The creek falls very rapidly, some 500 feet in less than half a mile.
- Nos. 200, 201. VALLEY OF THE YELLOWSTONE, looking south from the first cañon. On the left the Yellowstone or Snowy Range stands out in bold relief, the eye following it up to Emigrant Peak, thirty miles away. The river winding among groves of cottonwood through a broad lake-like valley, of from three to five miles in width, until it fades away in the distance, forming one of the most attractive views in the catalogue.
- No. 202. EXIT OF THE YELLOWSTONE, through the first cañon, showing a portion of the mountain range included in the last view.
- No. 203. BOTELER'S RANCH, on the Yellowstone, opposite Emigrant Peak. A log cabin of the pioneer stamp, owned by three brothers who have earned a wide reputation for whole-souled, hearty hospitality. Here all wagons and extra baggage were left, for beyond this point was nothing but a narrow trail, (1871,) accessible only to the sure-footed mule or hardy cayuse.
- No. 204. EMIGRANT PEAK. A great volcanic cone on the east bank of the Yellowstone opposite Boteler's, and the southern terminus of the Yellowstone Snowy Range; elevation, 10,629 feet, and 5,500 feet above the river at its base. On its northern flank is the well-known Emigrant Gulch mining-district, and the site of what was once Yellowstone City.
- No. 205. VALLEY OF THE YELLOWSTONE. Six miles above Boteler's, looking north, great masses of volcanic breccia in the foreground, a basaltic table in the middle distance, and in the extreme distance the sharp crest of Emigrant Peak.
- No. 206. THE LOWER OR SECOND CAÑON OF THE YELLOWSTONE, from the lower end looking up. The granite walls rise in abrupt angular lines one thousand feet or more above the turbulent stream, forcing its way through the narrow channel at their feet.
- No. 207. THE SECOND CAÑON from its upper end looking down.
- No. 208. THE SECOND CAÑON at the water's edge. On one side rise abrupt perpendicular walls of gneiss, and on the opposite side, less abrupt, are scattered a few cottonwoods among the mass of rocky debris, affording pleasant shade for the fisherman, for the river in this neighborhood is most abundantly stocked with the largest and finest of trout.
- No. 209. APPROACH TO CINNABAR MOUNTAIN from below, looking up the river from the stand-point of No. 207.
- Nos. 210-213, are different views of Cinnabar Mountain and the Devil's Slide, ten miles above the second cañon. It is a mountain of alternate beds of limestone, sandstone, quartzites, and volcanic dikes, elevated to a very nearly vertical position, with the softer strata so worn away as to leave the harder and more enduring ridges standing. Our views include only the central portion of the long series of ridges. Prominent among them are two parallel walls, fifty feet apart and two hundred

in height, running up the mountain side 1,500 feet. Between the walls on one side is a band of bright vermilion-tinted clay, which has been mistaken for cinnabar, and hence the name Cinnabar Mountain.

#### THE GREAT HOT SPRINGS ON GARDINER'S RIVER.

Ten miles above Cinnabar Mountain, and thirty-five from Boteler's, we come to Gardiner's River, a mountain torrent cutting its way through Cretaceous and Tertiary strata, in picturesque cañons, and emptying itself into the Yellowstone at the foot of the third cañon. Four miles above the junction of the streams, and at an elevation of 500 or 600 feet above Gardiner's River, we come suddenly in sight of the springs. Before us lies a high white hill of calcareous sediment, deposited from numerous hot springs. The whole mass looks like some grand cascade that had been suddenly arrested in its descent and frozen. On examination it was found that the deposit extended for some two miles further up the gorge, and below reached to the edge of the river, occupying altogether about four square miles. The principal mass, occupying an area of about one square mile, is arranged in a series of terraces, one above the other, each being composed of beautiful basins, semicircular in shape and having regular edges with exquisitely scalloped margins. Small streams flow down from them in channels lined with oxide of iron, with the most delicate tints of red. Others show exquisite shades of yellow, from a deep, bright sulphur to a delicate cream color. Still others are stained with shades of green. All these colors are as brilliant as the brightest aniline dyes.

The water, after rising from the spring-basins, flows down the declivity step by step, from one reservoir to another, at each one of them losing a portion of its heat until it becomes as cool as spring-water. Holding in solution a great amount of lime, with some soda, alumina, and magnesia, they are slowly deposited as the water flows down the mountain, forming the succession of basins. The temperature varies from 160° Fahr. to 194°, the boiling-point at this elevation.

These natural basins vary somewhat in size, averaging five by eight feet, and from one to four feet in depth. Their margins are beautifully scalloped and adorned with a natural bead-work of exquisite beauty.

Nos. 214, 215. GROUP OF LOWER BASINS.

Nos. 216, 217. GROUP OF UPPER BASINS.

The above series comprise the principal portion of the basins termed fancifully by some Diana's Bathing Pools.

No. 218. LARGE SPRING UPON SUMMIT, near the outer margin of the main terrace, supplying the above bathing-pools with their water. Its dimensions are twenty-five by forty feet.

Nos. 219-223. GROUP OF SPRINGS upon the same level with the above great boiling spring, of less activity, but greater beauty in form and tint.

No. 224. AN OBLONG FISSURED RIDGE, of about 150 yards in length, six to ten feet high, and from ten to fifteen broad at the base. The fissure runs from one end to the other, and is from six

to twelve inches wide, from which steam issues in considerable quantities. The inner portion of the shell is lined with a hard, white enamel like porcelain, covered with beautiful crystals of sulphur that have been gathered from the surging and seething cauldron of sulphureted steam rising from it.

No. 225. A GENERAL VIEW of the northern face of the main central portion.

No. 226. CAP OF LIBERTY, distant view.

No. 227. CAP OF LIBERTY, near view.

At the base of the principal terrace is a large area covered with shallow pools, where some of the ornamentations are perfect, while others are fast going to decay, leaving the decomposed sediment as white as snow. On this sub-terrace is a remarkable cone about fifty feet in height, and twenty feet broad at the base, its form suggesting the name of the Liberty Cap. It is undoubtedly the remains of an extinct geyser.

No. 228. LOOKING UP over the extinct portion of the main terrace from the Cap of Liberty.

No. 229. LOOKING DOWN upon Gardiner's River from the summit of the main terrace, the beautiful basins forming the foreground, and rising abruptly from the river to a height of from 1,500 to 2,000 feet, is a vertical bluff of beautifully stratified Cretaceous and Tertiary beds, capped by a basaltic plateau.

No. 230. GENERAL VIEW OF THE MAIN SPRING and terrace from above.

No. 231. GENERAL VIEW OF THE MAIN SPRING from below.

No. 232. THE FIRST BRIDGE EVER BUILT ACROSS THE YELLOWSTONE, near the junction of East River with the Yellowstone, and about fifteen miles above the Hot Springs. It was built by miners in the summer of 1870, to accommodate the "stam-pede" that set in toward the Clark's Fork "diggings." The river is here 200 feet wide, and flows with great force and rapidity between perpendicular walls.

No. 233. TOWER FALLS, near view from near its base.

No. 234. TOWER FALLS, distant view from above.

Fifty miles above Boteler's we reach the deep, wild, romantic gorge through which flows Tower Creek. It rises high up in the main divide, back of Mount Washburn, and flows for about ten miles through gloomy cañons. About 200 yards above its entrance into the Yellowstone the stream pours over an abrupt descent of 156 feet. The falls are about 260 feet above the level of the Yellowstone at the junction, and are surrounded by columns of volcanic breccia, (Nos. 235, 236, and 237,) rising from 50 to 100 feet above the falls, and extending down to their foot, standing like gloomy sentinels or like gigantic pillars at the entrance to some grand temple. They form the most conspicuous feature of the scenery, and suggest the name given to creek and falls.

No. 238. COLUMN ROCKS, on the east bank of the Yellowstone, a short distance below the mouth of Tower Creek, and forming one side of a deep narrow cañon. The walls are about 600 feet in height, and have two rows of basaltic columns, each one of which is about twenty-five feet in height and five feet in diameter. Between these two layers, which are 200 feet apart, are beds that seem to have a large amount of sulphur in their composition, from their bright yellow color.

## THE GREAT FALLS OF THE YELLOWSTONE.

Sixteen miles below Yellowstone Lake, at the head of the Grand Cañon, are the Great Falls of the Yellowstone, the Upper, and the Lower. The two falls are not more than a quarter of a mile apart. Above, the river flows through a grassy, meadow-like valley, with a calm, steady current, until within about half a mile of the Upper Falls, when the rapids commence hurrying the waters on between low, but narrow and precipitous, walls of massive basalt, when they literally shoot out through a narrow contracted gorge over a precipice 140 feet, striking a slanting shelf below, ricochetting off into the basin a mass of snow-white foam. The river then spreads out over a wide, gently descending bed of rock, with walls from 200 to 400 feet in height, until it reaches the brink of the Lower Falls, when the stream is contracted to a width of 100 feet, and then plunges over the precipice, a solid, unbroken mass, and falls 397 feet into the spray-filled chasm, enlivened with rainbows and glittering like a shower of diamonds. The walls of the cañon immediately above the Lower Falls are about 400 feet in height, or a total depth to the bottom of the falls of about 800 feet, and upon each side of the falls are perfectly horizontal for nearly the whole height.

No. 239. THE LOWER FALLS. A near view, not far from the bottom of the cañon, and about 800 yards below the falls.

No. 240. THE LOWER FALLS. Distant view farther down the cañon.

Nos. 241, 242. THE LOWER FALLS. A view from the top of the cañon, west side, one mile below the falls, and showing the cañon for that distance.

No. 243. THE LOWER FALLS. View from the east side of the cañon.

No. 244. UPPER FALLS, from the top of the cañon, just above the Lower Falls.

No. 245, 246. UPPER FALLS, near view from the east side of the cañon.

No. 247. UPPER FALLS, near view from the west side.

## THE GRAND CAÑON.

Above the falls, the river flowing over hard, compact, iron-like basalt, makes but little impression upon it, but after its leap it has different material to deal with. Instead of unyielding rock, there is a vast deposit of soft volcanic ash with harder seams and dike-like eruptions of breccia and basalt. Ages ago this whole region was the basin of an immense lake. Then it became the center of volcanic activity; vast quantities of lava were emptied, which, cooling on the water, took the form of basalt. Volumes of volcanic ash and rock fragments were thrown out from the craters from time to time, forming breccia as they sunk through the water, and mingled with the deposits from silicious springs. Over this were spread the later deposits from the waters of the old lake.

In time the country was slowly elevated, and the lake was drained away. The easily eroded breccia along the river-channel was cut deeper and deeper as ages passed, while springs and creeks and the falling rain combined to carve



the sides of the cañon into the fantastic forms they now present, by wearing away the softer rock and leaving the hard basalt and the firmer hot-spring deposits standing in massive columns and Gothic pinnacles. The basis material of the old hot-spring deposits is silica, originally white as snow, but now stained by mineral waters with every shade of red and yellow, from scarlet to rose color, from bright sulphur to the daintiest tint of green. When the light falls favorably upon these blended tints, the Grand Cañon presents a more enchanting and bewildering variety of forms and colors than human artists ever conceived. The erosion was practically arrested at the upper end of the cañon by a sudden transition from the softer breccia to hard basalt, and the falls were the result.

Nos. 248, 249. GRAND CAÑON, looking down from over the Lower Falls, west side.

Nos. 250, 251. GRAND CAÑON from the east bank.

No. 252. GRAND CAÑON. West side, one mile below the falls, looking down.

No. 253. GRAND CAÑON from the east side, one mile below the falls, looking down.

No. 254. THE WALLS OF THE CAÑON, as seen from below.

Nos. 255, 256. CRYSTAL FALLS. Cascade Creek, is a small tributary of the Yellowstone, cutting its way through a deep cañon of volcanic ash and basalt, and just before its union with the Yellowstone flowing over a series of ledges, making a cascade as beautiful as its previous course has been weird and ugly. There is first a fall of five feet, and another of fifteen; then it spreads out over the rocks down an abrupt descent of eighty-four feet.

Nos. 257-259. RAPIDS ABOVE THE UPPER FALLS of the Yellowstone.

The first view is immediately above the falls, showing the narrow rock-bound channel, the other two a quarter of a mile farther up the stream, and showing the huge, detached masses of basalt that have been left standing in the middle of the river.

No. 260. SULPHUR SPRING. At Crater Hills, ten miles above the falls, on the east side of the Yellowstone, in the center of a most interesting group of hot springs, is a magnificent sulphur spring. The deposits around it are silica and enamel like the finest porcelain. The thin edges of the nearly circular rim extend over the waters of the basin several feet, the open portion being fifteen feet in diameter. The water is in a constant state of agitation, and seems to affect the entire mass, carrying it up impulsively to a height of four or five feet. The decorations about the spring, the most beautiful scalloping around the rim, and the inner and outer surface, covered with a sort of pearl-like bead work, give it great beauty.

No. 261. MUD SPRINGS, at Crater Hills, near the Sulphur Spring.

The contents of this spring are a fine, silicious, pearl-colored mud, of the consistency of thick hasty-pudding. The surface is covered all over with puffs of mud which, as they burst, give off a thud-like noise, and then the fine mud recedes from the center of the puffs in the most perfect series of rings to the side. The explosion is produced by the escape of sulphureted hydrogen gas through the mud.

No. 262. **THE GROTTO SPRING.** About two miles above the Crater Hills, on the west side of the Yellowstone. A column of steam issuing from a cave on the side of the hill, with an opening of about five feet in diameter, readily locates its position. The roaring of the waters in the cave, and the noise of the waves as they surge up to the mouth of the opening, are like that of the billows lashing the sea-shore. The water is as clear as crystal, and the steam is so hot that it is only when a breeze wafts it aside for a moment, that one can venture to take a look into the opening.

No. 263. **CRATER OF THE MUD GEYSER.**

No. 264. **MUD GEYSER IN ACTION.** The only true mud geyser discovered, eight miles below Yellowstone Lake. It has a funnel-shaped orifice in the center of a basin 150 feet in diameter, and in which there are two other hot mud springs.

The flow of the geyser is regular every six hours, the eruptions lasting about fifteen minutes. The thick, muddy water rises gradually in the crater, commencing to boil about half way to the surface, and occasionally breaking forth with great violence. When the crater is filled it is expelled from it in a splashing, scattered mass ten feet in diameter to forty feet in height. The mud is a dark lead-color, and deposits itself thickly all about the rim of the crater.

No. 265. **A MUD SPRING** on the opposite side of the river, and of the same nature as No. 261.

No. 266. **YELLOWSTONE RIVER** where it leaves the lake, looking down from the same stand point as the following.

Nos. 267, 268. **YELLOWSTONE LAKE**, looking south from where the river leaves it, and showing the larger portion, or the body, of the lake. It is some twenty-two miles long, from north to south, and about ten or fifteen miles in width, from east to west, with an elevation of 7,427 feet above tide-water.

In shape it is aptly compared to the human hand; the northern portion would constitute the palm, while the southern arms might represent the fingers. Careful soundings gave the greatest depth at 300 feet. When calm, the waters reflect the sky in the most delicate and beautiful ultramarine hues, but when stormy, and lashed by the strong winds of this high altitude, it resembles in its white-capped breakers and heavy rolling surf some of our larger inland seas. The lake is plentifully stocked with salmon-trout, their numbers being almost incredible, and will average two pounds in weight.

No. 268. **FIRST CAMP OF THE SURVEY**, upon the banks of the lake, at the mouth of Bridge Creek, and just opposite Stevenson's Island.

Nos. 269-272. **CAMP OF THE SURVEY** and of their escort, upon the large southwest arm of the lake.

No. 273. **THE ANNA**, the first boat ever launched upon the lake. Its frame-work was brought up from Fort Ellis and then put together, and covered with tar-soaked canvas. A tent-fly made the sail. In it two adventurous members of the survey visited every arm and nook of the lake, and made all the soundings. It is so named in compliment to Miss Anna Dawes, a daughter of the distinguished statesman whose generous sympathy and aid have done so much toward securing these results.

No. 274. **A VIEW ALONG THE SOUTHWEST ARM OF THE LAKE**, looking north from the camp. The shore is covered to a considera-

ble thickness with the disintegrated silica deposited from the flowing hot springs, so that in walking over it, it seems like treading on the broken fragments of washed shells along the sea-shore.

- No. 275. A HOT SPRING CONE, entirely surrounded by the clear cold water of the lake. In the center is the spring of boiling water. One may stand on it, extend his rod into the lake, catch the trout, and cook them in the boiling spring, without removing them from the hook. It is six feet in diameter at the water's edge.
- No. 276. A GROUP OF HOT-SPRING BASINS in the same vicinity. Their great beauty lies almost wholly in the exquisite color they possess, and of which no pen can convey any adequate idea.
- No. 277. MUD PUFFS. A thick boiling and bubbling mass of reddish mud. These mud springs lie all about the camp, (Nos. 268-272,) and their constant thud is heard night and day, as the hot steam struggles up from below, and exploding scatters the mud in every direction.
- Nos. 278-282. YELLOWSTONE LAKE, a bird's-eye panoramic view, in five sections, taken from the high hills on the east side of the southeast arm, near where the Uppér Yellowstone empties into the lake. The first view looks south, and shows the high range that separates the waters of the Yellowstone from those of Wind River. The second view includes the Upper Yellowstone and the bay in which it empties. The third and fourth are looking east and northeastly across the southern arms of the lake and Promontory Point to the distant mountains on the farther side. No. 5, or the last of the series, is a view south, past Promontory Point, into the large open space of the lake, where it fades away into the horizon.
- Nos. 283, 284. MOUNTS DOANE AND STEVENSON. The first 10,118 feet above the sea, and the other but a few feet lower, situated some six or eight miles east of the southeast arm of the lake. They are the fragments of the rim of an immense crater.
- Nos. 285, 286, 287. VIEWS LOOKING UP THE SOUTHEAST ARM, with Promontory Point in the center, the waters of the bay extending far away into the distance. In the foreground on the left the basalts are shown, especially in No. 287, where detached masses of breccia extend out into the lake.
- No. 288. EARTHQUAKE CAMP, near Steamy Point, east side of Yellowstone Lake, so named from several slight shocks of earthquake, which were experienced at this place on the night of the 19th of August, 1871.
- No. 289. MARY'S BAY, east shore of Yellowstone Lake, showing one of the numerous beautiful curves (as perfect as if drawn by the hand of art) of the shore-line.
- No. 290. STEAMY POINT, east shore of the lake, near its outlet. Numerous steam-vents abound here, which are in operation constantly, sending off steam with a noise like that of the escape-pipe of a steamboat.
- No. 291. PELICAN'S ROOST, near Steamy Point. A detached mass of the hot spring deposit, which has been cut off from the mainland by the action of the waves, and left in the lake one hundred feet from the shore.
- No. 292. SMALL SOUTHWESTERN ARM OF THE LAKE, at the foot of Flat Mountain.

- No. 293. **THE HIDDEN LAKE**, within a quarter of a mile of Yellowstone Lake, and near the camp in No. 269. It is about a mile in length, entirely hidden among the dense pines, and might easily escape notice.

#### THE UPPER GEYSER BASIN.

- On Fire Hole River, a tributary of, and sometimes called, the Madison, are the principal ones of the famed spouting geysers. Our time being very limited indeed, we only have a few views of the craters of the most noted geysers. For a more extended list, see catalogue for 1872.
- No. 294. **CRATER OF THE CASTLE GEYSER**. Bearing a strong resemblance to an old castle, but of the purest white marble. This view, taken from the side opposite the river, shows the main portion to be composed of very thin laminae of silica.
- No. 295. **CRATER OF CASTLE GEYSER**. A view from the river side. Here we see the peculiar crystallization of the silica in large globular masses, like spongiform corals, and running off into the usual exquisite bead-work to the laminated base. The entire mound is about forty feet in height. On the right, close to its base, is a small but very active and turbulent little geyser, probably an offshoot from the greater one. In the center of the view, and the most striking object in it, is the beautiful hot spring, with elegantly carved border and water of the clearest turquoise blue. It is nearly circular, about twenty-five feet in diameter, and funnel-shaped, passing down to a depth of sixty feet in the center. The water is of almost unnatural clearness, and the varying depth gives a most beautiful gradation of color. It has a constant temperature of 172 degrees.
- No. 296. **CRATER OF THE GIANT**, located about a quarter of a mile below the Castle. It is about ten feet in diameter at its base and twelve in height, with an orifice of about three feet in diameter. It projects a column of water to a height of from 125 to 150 feet, the eruptions lasting about two hours.
- No. 297. **CRATER OF THE GROTTO**, a few rods below the Giant, and ensconced in a grove of trees. It differs externally from all the other craters, but, like them, consists of a mass of silicious sinter, twelve feet in diameter and five feet high, full of large sinuous orifices, from which the water is projected during an eruption.
- No. 298. **THE GROTTO IN ERUPTION**, throwing an immense body of water, but not more than forty feet in height. The great amount of steam given off almost entirely conceals the jets of water.
- No. 299. **CAMP UPON THE SUMMIT OF THE DIVIDE**, between the head of the East Fork and the main Yellowstone, by the side of a little lake, 8,500 feet above the sea.
- No. 300. **ANOTHER VIEW** of the same lake.
- No. 301. **THE ODOMETER**, made by attaching a pair of shafts to the fore wheels of an ambulance, to the spokes of which were attached the instruments that recorded their revolutions, and measured the surface of the country over which we passed. These were the first wheels that were ever taken into this little-known region.

- No. 302. OUR HUNTERS, José and Joe Clark, returning from a successful hunt, with pack-animal laden with elk meat.
- No. 303. THE UNITED STATES GEOLOGICAL SURVEY, with pack-train, *en route* upon the trail between the Yellowstone and the East Fork, showing the manner in which all parties traverse these wilds.
- No. 304. AN ELK, *Cervus Canadensis*. Very abundant about the lake. The one shown in the view is two years old, with horns still in the velvet.
- Nos. 305, 306, 307. THE CONE OF AN EXTINCT HOT SPRING OR GEYSER upon the East Fork of the Yellowstone. A very curious mammiform mound, of about forty feet in height, built up by overlapping layers like the Cap of Liberty, on Gardiner's River. The material is principally calcareous. No water issues from the cone at the present time, and none of the springs in the immediate vicinity are above the ordinary temperature of brook-water.
- No. 308. POINT OF ROCKS, on the Beaver Head River, on the line of the Ogden and Helena overland-stage road. The rocks are a carboniferous limestone, with a dip of twenty-three degrees to the southeast. The Beaver Head cuts a narrow channel through it, forming a small cañon.
- No. 309. BEAVER HEAD ROCKS, at the mouth of the cañon of the same name, looking down the cañon from above. The river forces itself through a narrow gateway, with vertical walls of dark purplish basalt. The rocks on either side present the forms of animals couchant, which, in the imagination of the Indians, bear a resemblance to the beaver; hence the name, which is applied to the river as well as the cañon.
- No. 310. A HIGH BLUFF OF LIMESTONE, upon the west bank of the river.
- No. 311. AN OUTBURST OF IGNEOUS MATERIAL, about five miles above the entrance to the cañon. It has assumed the nearly columnar form of basalt, and is weathered into sharp pinnacles.
- No. 312. CAMP AT FORT HALL. (See No. 177.)
- No. 313. CAMP, twenty-five miles south of Fort Hall, at Three Springs.
- No. 314. SODA SPRINGS ON BEAR RIVER. At the Big Bend of Bear River are located the most interesting group of soda springs known on the continent, occupying an area of about six square miles. They are now few in number, and simply the remnants of former greatness. On the opposite side of the river, in the above view, are the steam-vents, to which Frémont gave the name of Steamboat Springs, from the noise they make like a low-pressure engine. Near by is a spring, with an orifice brightly stained with a brilliant yellow coating of oxide of iron, from which the water is thrown up two feet by a succession of impulses.
- No. 315. HOOPER'S SPRING, of the same nature as the others in the vicinity, but with a more copious escape of carbonic-acid gas, and is a favorite with those seeking these health-giving waters.
- Nos. 316, 317. EXTINCT SODA SPRING BASIN. About three miles up the valley of a small tributary of the Bear River we come to a most remarkable formation, consisting of the basins of old springs long extinct. They are called the "petrifying springs" by the settlers, from the abundance of calcareous tufa which exists in the basins. Some of them are six feet

in depth, and contain large masses of plants coated with a calcareous material, which retains perfectly the form of the leaf and stem.

- Nos. 318, 319, 320. BEAR LAKE, about half-way between Soda Springs and Evanston, ten miles in length, and from five to eight in breadth. The boundary-line between Idaho and Utah passes directly across the lake from east to west. It is a beautiful lake, set like an emerald among the mountains, and not even the Yellowstone presents such exquisite coloring. The elevation is 5,911 feet.
- Nos. 320, 321. EVANSTON COAL-MINES, about a mile from the town of the same name, on the Union Pacific Railroad. These beds are the largest and most extensively worked in the West. The vein is from twenty-two to twenty-three feet in thickness, cropping out upon the side of the mountains, with a dip of ten degrees north of east.
- Nos. 323 to 364. PORTRAITS AND VIEWS of the habitations of the Indians, a description of which will be found in another portion of this catalogue.

#### STEREOSCOPIC VIEWS.

- No. 380. OGDEN CAÑON.  
 No. 381. OGDEN CAÑON, near mouth.  
 No. 382. OGDEN CAÑON, near mouth.  
 No. 383. OGDEN CAÑON, near mouth.  
 No. 384. CAMP ON WARM CREEK, head of Cache Valley.  
 No. 385. PORTNEUF CAÑON.  
 No. 386. SNAKE RIVER BRIDGE.  
 No. 387. SNAKE RIVER BRIDGE.  
 No. 388. SNAKE RIVER BRIDGE.  
 No. 389. POT-HOLES IN BASALTIC ROCKS.  
 Nos. 390-394. WILD-CAT CAÑON, Mont.  
 Nos. 395-397. DEVIL'S PASSWAY, Mont.  
 No. 398. CAMP ON THE STINKING WATER.  
 Nos. 399-401. HYDRAULIC MINING, near Virginia City, Mont.  
 No. 402. CHINAMEN SLUICING.  
 No. 403. "PANNING OUT."  
 No. 404. "CRADLING."  
 No. 405. MADISON BRIDGE.  
 Nos. 410-413. CAÑON SOUTH OF MYSTIC LAKE.  
 No. 414. THE MISSION, or Crow agency.  
 No. 415. CAMP OF NEZ PERCÉ INDIANS.  
 Nos. 416-418. LODGES OF NEZ PERCÉ INDIANS.  
 No. 419. YELLOWSTONE VALLEY, six miles above Boteler's.  
 Nos. 420-422. VIEWS IN THE LOWER CAÑON.  
 No. 423. A SUCCESSFUL FISHERMAN.  
 Nos. 424-429. DEVIL'S SLIDE, or Cinnabar Mountain.  
 Nos. 430-431. LOWER BASINS, Soda Springs, Gardiner's River.  
 Nos. 432-434. UPPER BASINS.  
 No. 435. GENERAL VIEW of Upper Basins on Gardiner's River.  
 No. 436. CAP OF LIBERTY, on Gardiner's River.  
 No. 437. LOWER FALLS, on Gardiner's River.  
 No. 438. COLUMN ROCKS.  
 Nos. 439, 440. THE LOWER FALLS OF THE YELLOWSTONE.  
 No. 441. THE LOWER FALLS OF THE YELLOWSTONE, east side.

- No. 442. THE UPPER FALLS OF THE YELLOWSTONE.  
 No. 443. THE UPPER FALLS OF THE YELLOWSTONE, distant view.  
 No. 444. THE UPPER FALLS OF THE YELLOWSTONE, near view.  
 Nos. 445-447. GRAND CAÑON OF THE YELLOWSTONE.  
 Nos. 448-450. GRAND CAÑON OF THE YELLOWSTONE, from east side.  
 No. 451. CRYSTAL FALLS, Cascade Creek.  
 Nos. 452-454. RAPIDS ABOVE THE UPPER FALLS.  
 No. 455. MARY'S BAY, Yellowstone Lake.  
 No. 456. SAIL-BOAT ANNA, on the Lake.  
 No. 457. SOUTHEAST ARM OF LAKE.  
 Nos. 458, 459. CASTLE GEYSER, Fire Hole River.  
 No. 460. GIANT GEYSER, Fire Hole River.  
 No. 461. GROTTO GEYSER, Fire Hole River.  
 No. 462. THE ODOMETER.  
 No. 463. OUR HUNTERS.  
 No. 464. CAMP BY LAKE IN THE WOODS.  
 Nos. 465, 466. EXTINCT GEYSER, East Fork.  
 No. 467. AN ELK.  
 No. 468. BEAVER HEAD ROCK.  
 No. 469. BEAVER HEAD CAÑON.  
 Nos. 470, 471. PAWNEE AGENCY, Nebr.  
 No. 472. PAWNEE SCHOOL-HOUSE, Nebr.  
 No. 473. OMAHA INDIAN AGENCY.  
 No. 474. OMAHA INDIAN VILLAGE.  
 Nos. 475-477. OMAHA INDIAN CHILDREN.  
 No. 478. STANDING HAWK AND SQUAW.  
 No. 479. BLACKBIRD HILL, OMAHA RESERVE.  
 Nos. 480, 481. HELENA, Mont.  
 Nos. 482, 483. BIRD-TAIL ROCK, Mont.  
 Nos. 484, 485. UNION MILLS, Mont.  
 Nos. 486, 487. MINING-FLUME, in Montana.

## 1872 SERIES.

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Before the whole party had gathered together in the rendezvous camp at Ogden, Utah, two side trips for views were made by the photographers—one along the foot-hills of Colorado, as far south as Pike's Peak, and the other to Cottonwood Cañon, south of Salt Lake City. Starting from Ogden the 24th of June, we have views of the route through Malade Valley, and Portneuf Cañon to Fort Hall, Idaho. The Great Teton Range, near the head of Snake River, was reached in the latter part of July, and worked up in detail during a lay-over of ten days.

The geyser basins on the head of the Madison were reached via Henry's Lake and Tyghee Pass, and the result of a week's sojourn is a large series of exceedingly interesting views of that remarkable region. The falls, cañon, and mammoth hot springs of the Yellowstone were then re-visited for the purpose of extending and perfecting our series. The grand and beautiful scenery of the Gallatin Mountains and the West Gallatin River were next worked up, presenting to the world for the first time some of the finest and most picturesque views in the Rocky Mountains.

The work of this season includes forty-five,  $11 \times 14$  views, the very first plates of this size ever made in the Rocky Mountains, one hundred and sixty,  $8 \times 10$ , and one hundred and forty-five stereoscopic.

With but very few exceptions the following, as also the preceding views, are the first ever made of the different subjects:

$11 \times 14$ .

- No. 1. CAMP OF THE UNITED STATES GEOLOGICAL SURVEY, at Ogden, Utah. (See No. 166.)
- No. 2. GROUP OF THE MEMBERS OF THE SURVEY at the camp at Ogden.
- No. 3. CAMP OF THE SURVEY AT FORT HALL, Idaho. (See Nos. 177 and 312.) At this point the wagons, and all extra baggage were left behind, and the remainder of the journey effected with pack-animals.
- No. 4. GROUP. Headquarters tent, of the Snake River division.
- No. 5. MOUNT HAYDEN, OR THE GREAT TETON. The highest peak in the Great Teton Range, near the head-waters of Snake River, and lying upon the boundary between Idaho and Wyoming. It has an elevation of 13,833 feet above the sea, about 6,000 feet above the cañon shown in the view at the foot of the peak, and over 7,000 feet above Jackson's Lake, which stands under it on the opposite side. Our view is from the east, looking directly west. Although not the highest, it is the grandest and most alpine-like peak in the West. No others can show such abrupt angles and bold outlines, where snow even can rest only in small patches on the ledges. It gathers, however, in great masses in the bottom of the great cañon at our feet, 2,000 feet below. So far as known, it was ascended for the first time by Messrs. Stevenson and Langford, on the 29th of July, 1872. A full account of the exploit occurs in Scribner's Monthly for June, 1873.



- No. 6. THE THREE TETONS, upright, including a narrow angle of view.
- No. 7. THE THREE TETONS, oblong, including a wide angle of view.
- Views from one of the summits of the limestone ridges which form the western foot-hills of the Teton Range, and at an elevation of 11,500 feet. This is the average height of the range, only the grand peaks in the distance rising above it. We look directly east over a broad, snow-covered plateau four miles wide, and just at the foot of the Tetons is the Grand Cañon, 2,000 feet below the surface. No. 5 was made from the other side of the small butte that lies directly under the Middle Teton.
- Nos. 8, 9. PANORAMIC VIEW IN THE TETON RANGE, looking east and south, including a view of about 120 degrees. No. 8 is the same as No. 7. No. 9 looks south over the West Teton River, and up its right-hand fork. On the right-hand side of the cañon is an exposure of over 2,000 feet of limestone, very nearly perpendicular. The distance rolls away into the perpetually snow-covered plateau of the Summit Range.
- Nos. 10, 11. CAMP AT THE FOOT OF THE THREE TETONS, in the Teton Basin, and ten miles in a direct line from them. Elevation of camp, 6,646 feet, Mount Hayden, the highest Teton, rising 7,187 feet above it.
- No. 12. GROUP OF ALL THE MEMBERS OF THE UNITED STATES GEOLOGICAL SURVEY. A simultaneous meeting of all of the divisions on the 15th of August, including sixty-two persons in all.
- No. 13. UPPER FIRE HOLE BASIN, from the crater of Old Faithful, a general view, looking down. In the middle distance is the Grand Geysir in eruption, and at the left is the Castle. Within the scope of this view are all of the largest and most active geysers. (See No. 439, page 44.)
- No. 14. CRATER OF THE CASTLE GEYSER and the Beautiful Hot Spring. Upon the west side and midway in the Upper Basin. A castle-like form, built up to a height of forty feet by the deposition of the silica held in solution in the hot waters of the geyser. The eruptions are of long duration, lasting sometimes two and three hours, attaining a height of one hundred to one hundred and fifty feet.
- The circular hot spring in the foreground is about twenty-five feet in diameter, funnel-shaped to a depth of forty-feet, with a beautifully-scalloped border, one foot in height, and most delicately tinted in red and yellow, upon a white ground. The water is of a most perfect cerulean blue, shaded from an almost black center to lighter and more delicate hues in the more shallow portions. (See No. 295, page 32.)
- No. 15. CRATER OF THE GROTTO GEYSER, situated near the lower end of the Upper Basin. An irregular mound, full of sinuous orifices, from which the water is projected in all directions during eruptions. The eruptions are quite numerous, going off nearly every three hours, each one lasting about fifteen minutes. (See also Nos. 297 and 298, page 32.)
- No. 16. CRATER OF THE ARCHITECTURAL GEYSER, in the Lower Basin, showing the central portion only, of a total width of about sixty feet. The circular orifice from which the geyser issues is about twelve feet in diameter. It is constantly boiling,

with irregular periods of eruption, throwing to a height of one hundred feet.

- No. 17. **THE UPPER FALLS OF THE YELLOWSTONE**, one-half mile above the Lower Falls, and photographed from a point nearly over it, at a height of 500 feet above the river. Height, 140 feet. (See No. 245, page 28.)
- No. 18. **THE LOWER FALLS OF THE YELLOWSTONE**, 397 feet in height; width of river at the brink, 100 feet. Photographed from a point one-fourth of a mile below the falls, and 300 feet above the bottom of the cañon. The perpendicular walls about the falls form the upper end of the Grand Cañon. (See No. 239, page 28.)
- No. 19. **THE LOWER FALLS OF THE YELLOWSTONE**. Distant view, from the top of the cañon, bringing in the brilliantly-colored and castellated walls of the cañon. (See No. 242, page 28.)
- No. 20. **THE GRAND CAÑON OF THE YELLOWSTONE**, from a point directly over the Lower Falls and looking down. At this point the cañon has an average depth of about 1,500 feet, and of about the same width at the surface. The view embraces nearly one mile of its length. (See No. 248, page 29.)
- No. 21. **THE GRAND CAÑON**, same as above, but the shape of the view is oblong instead of upright, embracing a very little wider angle of view.
- No. 22. **THE GRAND CAÑON OF THE YELLOWSTONE**, from a point one mile below the falls. The walls are much more abrupt and the cañon 500 feet deeper than the preceding.
- No. 23. **TOWER FALLS**, on Tower Creek, a small tributary of the Yellowstone, fifteen miles below the falls and about 500 yards above the junction of the streams. They are 132 feet in height, emerging from between great towers of closely cemented breccia, that extend far up its cañon toward its source in Mount Washburn. (See No. 233, page 27.)
- No. 24, 25, 26, 27. **THE TERRACES AND BASINS OF THE MAMMOTH HOT SPRINGS**, on Gardiner's River. The first is a profile view from below, the next two bird's-eye views from above, and the last a more extended view of one of the slopes. These springs cover an area of about four square miles, on the right-hand side of Gardiner's River, some three miles above its junction with the Yellowstone. The temperature of the principal springs varies from 120° to the boiling-point, and they hold in solution a large amount of calcareous matter, which has been deposited to a depth of many hundred feet. Upon the slopes the deposit takes the form of beautifully-scalloped basins filled with water of varying temperature, according to their remoteness from their source. The oxidation of the mineral substances contained in the water has stained the basins to every conceivable shade of red and yellow, forming rich contrasts to the vivid greens and blues of the waters. (See Nos. 215 to 225, page 26.)
- No. 28. **THE CAP OF LIBERTY**, Mammoth Hot Springs. A calcareous mound, forty-five feet in height, from the apex of which at one time issued a hot spring, building up and growing higher, until finally it closed itself up and died out, there not being sufficient force to impel the water to a greater height. (See No. 227, page 27.)
- Nos. 29, 30, 31. **THE LOWER YELLOWSTONE VALLEY**, a panoramic view looking south from the First Cañon. On the left is the Yel-

- lowstone Snowy Range, extending to Emigrant Peak, thirty miles away; then comes the broad park-like valley, six miles wide by thirty long, through the center of which flows the Yellowstone River. (See No. 200, page 25.)
- No. 32. **BRIDGER MOUNTAIN**, Mont. Elevation, 9,000 feet above the sea, and 4,000 feet above Fort Ellis, distant some three miles south.
- No. 33. **NEEDLE ROCK** in Bridger Cañon—southern base of Bridger Mountain. A detached mass of beautifully stratified limestones, weathered into a sharp pinnacle, rising some two hundred feet above the bed of the creek.
- Nos. 34, 35. **MYSTIC LAKE**, Mont. In the mountains about the head of the East Gallatin River, twelve miles south of Fort Ellis. As it is well stocked with most excellent trout, it is quite a pleasure resort, despite the difficulties to encounter in reaching it. (See No. 197, page 25.)
- No. 36. **CAMP ON MYSTIC LAKE**.
- No. 37. **PALACE BUTTE PARK**, near the head of Middle Creek. A most romantic little spot, in the very heart of the Gallatin Mountains, distant about twenty-five miles southwest from Fort Ellis. Palace Butte, in the distance, rises nearly 3,000 feet above the valley.
- No. 38. **PALACE BUTTE**, one of the spurs of Mount Blackmore, Mont., which has an elevation of 10,134 feet, and this portion of it rises abruptly nearly 3,000 feet above the valley at its foot.
- No. 39. **ARCHED FALLS**, on Middle Creek, just above Palace Butte. The fall makes two leaps of about fifteen feet each, over the lower of which springs a natural arch, worn out of the solid basaltic rock.
- No. 40. **FALLS ON MIDDLE CREEK**, about one mile above Palace Butte Park.
- No. 41. **THE CASCADE**, near the sources of Middle Creek. But a short distance above, lie the perpetual snows that feed the stream. Reaching the brink, the waters are first hurried down a sharp descent of five hundred feet, (the portion included in the above view,) and then descend in a long series of falls and cascades to the park-like little valley below.
- No. 42. **HEAD OF MIDDLE CREEK**. The large amphitheater filled with perpetual snows, from which the creek is fed. The crest is the divide between the waters of the East and the West Gallatin.
- No. 43. **PALISADES ON THE WEST GALLATIN RIVER**. Gallatin Cañon has a total length of about forty miles, the lower portion of which is extremely wild and rugged in its characteristics. On the eastern side rise these majestic walls and pinnacles to a height of 2,000 feet.
- No. 44. **TRAIL IN WEST GALLATIN CAÑON**, through the dense timber or forest growth, which has in some places obtained a footing among the immense masses of debris that has fallen down from the walls of the cañon.
- No. 45. **TRAIL OVER THE ROCKS**, in West Gallatin Cañon. At the foot of the Palisades the trail is forced to the brink of the river, and over huge granite boulders, for a distance of about a half-mile, forming the most difficult and dangerous traveling the pack and saddle animals have to encounter. The river at this point is but a long series of rapids, averaging twenty-five feet in width and ten in depth.

- Nos. 365, 366. GATEWAY, GARDEN OF THE GODS, Col., within three or four miles of Colorado City. A great wall of sandstone running up to 350 feet in height, through the center of which is a natural gateway of some 200 feet in width. The views are from opposite sides; in the first we have a glimpse of Pike's Peak, in the distance.
- Nos. 367. CATHEDRAL ROCK, GARDEN OF THE GODS, Col., an end view of the great wall in which is the gateway.
- No. 368. CATHEDRAL SPIRES, in the Garden of the Gods, a detached mass of spires and pinnacles, carved out of the prevailing red sandstone which has here been uplifted perpendicularly. The tallest spire is about 150 feet.
- No. 369. LOOKING SOUTH from the Garden of the Gods, toward Cheyenne Mountain, an outlying spur, east of Pike's Peak.
- No. 370. NEEDLE ROCK, Glen Eyrie, about one mile above the Garden of the Gods. Our view is a monolith, some 200 feet in height, and 20 feet in diameter at the base. In the same neighborhood are many other examples of the same peculiar weathering.
- No. 371. GLEN EYRIE, a picturesque gorge through which Camp Creek cuts its way to its junction with Fountain Creek, at Colorado City.
- Nos. 372, 373. GOLDEN CITY, COL. View from the foot-hills west of the city, looking east over the broad basaltic tables, flanking Clear Creek upon either side.
- Nos. 374, 379. CLEAR CREEK CAÑON. The route of the Colorado Central Narrow-Gauge Railroad to Black Hawk and Georgetown. One of the grandest and most picturesque cañons of the many which cut the Foot Hill Range at right angles. The views extend up the cañon about eight miles, that being the end of grading at the time they were made.
- Nos. 380, 381. CAÑON CASCADE in Waterfall Cañon, near Ogden, Utah, a cascade of some 300 feet, running down over beautifully stratified white quartzites. Above it rises Ogden Mountain to a height of 9,716 feet.
- No. 382. OGDEN, UTAH. From the same stand-point from which the preceding view was made, looking down into Salt Lake Valley over Ogden, distant about three miles, to Salt Lake and Promontory Point in the extreme distance.
- No. 383. LOOKING NORTH from the table-land back of Ogden, showing the spur of the Wasatch Mountains, under which lie the Hot Springs.
- Nos. 384, 385. HEAD OF LITTLE COTTONWOOD CAÑON, looking up from Central City. The cañon is about ten miles in length, rising in the very summit of the Wasatch Mountains, and comes out upon Salt Lake Valley seventeen miles south of Salt Lake City. It is noted as a mining region, there being some of the richest silver mines in the West located upon the sides of these mountains. The little mining towns included in the views have an elevation of over 10,000 feet, and snow lies in their streets until long into summer. These views were made June 20th, yet the snow lies so thickly as to render the roads nearly impassible.
- No. 386. LOOKING DOWN LITTLE COTTONWOOD CAÑON from Cen-

tral. It is from the precipitous sides of the cañon, as shown on the left, that the frequent avalanches or snow-slides occur, with such fatal results to those who may be caught by them.

- No. 387. **GRANITE PEAK, LITTLE COTTONWOOD CAÑON**, about half way down. It rises nearly 3,000 feet above the creek at its foot, and is a solid mass of the beautiful granite characteristic of the cañon.
- No. 388. **QUARRYING GRANITE** in Cottonwood Cañon, seventeen miles south of Salt Lake City, for the Mormon Tabernacle. The ground is completely strewn with immense boulders and detached masses of granite, which have fallen down from the walls of the cañon on either side, some of which are from thirty to forty feet square. All the quarrying is confined to splitting up these blocks.
- Nos. 389, 390. **VIEW OF THE WASATCH MOUNTAINS** from the Twin Peaks to the spur that separates Salt Lake from Utah Lake. The Twin Peaks fall but a little short of being the highest in the range, being not far from 12,000 feet above the sea.
- No. 391. **TWO YOUNG CINNAMON BEARS**, about two months old, captured in the mountains near Ogden.
- No. 392. **POINT OF THE MOUNTAIN**, ten miles north of Salt Lake City, near the Hot Sulphur Springs.
- No. 393. **WILLARD CAÑON**, in the above spur of the Wasatch Mountains.
- No. 394. **WILLARD CITY**, fifteen miles north from Salt Lake, a Mormon village of some 900 souls. Over the village a glimpse of Bear River Bay, of Salt Lake, is had.
- No. 395. **BEAR RIVER HOTEL AND BRIDGE**, the crossing, on the line of the old stage-line from Ogden to Montana.
- Nos. 396, 397. **PANORAMIC VIEW OF MALADE**, Utah, from the bluffs back of the town, looking south down the valley; a Mormon settlement of about 1,200 inhabitants.
- Nos. 398, 399. **PORTNEUF CAÑON**, Idaho, looking down from the great bend, about midway in the cañon. (See No. 175, page 23.)
- Nos. 400, 401. **PORTNEUF CAÑON**, looking up from same stand-point.
- No. 402. **PORTNEUF MOUNTAINS**, lying to the east of the cañon. They are covered with a thick mantle of snow, which fell during the night of the 2d of July.
- No. 403. **CRATER BUTTES**, or extinct volcanoes, on Henry's Fork, near its junction with Snake River. They are prominent landmarks for many miles along the line of the stage-road. The larger one of the two, as shown in one view, rises about 500 feet above the plain, upon a base about one and a half miles in diameter. Its crater is about half a mile in diameter, and one hundred and fifty feet deep.
- No. 404. **KENILWORTH CASTLE**, a mass of volcanic sandstone, lying near the base of the butte, that has been washed away to its present form; is about fifty feet high and one hundred long.
- No. 405. **A GROUP OF COTTONWOODS** on the middle fork of the Teton River, in the Teton Basin.
- No. 406. **PERMANENT CAMP OF THE SURVEY** during the exploration of the Teton Range, situated at the foot of the main cañon that comes down from the Three Tetons, and distant in an air line about ten miles from them. Elevation of camp, 6,646 feet.
- Nos. 407, 408. **A PANORAMIC VIEW IN THE TETON RANGE**, from a point

about seven miles west of them, including an angle of about  $90^{\circ}$ . Elevation of stand-point, about 10,000 feet, and of the highest Teton, 13,833 feet. (See the series 410 to 414.)

- No. 409. **THE THREE TETONS**, from a prominent stand-point, looking across the left-hand cañon of West Teton River and over the broad snow-covered plateau, extending up to the foot of the Tetons. The views Nos. 415 to 419 were made from under the other side of the small butte that lies directly under the middle peak.
- Nos. 410-414. **A COMPLETE PANORAMIC VIEW**, in five sections, sweeping the whole horizon from a stand-point having an elevation of nearly 11,000 feet. The Tetons occupy the first view, and the others sweep around and join it on the left. From their great elevation, and their abrupt, pointed outlines, visible in all directions from great distances, they have long been noted land-marks for travelers. They are described for the first time in Irving's Astoria, as the Pilot Knobs. Only three peaks are seen from a distance, but there are really a score, grand in themselves, were they not overshadowed and hidden by their more majestic neighbors. To the south and southeast we look over great cañons and broad, snow-covered plateau mountain tops, to nameless and numberless peaks in the dim distance. To the north are long serrated mountain ridges, rugged, bare, and snow-streaked. To the west are two great snow-covered sentinels, and beyond them the great plane of the Snake River. All these views were taken about August 1, when there was the least quantity of snow in the year.
- No. 415. **VIEW IN THE TETON RANGE**, looking west from a point about three miles from the Tetons, and from the edge of the great cañon that separates them from the abutting quartzites.
- No. 416. **VIEW LOOKING NORTH** to the sharply serrated peaks lying north of the Great Cañon.
- No. 417. **VIEW LOOKING SOUTH** across the great snow-covered plateau, thickly scattered over with rugged and precipitous mountain peaks.
- No. 418. **VIEW SOUTHEAST**. A continuation to the left of the preceding view, showing the two lesser Tetons and the head of the Great Cañon. In the foreground is the edge of the precipice, that drops down perpendicularly 2,000 feet to the cañon below.
- No. 419. **MOUNT HAYDEN**, or the Great Teton, the highest of the Three Tetons, having an elevation of 13,833 feet above the sea. It is nearly 6,000 feet above the bottom of the Great Cañon, as shown in the view, and over 7,000 feet above Jackson's Lake, on the opposite side. Immediately in front is the Great Cañon, sweeping around to the north and east, showing the full depth of over 2,000 feet. On the 29th of July, 1872, Messrs. Stevenson and Langford succeeded in reaching its summit, after a series of most thrilling adventures and hair-breadth escapes; and as they were, in all probability, the only white men who ever accomplished the ascent, claimed the right to name the mountain.
- No. 420. **A VIEW LOOKING DOWN THE SOUTH FORK OF TETON RIVER**, three miles above the junction.

- No. 421. **CAMP AMONG THE PINES**, at the forks of West Teton River, of the photographers of the survey.
- No. 422. **MOOSE CAMP** of the photographers, in the Teton Cañon, three miles above its mouth. So named from the killing of three moose close by. One of the small ones is hanging by the tent.
- No. 423. **PHOTOGRAPHING IN HIGH PLACES**. A common experience among the Tetons. The series included in Nos. 410 to 414 were taken from this point.
- No. 424. **CAMP OF THE SURVEY**, upon Middle Fork. Second day from the Tetons, going north.
- Nos. 425, 426. **HENRY'S LAKE**, Idaho, a shallow body of water, about three by two miles in diameter, and full of small, scattered islands, and the source of Henry's Fork. It is also well stocked with most excellent trout. At this point are four remarkable passes through the range, Tyghee and Red Rock, on the east and west; Raynolds, or the Madison, on the north; and Henry's Lake, on the south. Elevation of lake, 6,492 feet; Tyghee Pass, 7,063 feet; Red Rock Pass, 7,271 feet; Raynolds, 6,911 feet. The view is taken from the north, looking south, over Sawtell's ranch.
- Nos. 427-430. **PANORAMIC VIEW OF HENRY'S LAKE**, from a point on the east side, between Raynolds and Tyghee Passes, embracing a view from Raynolds Pass, on the right, past Red Rock and Henry's Lake Passes, to Tyghee on the left. In the center is Sawtell's Peak, a well-defined extinct volcano, 10,600 feet in height, with a crater 1,000 feet in depth, and one and a half miles across its longest diameter.
- No. 431. **SAWTELL'S RANCH**, at the northern end of Henry's Lake. Messrs. Sawtell and Wurtz, the pioneers of this region, have built themselves very comfortable quarters by the side of a very fine, large spring. They catch large quantities of fish from the lake, for which they find a ready market in Virginia City and the mining towns. Large game of all kinds is abundant.

**THE GEYSER BASINS ON FIRE HOLE RIVER.** (See page 32.)

- No. 432. **MUD PUFFS**, or Hot Mud Spring, in the Lower Geyser Basin, a mass of pure white boiling mud, sputtering at a lively rate, and throwing it out all around, forming the raised bank about it.
- No. 433. **CRATER OF THE ARCHITECTURAL GEYSER**, Lower Basin, at the upper end of a valley that extends up from the Fire Hole River.
- No. 434. **THE GREAT HOT SPRINGS**, midway between the Upper and Lower Basins, and on the west side of Fire Hole River, a vast accumulation of silicious matter, built up fifty feet above the river, upon the summit of which are three very large boiling springs, the largest being 250 feet in diameter.
- No. 435. **VIEW IN THE UPPER FIRE HOLE BASIN**, looking up the river. Upon either side are the high silicious banks, bordered with numerous hot springs and ornamental borderings. In the distance we get a glimpse of the Bee-Hive in eruption.
- No. 436. **VIEW LOOKING DOWN IN FIRE HOLE**, from same standpoint as above.

- No. 437. CRATER OF THE CASTLE GEYSER, near view, from between it and the Beautiful Hot Spring lying next the river.
- No. 438. BEAUTIFUL HOT SPRING and crater of the Castle, same as No. 295.
- No. 439. CRATER OF THE OLD FAITHFUL, at the upper end and southern end of the basin, so named from the regularity of its eruptions, occurring once an hour with but very slight variations. (For views of the eruptions, see stereoscopic series, Nos. 546, 547.) It has built up a mound about twenty feet in height, with some most beautiful cauliflower-like formations, exquisitely beaded, with thousands of pearls, and when wet after the eruptions each one glistens and sparkles like the real gem. The orifice is about three feet in diameter.
- Nos. 440, 441. OLD FAITHFUL IN ERUPTION; not as good as the stereoscopic views, but still giving a good idea of the force and grandeur of the up-lift to such great height (150 feet) of so large a body of hot-water.
- No. 442. CRATER OF THE BEE-HIVE GEYSER. On the opposite side of the river from the Castle and Old Faithful. A very symmetrical cone, about five feet in height and six feet in diameter at its base. It is most beautifully beaded all over its exterior surface with small pearl-like drops of silica. Its eruptions are of great force, throwing a stream fully two hundred feet in height, and holding it up with perfect steadiness for a period of from ten to fifteen minutes.
- No. 443. CRATER OF THE GIANTESSE GEYSER. It has a large, deep orifice, twenty by twenty-five feet in diameter, and when empty showing a depth of eighty feet. Our view represents it nearly full, just previous to an eruption. In 1870 its eruptions were recorded by Langford as being over 200 feet in height.
- No. 444. CRATER OF THE GRAND GEYSER. Nearly opposite the Castle, and so named from the great force and power it displays in its eruptions, varying from 150 to 250 feet in height. For a space of ten feet about the crater the surface is elegantly adorned with beautifully-scalloped little reservoirs, filled with the clear transparent waters from the geyser.
- Nos. 445, 446. A DISTANT VIEW OF THE CASTLE IN ERUPTION, from across the river, near the Giantess, about 750 yards distant. This eruption lasted fully two hours, and averaged 100 feet in height; it was accompanied with a loud rumbling noise, and shook the earth near by. In the foreground is one of the small hot springs, so numerous throughout the basin.
- No. 447. TURBAN GEYSER, adjoining the Grand, within a few feet, the ornamentations about them being identical. The eruptions are not very great, not more than twenty or thirty feet in height.
- No. 448. THE GROTTO, a near view of the crater, showing the beading and crystalline whiteness of the whole mass. (See Nos. 297, 298.)
- No. 449. HOT SPRING BASIN, similar to those in Nos. 295 and 445, but most beautifully scalloped and beaded. Is about five feet in diameter. Occasionally it overruns its basin, and then recedes to a considerable depth, but never ejecting its waters as violently as a geyser.

THE MAMMOTH HOT SPRINGS ON GARDINER'S RIVER. A



series of twelve negatives made by J. Chrissman, of Bozeman, Mont. They are fully described in Nos. 214 to 231 of the 1871 series. (Page 26.)

- Nos. 450, 451. GROUP OF LOWER BASINS, on the main terrace.
- Nos. 452-454. GROUP OF THE UPPER BASINS, on the same terrace.
- Nos. 455-457. GROUPS OF SMALL, FLOWING SPRINGS, and sulphur vents, back of the Great Central Hot Spring.
- No. 458. THE CAP OF LIBERTY. (See No. 227, page 27.)
- No. 459. FALLS ON THE RIGHT FORK OF GARDINER'S RIVER, in a deep, dark, almost impenetrable gorge, about two miles above the springs.
- Nos. 460, 461. FALLS ON THE LEFT FORK OF GARDINER'S RIVER, three miles above the springs, in a deep gorge, across the end of which runs a basaltic wall, over which tumbles the water in a cascade about eighty feet in height.
- No. 462. EMIGRANT PEAK, view from Boteler's ranch. (See No. 204, page 25.)
- No. 463. MOUNT BLACKMORE, Mont. Twenty-five miles south of Bozeman, lying in the heart of the Gallatin Range. William Blackmore, esq., a wealthy English gentleman, deeply interested in the prosperity of our institutions, accompanied by his estimable wife, came to Bozeman to accompany the survey as a guest, leaving her there until his return from the trip to the head of the Yellowstone. During his absence, she grew suddenly ill, and expired before he could reach her. In memory of this sad event, and also the high estimation in which Mr. Blackmore is held, this mountain has been named as above. Elevation, 10,600 feet.
- No. 464. BRIDGER MOUNTAIN, the southern spur of the Gallatin Mountains, overlooking the broad and fertile valley of the Gallatin. Elevation, 9,002 feet.
- Nos. 465, 466. BRIDGER CAÑON. Bridger Creek cuts down deep through beautifully-stratified limestones, exposing perfectly vertical walls on the northern side.
- Nos. 467, 468. THE NEEDLE, in Bridger Cañon. A detached mass of rock, weathered into a sharp pinnacle.
- No. 469. MAJOR PEASE'S RANCH, on the Yellowstone, three miles above the First Cañon. Large droves of cattle are herded here, and as the winters are comparatively mild, require but little care throughout the whole year.
- Nos. 470, 471. VALLEY OF THE YELLOWSTONE, looking south from the First Cañon, same as No. 200 of 1871 series, but from a higher standpoint.
- No. 472. MYSTIC LAKE, twelve miles south of Fort Ellis. (See 196.)
- No. 473. MYSTIC LAKE, looking up from the promontory extending out into the lake, about midway on the right-hand side.
- No. 474. MYSTIC LAKE, from same place, looking down toward the outlet.
- No. 475. PALACE BUTTE, on Middle Creek, near its source, one of the spurs of Mount Blackmore.
- No. 476. CAMP IN PALACE BUTTE PARK. Upon the head of Middle Creek, and about the southern base of Mount Blackmore, is some of the grandest and most picturesque scenery to be found in Montana. There are many little park-like vistas, interspersed with rugged cañon scenery, filled with cascades.
- No. 477. THE TWIN BUTTES, lying but a short distance above Palace

Butte, and rising up nearly 3,000 feet above the rugged cañon at their feet.

- No. 478. **ARCHED FALLS**, directly under the Twin Buttes. The creek abounds for nearly its whole length in falls, cascades, and rapids. The above is in a deep, dark gorge, flowing over a dike of basaltic rock, and under a natural archway thrown out from the top to the bottom of the fall; is about thirty feet in height.
- No. 479. **FALLS NEAR THE HEAD OF MIDDLE CREEK**, and at the foot of the long cascade, shown in No. 41 of the 11 x 14 series.
- No. 480. **VIEW IN MIDDLE CREEK CAÑON**, showing its southern face.
- No. 481. **VIEW DOWN MIDDLE CREEK CAÑON** from same stand-point.
- No. 482. **HEAD OF MIDDLE CREEK**. A view showing the large amphitheater filled with snow, and from which Middle Creek finds its sources.
- Nos. 483, 484. **VIEW NEAR THE MOUTH OF WEST GALLATIN CAÑON**. A limestone mountain on the east side of the cañon, lying directly upon the volcanic rocks, an exposed face bordering the river, showing the line of junction.
- No. 485. **THE PALISADES OF THE WEST GALLATIN**. Towering castellated walls and pinnacles of granite rising to a height of 2,000 feet above the river.
- No. 486. **TRAIL OVER THE ROCKS**.
- No. 487. **TRAIL THROUGH THE WOODS** of West Gallatin Cañon. (See Nos. 44 and 45, 11 x 14 series, page 39.)
- No. 488. **BLUFFS** on the head of the West Gallatin, about 60 miles above the mouth of the cañon.
- No. 489. **SHADOW LAKE** on the summit of the divide, between the West Gallatin and the Yellowstone. Elevation above the sea 9,317 feet, and 4,332 feet above the Yellowstone at Boteler's.
- The following views, from 490 to 500, inclusive, were made by J. Chrissman, of Bozeman, Mont., who accompanied Professor Hayden's division of the survey, and visited those localities not reached by the photographers of the survey.
- Nos. 490, 491. **CAÑON OF THE UPPER MADISON**, between Gibbons's Fork and the Fire Hole River. It is here a long series of swift cascades, flowing between vertical walls of trachytic rock.
- Nos. 492, 493. **PULPIT ROCK**, in one of the small side cañons of the Middle Cañon of the Madison. A detached mass of limestone from the mountain side, about 150 feet in height, pulpit-like in form.
- No. 494. **A VIEW ON THE MADISON** below the Great Middle Cañon.
- No. 495. **A VIEW LOOKING UP** toward the Middle Cañon from below.
- No. 496. **HYDRAULIC MINING** in Alder Gulch, near Virginia City, Mont. (Same as 190.)
- No. 497. **HELENA, MONT.**, capital of the Territory. A lively, thriving city of about 5,000 inhabitants, sustained chiefly by the mining operations carried on extensively all around.
- No. 498. **TROUT CREEK FLUME**, carrying the water so necessary to the miners, near Helena.
- No. 499. **A MONTANA RANCH**, comfortable if not elegant, and the home of many well-to-do persons engaged in mining or stock-raising.
- No. 500. **THE SUCCESSFUL HUNTER**. Fred. Boteler, who accompanied the survey as hunter, killed, within an area of fifty feet diameter, five large elk, before breakfast. The view shows them as they fell, with the hunter in the center of the group. The

locality is on Yellowstone River, about three miles above the Great Falls.

- No. 501. A YOUNG MOOSE, domesticated on Major Pease's ranch, on the Yellowstone.
- Nos. 502, 503. HEAD OF AN OLD FEMALE MOOSE and one of the young ones, killed at the camp at the Tetons. (See No. 422.)
- Nos. 504-507. GROUPS OF FOUR YOUNG BUFFALO CALVES domesticated on Major Pease's ranch. They are about four months old, and of the real mountain-bison type, being caught high up in the mountains, about the head of East Fork. Turned in with the cows of the cattle-herd, they very readily took up with the new *régime*.
- Nos. 508, 509. GROUPS OF YOUNG ELK, caught at the same time and place, and undergoing the same domestication.
- No. 510. GROUP OF ALL THE MEMBERS OF THE SURVEY, taken in Fire Hole Basin the day after the simultaneous arrival of all the different divisions.
- Nos. 511, 512. "THE DIAMOND HITCH," or the operation of "packing" a mule. The entire transportation of the survey was effected by packing, each mule carrying on an average about 250 pounds, and so arranged upon the pack-saddle or *aparajo* by a system of "hitches" as to withstand all the vicissitudes of mountain traveling.
- Nos. 513-525. MISCELLANEOUS GROUPS of the members of the party by "messes" and by corps divisions.

#### STEREOSCOPIC VIEWS.

- Nos. 490-492. CLEAR CREEK CAÑON, Colo.
- No. 493. LITTLE COTTONWOOD CAÑON, Utah.
- No. 494. GRANITE PEAK, Little Cottonwood.
- No. 495. QUARRYING GRANITE for the Mormon temple.
- No. 496. GRANITE QUARRY in Little Cottonwood.
- Nos. 497, 498. CAÑON CASCADE, near Ogden.
- No. 499. WILLARD CAÑON, ten miles north from Ogden.
- No. 500. PORTNEUF CAÑON, Idaho.
- No. 501. CAÑON OF THE MIDDLE FORK OF THE TETON RIVER.
- No. 502. CAMP at the foot of the Three Tetons.
- No. 503. HAYDEN'S PEAK, on the Great Teton.
- Nos. 504-514. THE THREE TETONS and the range from the two stand-points of Nos. 5 and 7 of 11×14 series, and sweeping the whole horizon in panoramic series.
- No. 515. PHOTOGRAPHING IN HIGH PLACES.
- Nos. 516-521. STUDIES on the Left Fork of Teton River.
- Nos. 522-529. STUDIES on the Right Fork of Teton River.
- No. 530. VIEW down the Right Fork.
- No. 531. HENRY'S LAKE, Idaho.
- No. 532. SAWTELL'S RANCH, on Henry's Lake.
- Nos. 533, 534. INTERIOR OF SAWTELL'S RANCH.
- No. 535. MUD PUFFS, Lower Fire-Hole Basin.
- No. 536. HOT SPRING POOLS, Lower Fire-Hole Basin.
- No. 538. SMALL GEYSER CRATER, Lower Fire-Hole Basin.
- No. 539. ORNAMENTAL HOT SPRING, Lower Fire-Hole Basin.
- No. 540. CRATER OF FOUNTAIN GEYSER, Lower Fire-Hole Basin.
- No. 541. GENERAL VIEW of Lower Fire-Hole Basin.
- No. 542. STEAM JET in Lower Fire-Hole Basin.

- No. 543. GREAT HOT SPRING, between Upper and Lower Basin.  
 No. 544. UPPER FIRE-HOLE BASIN, looking up.  
 No. 545. UPPER FIRE-HOLE BASIN, looking down.  
 Nos. 546, 547. OLD FAITHFUL IN ERUPTION.  
 Nos. 548-550. CRATER OF OLD FAITHFUL.  
 No. 551. CRATER OF THE BEE-HIVE GEYSER.  
 No. 552. CRATER OF THE GIANTESS GEYSER.  
 No. 553. CRATER OF THE GRAND GEYSER.  
 No. 554. CRATER OF THE GROTTO GEYSER.  
 No. 555. THE GROTTO IN ERUPTION.  
 No. 556. SOUNDING THE GROTTO.  
 No. 557. DISTANT VIEW OF THE CASTLE IN ERUPTION.  
 No. 558. CRATER OF THE CASTLE AND HOT SPRING BASIN.  
 Nos. 559-563. HOT SPRING POOLS OF THE UPPER BASIN.  
 No. 664. TOWER FALLS.  
 Nos. 565-567. MAMMOTH HOT SPRINGS, on Gardiner's River, Lower Basins.  
 Nos. 568-573. MAMMOTH HOT SPRINGS, on Gardiner's River, Upper Basins.  
 No. 574. CAP OF LIBERTY, at Mammoth Hot Springs.  
 No. 575. EMIGRANT PEAK, from Boteler's.  
 Nos. 576, 577. VALLEY OF THE YELLOWSTONE.  
 Nos. 578-584. BRIDGER CAÑON, near Fort Ellis, Montana.  
 No. 585. MYSTIC LAKE, twelve miles south of Fort Ellis.  
 No. 586. PALACE BUTTE, Middle Creek.  
 No. 587. PALACE BUTTE PARK, Middle Creek.  
 Nos. 588-593. VIEWS IN THE UPPER CAÑON of Middle Creek.  
 Nos. 594, 595. ARCHED FALLS, Middle Creek.  
 Nos. 596-599. CASCADE of Middle Creek.  
 No. 600. MOUTH OF WEST GALLATIN CAÑON.  
 Nos. 601, 602. TRAIL IN THE WOODS.  
 No. 603. TRAIL OVER THE ROCKS.  
 Nos. 604, 605. PALISADES OF THE WEST GALLATIN.  
 Nos. 606, 607. VIEW IN THE MIDDLE CAÑON.  
 No. 608. CAMP ON THE WEST GALLATIN.  
 No. 609. UPPER CAÑON, West Gallatin.  
 Nos. 610, 611. SHADOW LAKES on the Divide.  
 No. 612-614. FALLS ON GARDINER'S RIVER, near Hot Springs.  
 Nos. 615, 616. UPPER MADISON CAÑON.  
 No. 617. LOWER MADISON CAÑON.  
 No. 618. HYDRAULIC MINING IN ALDER GULCH.  
 No. 619. MINER'S CABINS, in Alder Gulch.  
 No. 620. BEAVER HEAD ROCKS.  
 No. 521. HOT SPRINGS HOTEL, near Helena.  
 No. 622. TROUT CREEK CAÑON.  
 No. 623. HELL-GATE CAÑON.  
 No. 624. AVALANCHE CAÑON.  
 No. 625. MOUNTAIN CEDAR.  
 No. 626-636. BANNACK INDIANS.

## 1873 SERIES.

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The following is from the American Journal of Arts and Sciences, vol. vi, December, 1873, and affords an excellent introduction to the series: = v.

*United States Geological Survey of the Territories, F. V. Hayden, Geologist in Charge. Photographs of 1873.*—We have received an interesting selection from the photographic views taken by Professor Hayden's survey in Colorado this summer, and hasten to lay before the readers of the Journal some account of the operations of the survey in this department.

The photographic work was this year again in the charge of Mr. W. H. Jackson, who has approved in previous campaigns his skill as a workman, his enterprise and persistence as an explorer, and his good judgment in the selection of his subjects. To his party were joined, during most of the summer, the collectors in natural history. They began work near the end of May, about Long's Peak; the snow prevented them from ascending the mountain itself so early. Their views of the peak, however, and of the beautiful little Estes Park at its foot, were very successful. They then moved southward through the Front Range as far as Gray's Peak, getting the whole panorama on the way, and taking from Gray's itself a connected series of views around the horizon. The same was done again from Pike's Peak, to which the party next moved, visiting on their way Chicago Lake, Bear Creek, the Platte Cañon, and the remarkable tracts of fantastically worn sandstone known as Monument Park and the Garden of the Gods. From there they traversed South Park, and, after again taking panoramic views from Mount Lincoln, joined near Fairplay the party of the chiefs of the survey, and accompanied them to Weston Pass, Twin Lakes, and other points on the valley of the Arkansas, across the National Range and into the Elk Mountains, and finally up the Arkansas and beyond its headwaters to the Mount of the Holy Cross, returning thence to Denver and breaking up on the 5th of September. Panoramic views were taken from La Plata Mountain, in the National Range, and from White Rock Mountain, in the Elk group.

The total number of views taken during the campaign is nearly 300, half of them being stereoscopic, half the remainder  $4 \times 7$ -inch plates, and the rest the large  $9 \times 14$ -inch plates. They fairly cover the region traversed, in its various aspects. The interests of science were especially considered in the selection of subjects, and it was designed that the panoramic views should combine, with the drawings of Mr. Holmes, the artist of the survey, (drawings, it is believed, rarely equaled for their comprehensiveness, minute accuracy, and artistic truth of expression,) to make the reported facts thoroughly reliable, and to bring before the apprehension of lovers of nature, whether for her beauty or her history, the grand scenery of the grandest part of the Rocky Mountains. The high panoramas will need, in part, to be judged by their intent to display the structure of regions which few have visited, or can expect to visit. The lens is far behind the eye in its power to appreciate the distances in such views, and to discover the far off and faint. And while

there is plenty of sublimity in scenes where heights of 12,000, 13,000, and 14,000 feet count by scores, and vast amphitheatres and deep gorges are on every hand, they are not precisely *picturesque* in the proper sense; they are not manageable into pictures. Those who have seen both, give the preference in this respect to the Sierra Nevada over the Colorado Mountains. Especially the great volcanic peaks of the western coast, raising their majestic isolated cones from a low base, are more powerfully impressive than ranges where lines of peaks and crests of immense but equal altitude ascend from bases already at 7,000 to 10,000 feet. There are few summits in Colorado which are lifted more than 6,000 feet above their immediate surroundings. The barrenness of these mountains, too, as regards both white snow and green vegetation, in the mass, detracts from their effectiveness.

Almost everywhere the snow lies in summer only in lines and patches, which, though of no small absolute dimensions, are petty as compared with the great mountain-masses. The only marked exception this summer (when the snow was much less, to be sure, than the average) was the eastern amphitheater of one of the great peaks of the Elk Mountains, where there is an unbroken sheet a full mile wide, and covering half a mile of downward slope. This does not appear among the views taken; the survey were able to approach the mountain only from the rear. Even here, of course, is no glacier; the snow reaches the valley below only as water, after collecting in one of those intensely green lakes which dot the high slopes of these mountains, as of the Alps; the combined beauty and grandeur of the Swiss ice-rivers is altogether wanting. At the same time the evidences of former glacial action on an immense scale are abundant and striking, and views of them are among the most valuable of Mr. Jackson's pictures. There is, for example, the picture (taken from 1,300 feet above it) of the great glacier-trough leading down from the Holy Cross Mountain, and filled for miles with *roches moutonnées* on the grandest scale—sheep-backs up to 50 feet high and hundreds of feet long, all rounded and smoothed, and crowding one another so closely as to be almost impassable. The nearer views, taken from amid these ridges themselves, and showing the fallen timber with which the spaces between them are filled, give a lively sense of the delights of traveling among them. One of the most striking pictures of the series is that of this Holy Cross Mountain itself, with its white cross, 1,500 feet long, on its front. It was to gain this view that the party (as mentioned in our October number above, p. 299) had to climb all day, with 50 pounds of apparatus on each man's back, and then to spend the night near the summit, without food or shelter. Other important glacial views are those of the great moraines at the eastern base of the National Range, along the Arkansas Valley. The most remarkable of them, stretching out from the mouth of the regular and deeply penetrating valley of Clear Creek, are two or three miles long and 700 feet high, and from the opposite heights seem as regular as railway embankments. The Twin Lakes, a few miles farther up the valley, the lovely situation and beauty of which are well illustrated by a series of views, are themselves also interesting results of glacial action, nestled between vast moraines in front and vaster mountains behind. Even the narrow bar that separates them is but a terminal moraine, dropped across their basin by a freak of the retreating glacier.

In the three more easterly ranges there is great uniformity of material; almost everything is granite and gneiss; and the variety is that of eroded form. In the National Range, especially, there is not a trace

of sedimentary rock through its whole extent of 80 miles. With the Elk Mountains the case is very different, and some of their striking and peculiar features are brought clearly to light by these views. They have a wonderful variety of coloring also, which unhappily photography is unable to reproduce. From the top of Italian Mountain, for example, (so named from its presenting in brilliancy the Italian colors, red, white, and green,) nearly the whole structure of the group can be read in the contrasts of coloring: the light gray of the granitic and eruptive nucleus, with the numberless peaks of sandstone about it, the strata conspicuously dipping away in every direction, and in two shades of red, a lighter and a darker, the latter a rich maroon color. There are few more beautiful scenes than the Grand Teocalli, as seen from the mouth of the short valley (some three miles long and a mile broad, between high walls) which leads from it down to the East River, a vast pyramid, 2,700 feet high, of most regular form, in bare steps and courses of maroon red at the summit, and with the same color blushing, as it were, with a most peculiar effect, through the thin, grassy covering of its lower slopes.

Besides these grander views, illustrative of the geography and geology of the region, there is the usual proportion, in the usual variety, of minor items of scenery, such as waterfalls, lakes, natural bridges, bits of ravine, and strange rock-forms. Conspicuous among these last are the almost incredible shapes of eroded sandstone columns in Monument Park.

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Nos. 46, 47. LONG'S PEAK, VIEW FROM ESTES PARK, on the northwest, distant about twelve miles from the summit. The park is about four by six miles in diameter, lying inside the foot-hill range and close under the main range. Being well sheltered and easy of access, it is proving to be a most excellent pasture for large herds of cattle. A few families have also settled here, and taken up permanent homesteads. It is quite a pleasure-resort, and as the only practicable route for ascending the peak leads up from this valley, it is destined to become a favorite stopping-place for health-seeker and traveler. The Big Thompson, draining all this region, is an excellent trout stream, and in season affords most excellent fishing.

Long's Peak, as seen from the plains, is the most prominent in the front range, rising sharply high above the surrounding peaks. Its elevation is 14,088 feet, and about 6,300 feet above the park. Composed entirely of the primitive rocks, it has bold, decided outlines, great walls, and deep cañons, and about its northwestern base particularly, are said to be gorges and cañons among the grandest on the continent.

Its summit is divided into two sharp crests, the most western one being the highest and most difficult of ascent. The trail leads directly up to timber-line, and then passes around to the north and west, from which direction only the summit can be reached. No. 47 is from Prospect Mountain, standing isolated on the southern edge of the park, about 1,000 feet in height, and affording most excellent panoramic views.

Nos. 48-50. LONG'S PEAK, a panoramic view, in three sections, from the

summit of the divide, between the waters of the Saint Vrain and the Boulder, southeast about ten miles from the peak. In the first, or left-hand view, we are looking a little north of west, showing the line of sharp snowy crests that extend southward. Among them rises the Saint Vrain, flowing down through the deep gorge in the center of the view. In No. 49 the peak occupies nearly the whole view, but it is only the most easterly of the twin summits, the highest one being beyond and hidden by it. No. 50 is an extension of the view eastwardly, giving us a glimpse of the range lying to the north of Estes Park. In the center, Mount Lilly, a ridge of gneissic schists and quartzites, rises about 2,500 feet above the plateau. The foreground of these three views is characteristic of all the country lying inside the foot-hills, a great plateau of granites, seamed and furrowed into deep ravines and cañons, and covered to a great extent with dense groves of pine.

Nos. 51-53. A PANORAMIC VIEW OF THE COLORADO OR FRONT RANGE, as seen from Bald Mountain, about three miles west from the Ward mining district, embracing a view from Long's Peak on the north, to near Arapaho on the south. In the foreground is one of the little snow-fed lakes, so numerous throughout the mountains, and forming a pleasant variety to the monotony of numberless snow-white peaks. Although this view was made late in June, it will be seen that the hill-sides are heavily draped in a mantle of snow, lying very deep through all the forest. The difficulty of reaching even this altitude was very great, requiring most laborious plunging through the thick timber and deep drifts. At the extreme left in the first view are the two sharp crests of Smith's Peak. In the center is a number of grand peaks, but nameless. In No. 52 the large rounded summit of "Jim" Peak is most prominent. In the last of the series the eye is carried past Audubon to Long's Peak, away to the north about fifty miles. This lake has an elevation of 12,000 feet, and the average height of the range is some 2,000 feet above it.

Nos. 54-56. THE FRONT RANGE, a panoramic view from Prospect Mountain, about two miles north of the North Boulder. The first view to the left is over the broad plateau, bordering the range, to James Peak, distant about twenty miles. The next view is a continuation of the panorama northward across the head-waters of the Boulder. Among the hills in the distance are the town and the famous mines of Caribou. The town of Middle Boulder and the reduction-works, are about four miles below, in the valley. Beyond the hills the very tip only of Arapaho can be seen. In No. 56 Smith Peaks are again shown, and a portion of the Bald Mountains, from near which the previous series were taken.

No. 57. CASTLE ROCK, IN BOULDER CAÑON, five miles below Middle Boulder, near the head of the cañon. It is a solid mass of granite, standing out detached from the walls of the cañon, the river describing a half-circle about it, sweeping close to its base. It is conical in form, rising to a height of about 250 feet, and is often called Hay-Stack Rock.

No. 58. BOULDER CAÑON. Close under the lower side of Castle Rock, the river hugs its sides so closely that the roadway is forced



to leap the stream, as shown in the view, and follow down the opposite side until the same conditions occur again. The roadway is a most excellent one, built only after great labor and expense. The cañon is about seventeen miles in length, cutting deep down through the metamorphic rocks of the foot-hills, so that in some places the sides of the cañon rise up nearly 3,000 feet above its bed. The Caribou mines, at the head of this cañon, are among the richest in Colorado, and the transportation between them and railroad communication passes through this cañon.

In this view the sides of Castle Rock rise up abruptly to its full height, showing the perpendicular face on the left.

No. 59. CARIBOU. A mining town of some 300 inhabitants, situated high up on the foot-hills, about the head-waters of the Middle Boulder. Its elevation is 9,730 feet, being very near the timber-line. It is the scene of considerable mining activity, the hills all about being deeply furrowed with mines and prospect holes. The Caribou mine, from which the locality takes its name, was sold to a company of foreign capitalists for \$3,000,000, and it is said to prove a good investment. There are others in the same neighborhood which are said to be equally promising. The ore occurs in fissures between the gneisses and quartzites.

Nos. 60-62. JAMES PEAK and the range northward, a panoramic view from a high point east of the peak, at an elevation of 12,200 feet, the peak being 13,130 feet above the sea. It is on the main divide, which, at this point, turns sharply to the west, describing a great arch around to Gray's Peak and Mount Rosalie. Like the rest of the range, it is of metamorphic rock, gneiss and schist predominating. To the left, in the distance of the first view, is a spur of Parry's Peak, which lies close to Berthoud Pass. In the next view we have a continuation northward, showing a deep, snow-filled valley and numerous lakes, not yet freed from their icy bondage. Leading up to the right is the trail from the South Boulder, over to Middle Park. A wagon-road is in the course of construction, that will afford easy access to the park. This is known as James Pass. In No. 62 the view is due north toward Arapaho, whose square-topped summit looms up in the distance far above the surrounding range; and from it the mountains sweep down in undulating lines to the foot-hills, that appear almost as a rolling prairie.

No. 63. FROZEN LAKE, NEAR FOOT OF JAMES PEAK, the source of Fall River. One of thousands similar, scattered all over the mountain range; small basins filled with the waters from the melting snows, and remaining ice-locked until far into the summer. They will average from two to three acres in extent, and rarely exceeding a half mile in length. In this view we see one of the great snow-fields that remain all summer long, feeding the thousands of little brooks that gather together into the great streams, which water the plains and transform the wilderness into smiling gardens.

No. 64. GEORGETOWN. A view from the summit of the trail leading from the valley below to Empire, at an elevation of about one thousand feet above the creek. The town has a population of about 3,000 inhabitants, the outgrowth entirely

of the very extensive mining operations carried on in the immediate neighborhood. It lies on Clear Creek, about fifty miles due west from Denver, and at the head of the open valley-like cañon. Back of the town the stream forks, Leavenworth Mountain standing between, and passes up in rapidly-ascending cañons to the very base of Gray's and Torrey's Peaks. Upon the left is Griffith Mountain, over which a very steep and sinuous trail leads to Idaho Springs and to Chicago Lake. The elevation of Georgetown is 8,735 feet. Being so near the well-known Gray's Peak region of the mountains, it is much frequented by pleasure-seekers and tourists, the railroad from Denver affording easy access.

Nos. 65-70. A PANORAMIC VIEW OF THE FRONT RANGE OF THE ROCKY MOUNTAINS, FROM NEAR GRAY'S AND TORREY'S PEAKS, sweeping the horizon in every direction, and including the 360° in the above six views, which can be joined together as one. The area embraced is about one hundred and fifty miles in diameter, extending from Long's Peak on the north to Pike's in the southeast, to Mount Lincoln in the south, and the Blue River Mountains to the west. The stand-point is upon McClellan Mountain, a spur running northward from Gray's Peak, extending eventually down to Leavenworth Mountain, back of Georgetown. There are several rich mines upon it, at an elevation of 12,000 feet, and upon the summit, in the bare spaces among the snow-drifts, are frequently-occurring stakes, marking some one's "claims." In the first view, No. 65, are the twin peaks, Gray and Torrey, named from the two collaborators in science, who have done so much for their cause, among these mountains. They are very nearly of equal height, Gray being 14,145 feet and Torrey 14,150. From peak to peak the distance is nearly a mile, and through this saddle is a "pass" from Georgetown to the mining towns on the Blue River. The trail runs up the long ridge toward Gray, and then turns to the right. Its course can be seen by looking sharply where the snow-banks cut across it. The combing crest of snow at the summit frequently lies all summer, and it then becomes necessary to tunnel under it, so that the pack-animals may pass over. To the right of Torrey, away in the distance, across Middle Park, are the Blue River Mountains, their glittering snow-fields alone making them visible.

In the second of the series, No. 66, is a wilderness of snow-streaked mountain summits. In the foreground, looking away down into the valley 2,000 feet below, is the mining region that once gave Bakerville a name and prominent place in the mining history of the West. No. 67 is very nearly due north, looking down on the spur of Mount McClellan, and directly opposite from Gray's Peak. Beyond, James Peak, and the range about it. In the distance, we can discern away off upon the horizon Long's Peak, and the range running west from it, forming the boundary between North and Middle Parks. Nos. 68 and 69, carry the view around to the east and to the twin peaks, Evans and Rosalie, which lie almost directly between our point of view and Denver. They are detached from the main mountain range and stand out from it to the east, and are consequently the most-prom-

inent, as seen from Denver. To the left, in the last view, is a remarkable square-topped mountain, called Table Mountain. Between it and our stand-point is Argentine Pass, over which a trail has been constructed into the valley of the Blue, *via* Snake River. The summit of the pass is about 13,500 feet above the sea. No. 70 completes the panorama, and brings us around to where we commenced, the high, prominent point in our view being the summit of Mount McClellan, and connects by a low saddle with Gray and Torrey. McClellan is but a little below Gray, being 13,708 feet high.

- No. 71. CHICAGO LAKES. Lying at the foot of Mount Rosalie, the source of Chicago Creek, and the most picturesque mountain lake in Colorado. They are high upon the mountain, just at the verge of timber line, having an elevation of 11,995 feet, the summit of Rosalie, shown in the view, being 2,200 feet higher. Another lake, of equal size and same characteristics, lies up on the plateau, over which the cascade flows. From the high point on the left a dozen lakelets may be seen scattered about at different elevations in this same vicinity. This lower lake contains many trout, not very large, but most delicious, the water in which they live coming direct from the pure snows above, and retaining an icy coldness all the summer. The lakes are distant from Georgetown and Idaho Springs about sixteen miles, the last five of which are over a very rough trail; but, notwithstanding the difficulties, many travelers visit this place, both for the rare scenery and for a mess of the best trout in the mountains.
- Nos. 72, 73. ERODED SANDSTONES IN MONUMENT PARK. Situated upon a small tributary of Monument Creek, about nine miles north of Colorado City. The Denver and Rio Grande railroad, a narrow-gauge road, running south from Denver, passes across the lower end of the park. The most interesting groups, however, lie back two or three miles from it. For complete description, see Nos. 157-160 of 1870 series.
- No. 74. GATEWAY TO THE GARDEN OF THE GODS, about three miles above Colorado City. Two vertical walls of red sandstone, 350 feet in height, the space between them being a perfect gateway. For further description see No. 365, 1872 series.
- No. 75. CATHEDRAL SPIRES, in the Garden of the Gods, just inside the gateway shown in the previous view, tall minarets and spires, needle like in their perfect symmetry. They are the remnants of the same uplifted strata of red sandstones that form the walls of the gateway. The tallest spire is about 200 feet in height.
- Nos. 76-78. A PANORAMIC VIEW OF PIKE'S PEAK, in three sections, with its eastern spurs; from the western edge of the Mesa, lying between the town of Colorado Springs and the Garden of the Gods. In No. 76 we have that portion which extends out to the edge of the plain, a bold promontory-like head-land, known as Cheyenne Mountain, having an elevation of 4,000 feet above the plain. It has many picturesque features, and is sure to engage the attention of the traveler. Along its north face, and extending behind it, are Cheyenne and Bear Cañons, extremely wild and rugged, and picturesque gorges, the first-named having several very fine water-falls and cascades.

In the middle distance, about three miles away, is the old town of Colorado City, built in 1859, during the first days of the "Pike's Peak" excitement. Although brushing up and improving under the influence of the influx of summer tourists, yet it is being overshadowed by more pretentious rivals. The town of Colorado Springs lies about two miles to the east, and Manitou, where the springs are, the same distance west. For description of springs, see No. 154, 1870 series. In the second view we have the intermediate portion of the range, with Cameron's Cone as the prominent point. In the middle distance are some of the upturned strata, which form a portion of the Garden of the Gods.

No. 78. PIKE'S PEAK, as seen looking over the walls of the Garden of the Gods, and distant, in an air-line, about ten miles. Its elevation above the sea is 13,893 feet, and above Colorado City 7,869 feet. It is entirely detached from the main range, lying some seventy-five miles to the east of it. With its spurs, it forms the southeastern boundary of South Park. About two miles beyond the garden, the Fountain qui Bouille flows down through a narrow rugged cañon, known as Ute Pass, over which a road has been constructed into South Park.

The peak offers no great difficulties in the ascent, and lately a good trail has been built to the summit, so that saddle-animals may be used the entire distance.

The Signal Service Bureau of the United States Army have established a station upon the summit, and the observers have taken up their residence there, isolating themselves completely, for a long and dreary winter.

Nos. 79-84. A PAMORAMA IN SIX SECTIONS FROM THE SUMMIT OF MOUNT LINCOLN, situated upon the western extreme of South Park, slightly detached from the main range or the "divide," which here turns abruptly to the west, to Tennessee Pass, and its junction with the Sawatch Range. Its elevation, by carefully computed measurements, is found to be 14,121 feet, very much less than was supposed for a long time. It is the highest point in that spur or continuation of the Park Range, which extend as far south as Buffalo Peaks, running parallel to the Sawatch Range on the other side of the Arkansas. At its feet, extending eastward, is South Park, comprising some 2,500 square miles in extent, and bounded on the distant horizon by the lofty cone of Pike's Peak. The floor of the park is composed of sedimentary rocks, which have been lifted nearly to the very summit of Mount Lincoln. A section through the mountain, as revealed upon its sides, shows, first, at its base, mica schists, passing up into quartzites. Then comes nearly a thousand feet of limestones, in the upper portion of which occur the richest silver mines. A thin layer of decomposed sandstone follows, capped by a dike of porphyritic rock, forming the summit of the mountain.

Looking to the south, in No. 79, we see Mount Bross, long famous for its great wealth of silver-bearing rocks. The small buildings near the summit on the left cover the Moose mine, the richest on the mountain. Its whole face has been plowed and furrowed over by the prospector, and is fairly covered sometimes by those seeking new developments of

the precious mineral. Across its face two long lines can be traced: the upper, a wagon-road that has been constructed from the valley below to the very summit of Mount Lincoln, via the low saddle which separates the two mountains. The lower line is the old "trail" that was traveled by hardy little "jacks," laden with supplies for the miners going up, and with sacks of ore going down. Away to the extreme left is a portion of South Park, and in the distance on the right the continuation of the range along its axis to the Buffalo Peaks.

No. 80 is more to the west. The foreground is the continuation from Bross to Lincoln. At the right are the buildings of the Montezuma mine, only one hundred feet below the summit, and the highest mine in the United States. In the distance is the Sawatch Range, lying west of the Arkansas. The prominent peaks in the range are Grand, Elbert, La Platta, and Harvard, the highest mountains in the whole Rocky Mountain Chain.

In the next view, away in the distance, is a distant view of the mountain of the Holy Cross, (106). The deep amphitheater at our feet is the head of Montgomery Gulch. Beyond, in the middle distance, lies Tennessee Pass. Around to the north, in No. 82, the prominent point in the view is Quandary Peak, a few feet only below Lincoln. Away in the distance is the Blue River Range. No. 83, the fifth in the series, looks down a spur of Lincoln, over Montgomery, 3,500 feet below, on the Platte, so far below as to be out of sight, across Hoosier Pass, a continental divide, the highest point of which is 11,364 feet above the sea, and so into the valley of the Blue. In the distance on the horizon are Gray and Torrey's Peaks. The last view of this series looks east, over South Park, Pike's Peak looming up grandly seventy-five miles away. In the center is Silver Heels, a prominent peak from the park, of 13,650 feet elevation. In the valley below is the Platte River, flowing down through Fairplay, about twelve miles distant. At the foot of the spur of Mount Lincoln, which forms the foreground, is the village of Quartzville, barely discernible, situated just in the upper edge of the forest growth. A great many miners climb up this peak every day from the town.

Nos. 85-88. THE SAWATCH RANGE, a panoramic view in four sections, embracing about 180 degrees, from a point a little south of Weston's Pass. The elevation of the stand-point is 11,000 feet, or about 2,500 feet above the Arkansas River, just below. No. 85 looks south to Buffalo Peaks, a well-known landmark, occupying the extreme southern end of the Park Range. The next is of the Arkansas Valley, extending southward as far as Poncho Pass. In the center is Mount Harvard, the highest in the Rocky Mountains. No. 87 looks west across the Arkansas to the Twin Lakes, about ten miles distant. Beyond them extends the valley or cañon of Lake Creek up to Red Mountain Pass, on the summit of the range. These lakes are in the trough or bed of an old glacier that once filled the valley. On the right is an immense lateral moraine bounding the lake on that side, and on the other is another of less prominence. Upon either side are Elbert and

La Platta Peaks, the two next in height to Harvard. In the last view, looking nearly north to Tennessee Pass, at the extreme right, we see in the distance the Mount of the Holy Cross, and at the left Grand or Massive Mountain, whose height is 14,250 feet. Tennessee Pass is 10,161 feet above sea-level.

No. 89. **THE UPPER TWIN LAKE.** Lake Creek rises in the heart of the Sawatch Range, near Red Mountain Pass, and flowing down a valley of wonderful glacial erosion, empties itself into the Upper lake, then across a narrow neck which separates them into the Lower Lake. The former is about one and a half miles long, and the last three miles in length. They are well stocked with trout, and being surrounded by some of the grandest mountain scenery in the Territory, are destined to become a favorite pleasure-resort. A comfortable house of entertainment is already established by the Messrs. Derry, who have boats and other facilities for lake-fishing. (See No. 87.)

No. 90. **MOUNT HARVARD.** A view looking south on the Arkansas River, from a bluff 1,000 feet high, opposite the mouth of La Platta Creek. Mount Harvard, lying in the range west of the Arkansas, and latitude  $38^{\circ}45'$ , has an elevation of 14,319 feet, the highest in the Rocky Mountains within the limits of the United States. It was named by Prof. J. D. Whitney, who visited this region in 1869, in honor of the well-known seat of learning in New England. In the distance beyond are the spurs of Yale, its summit being obscured by a mass of clouds.

At the base of Harvard is a splended exhibition of enormous glacial action, in the great lateral moraines that sweep down to the bank of the river.

No. 91. **MORAINES ON LA PLATA CREEK.** A grand display of great glacial power. Upon either side of the creek are two lateral moraines a half mile apart, three miles in length, and averaging 500 feet in height, as regular as if plowed up by Titans. The granite walls of the cañon above are ground and polished so smoothly as to glisten in the sunlight. Ages past a glacier filled this cañon five hundred to eight hundred feet in depth, and twenty miles in length, discharging itself into the valley of the Arkansas, as shown in this view, leaving these mute witnesses to attest its ancient glory.

All the cañons along this range contain ample evidence of the same tremendous force having been at work upon their walls.

Nos. 92-97. **PANORAMIC VIEW OVER THE SUMMITS OF THE SAWATCH RANGE,** from the top of La Plata, at an elevation of 14,237 feet. The series is in six sections, embracing the whole horizon. La Plata lies in the center of the range, in the midst of a vast wilderness of mountain peaks, and we look over their summits as over the huge billows of a great sea.

In approaching the mountain we are enabled to ride within 1,500 feet of the summit, the rest of the ascent being easily accomplished on foot, the huge blocks of gneiss, of which the mountain is composed, being so disposed as to afford excellent footing, like a great stairway.

Our first view is a little west of south, along the axis of the range, over a great mass of mountain peaks. In this and the

next view to the left, No. 93, are seen the amphitheatres, or heads of the cañons, flowing either way, those on the right into the Pacific and those on the left into the Atlantic. In them originated the great glaciers. To the right, in No. 94, we have another glimpse of Mount Harvard, somewhat dimly, as it was obscured by a storm. On the left are the Buffalo Peaks, and a little to the right of them is Pike's Peak, nearly a hundred miles away. In the following view we look down across the mouth of Lake Creek Cañons, on the Arkansas, to the range about Mount Lincoln, in the distance. No. 96 carries the view around to the north. Prominent on the right is Elbert's Peak, named from one of Colorado's governors, and which is 14,150 feet high. Next it in the distance are the Grand and Holy Cross Mountains, and on the left the same wilderness of nameless peaks. In the last view of the series, No. 97, the eye follows up Lake Creek to its source, about Red Mountain Pass. Beyond the pass a little way is Grizzly Mountain, so named from the number of bears seen about it, and away in the distance, to its right, are the Elk Mountains; the glistening white face of Snow Mass, with the Capitol and Sopris still farther to the right, being distinguishable.

No. 98. SNOW MASS MOUNTAIN AND ELK LAKE. The Elk Mountains lie west of the Sawatch Range, occupying a triangular space, bounded upon two faces by the Grand and Gunnison Rivers, and upon the other by the main range, inclosing an area of about 400 square miles. The center of the range, (the peak in our view being one of the highest points,) is composed of granitic rocks as a core, about which, upon every side, are tipped up the sedimentary rocks into curiously castellated mountains, to an almost equal height.

Upon the opposite face of this mountain, as shown in the view, is a similar amphitheater filled with snow, an immense mass, one mile in length by a half mile in breadth, and of great depth. It is this feature that gives it its great prominence, as seen from the east. The lake in the foreground is about one hundred acres in extent, occupying an old glacier-bed. Still nearer is an exposure of glacier-smoothed granite, with a stranded boulder resting upon it. The height of Snow Mass Mountain is 13,899 feet.

No. 99. MAROON MOUNTAIN, lying a little south of east from Snow Mass, from near which this view was taken. Elevation of stand-point, 12,300 feet. The mountain is entirely of sedimentary rocks, with the exception of a few dikes, lying in well-defined strata of carboniferous sandstones of a deep rich maroon color, dipping to the north. The long narrow ridge running up to the mountains separates the waters of Rock Creek from those of Roaring Fork. Elevation of Maroon Mountain 13,938 feet.

No. 100. TREASURE MOUNTAIN, a view looking in an opposite direction, or directly west from the same stand-point, as in the preceding view. It is the most western spur of the Elk Mountain, lying west of Rock Creek. Its broad ridge-like summit has an elevation of about 13,250 feet. About its southern face the industrious prospector has unearthed some very rich silver ores, and already quite a settlement of miners have col-

lected for the purpose of working them. The mountain was named on account of this wealth which its rocks contain.

No. 101. A VIEW OF THE MOUNTAINS LYING NORTH AND WEST FROM SNOW MASS, one of its peaks showing upon the extreme right. A little to its left is the Capitol, one of the prominent peaks, as seen from the east, and whose elevation is 13,829 feet. The stratified rocks shown in the view have been inverted by some convulsion, and occurred in an inverse order from those near by, in place. Coming down from the snow-fields at the foot of the peaks is Rock Creek, tumbling over the rocks in a most beautiful series of cascades, fully 500 feet in height. Immediately above the Cascades is Elk Lake, (No. 98.) Below, the creek flows down through a very deep gorge, and a still deeper and darker cañon to its junction with the Grande.

Nos. 102-104. A PANORAMIC VIEW OF THE ELK MOUNTAINS, in three sections, from near White Rock Mountains, embracing the southern half of the horizon. The first view is of White Rock, looking west from a long spur or sharp dividing crest which separates two large amphitheaters, one on the right debouching into East River on the north, and the other via Teocalli Creek on the south. This mountain is a portion of the main granitic core, extending northward to the Snow Mass, Capitol, and Sopris, and is so named from a mass of light-colored rock, disintegrating into sand, that breaks out upon its summit. The height of White Rock is 13,563 feet. In the south, as shown in No. 103, is the beautiful pyramidal mountain Teocaeli, deriving its name from the Aztec sacrificial pyramid, or *teocalli*. Its upper portion is of beautifully stratified sandstone, rising by steps and broken into many little sharp pinnacles and towers. It is best seen from the opposite side. (See No. 37 of the following 5 x 8 series.) The third view embraces some of the highest and most conspicuous of the singular sandstone peaks which surround the center of the range. Chief among them is Castle Peak, from the wierd towers, by which its central pyramid is flanked on either side. It is a bright, rich red, distinctly banded by its stratification, and rising up in sharp blade-like crests to the summit. Its elevation is 14,041 feet, and that of Teocaeli 12,889 feet. This side of Castle Peak are two lesser pyramids, very characteristic of the system, and present their peculiarities more distinctly. Away in extreme distance the broad summit of Grizzly and the sharp crest of La Platta are distinctly seen.

Nos. 105, 106, 107. THE MOUNT OF THE HOLY CROSS, three views, showing first the approaches from a distance, then the cross itself, from a high point immediately opposite; and third, the *Roches Moutoënnes*, or Sheep-Backed Rocks, shown in the valley of the first view.

The following written extracts from a letter, by Prof. A. D. Whitney, of Yale College, who accompanied the party to the summit of the mount, describes the series perfectly, and some of the difficulties encountered in securing the views :

MONDAY, August 24th.—The Mount of the Holy Cross has been thoroughly done at last, but at a cost of time and labor which was not at all anticipated. It may be only after years, if at all, that another party



will try to repeat the ascent; still, some brief recital of our experience may not be without its value.

There is a broad valley, carrying a very heavy creek, which runs directly down from the main peak, a little east of north, to nearly the site of the camp at which my letter was begun. This valley was formerly the bed of a glacier, and its bottoms and its sides, up to a thousand feet or more above the bottom, are rounded and scored by the action of the ice. Perhaps there is not in our whole country such an exhibition of what the French call *roches moutonnées*, or "sheep-backed rocks," that look in the distance, namely, like a flock of enormous sheep lying down in a pasture. As an example of this particular kind of glacial action, our trip certainly has furnished nothing to compare with it, even distantly. Take such a valley, with the sheep-backs rising anywhere from ten to fifty feet over it, or broken ridges that afford no continuous pathway, and with the interstices filled with fallen timber, and you will readily perceive that traveling in it is no pastime; yet all attempts to scale the mountain must stand in some relation to this valley, and that although the ridge on neither side reaches the peak without a deep hollow intervening.

Well, our attempt was made up the western ridge. It was not hard to ascend from the creek valley to the edge of the ridge, but there the fallen timber grew worse and worse, and twice the train was turned back, on both arms of the ridge, and had to camp at evening at hardly two hours' distance from the starting point. A lighter party next day, well armed with axes, cut their way through, and reached first a high point at the edge of the ridge, 1,350 feet above the valley, and commanding a splendid view both of it, with its glacial phenomena, and of the peak beyond; how splendid, Mr. Jackson's photographs, taken from the spot, will by and by show. Two courses were now open; one, to plunge into the valley and work up it as far as possible below; the other, to labor along the edge to a point nearly opposite the peak, and try to get down there. It was, perhaps, one of those cases where, whichever alternative one takes, he will be sorry not to have taken the other; at any rate, we took, after careful consideration, the first, and would advise any other party by all means to try the second, which is probably practicable. For the plunge was a long and severe one, and, with our utmost efforts, we could get but a mile up through the valley, leaving two hours and a half of hard scrambling between our final camp and the bottom of the peak, with the heavy geodetic and photographic apparatus to carry. Nor was the food for the animals sufficiently abundant and nutritious below.

Next day, setting out soon after daybreak, the ascent was attempted by two parties; the photographic climbing to the end of the southern ridge, as being 500 feet lower, and otherwise more easily accessible, and as including the peak itself in the panorama. Unfortunately, the weather was not propitious. A showery afternoon the day before had ended in a rainy night; and though the clouds broke in the morning, yet the flying mist hung about the high summits all day long, obscuring the view. Both parties were compelled, instead of returning to camp, to do the best they could at timber-line, with no wraps, and only the lunch they had taken in their pockets, and to finish their work on the following morning. Fortunately the night was neither windy nor cold; but thirty hours on no provisions but a pocket-lunch are pretty hard upon men, some of whom have done 5,000 feet of climbing with thirty or forty pounds of instruments on their backs.

The following day was a fine one here, although the horizon was much

obscured by flying storms, and Mr. Gardner was able to right his points, and Mr. Jackson to make his panoramic views in time to return to camp in fair season. One of the photographs in particular shows finely the cross that gives name to the peak. Its cause lies in the cross-seams of the gneiss, which cut one another on that face at nearly a right angle, one of the horizontal ones happening to be broken out to such a depth as allows the snow to lie along in it.

The mountain itself, like the whole of the range to which it belongs, is of primitive rock, gneiss; the sedimentary beds cap some of its flanking hills, and abound over toward the Elk Mountains, as well as in the valley which lies this side of the Blue River Range, but they do not appear anywhere near the summit. It is not precisely in the main range, but rather constitutes a side branch, or spur striking off to the northwest, and is the most northern spur of the Sawatch Range. Nearly its entire drainage flows into Eagle River, or the Piney, as it is sometimes called, and so into the Grand. The height of the mount is 13,569 feet above tide-water, and that of the left-hand peak, in No. 105, from which the view of the cross, No. 106, was made, about 300 feet lower. The perpendicular arm of the cross is 1,500 feet in length and fully 50 feet in breadth, the snow lying in the crevice from 50 to 100 feet in depth. The horizontal arm varies with the seasons in length, but averages 700 feet.

5 × 8.

- Nos. 1-3. RENDEZVOUS CAMP, on Clear Creek, four miles northwest from Denver, a delightful spot, in the midst of a grove of cottonwoods, with great wide-spreading arms, resembling the eastern elm. The views are made in early spring, before the trees put forth their leaves. In this camp the members of the survey collected to organize and equip for the season's campaign.
- Nos. 4, 5. LONG'S PEAK, from lower end of Este's Park.
- No. 6. LONG'S PEAK, from Prospect Mountain.
- No. 7. MOUNT LINCOLN, from Hoosier Pass, looking across Montgomery Gulch, to the cap-like summit. (See Nos. 79-84, 11 x 14, series, page 56.)
- Nos. 8-12. PANORAMA FROM SUMMIT OF MOUNT LINCOLN. (See 11 x 14 series.)
- No. 13. HEAD OF MONTGOMERY GULCH, as seen from near Hoosier Pass, showing that portion of the range which connects Lincoln with Quandary.
- No. 14. HEAD OF BUCKSKIN GULCH. About it are many silver mines that are profitably worked. Buckskin Creek is a small tributary of Clear Creek, draining the southern face of Bross and Lincoln.
- No. 15. THE NORTH OR RIGHT HAND WALL OF BUCKSKIN GULCH, and the foot of Mount Bross, showing, in a well-defined section, the contact of the quartzites with the gneissic rocks below, and the limestones above.
- No. 16. HEAD OF MOSQUITO GULCH, lying next south to Buckskin, from a high point looking down into the amphitheater, and up to the crest of the divide which separates the waters of Platte and the Arkansas. To the left of the mountain butte, in the center, is Mosquito Pass, a trail only, leading over to Oro City and California Gulch. The elevation at the summit of the pass is 12,200 feet.
- No. 17. HEAD OF SACRAMENTO GULCH, lying next south of Mosquito.

From the same stand-point as the preceding. Prominent in the view are the long slopes of quartzites, which break down suddenly and leave the great basin or amphitheater between it and the granites of the main range.

- No. 18. HORSESHOE MOUNTAIN, southeast from Fairplay about ten miles, and in the same range with the preceding views. An amphitheater in an uplifted limestone strata, resembling very much the impression left by a horse's foot, upon a gigantic scale, in the side of the mountain. The floor of the amphitheater is composed of granite, the quartzites and limestones resting upon it. There are some very rich silver-mines about the mountain, lying in the stratified rocks high up on the mountain elevation.
- No. 19. LOOKING NORTH FROM NEAR HORSESHOE MOUNTAIN, to Bross and Lincoln, and across Sacramento, Mosquito, and Buckskin Gulches.
- No. 20. MORAINE ON THE SOUTH SIDE OF LA PLATA CREEK, at its junction with the Arkansas. (See No. 91 of 11 x 14 series, page 58.)
- No. 21. VIEW OF THE ARKANSAS RIVER, between the La Plata Creek and Twin Lakes, where the stream is narrowed down to a foaming cascade or fall, and flanked by great towering walls of granite.
- No. 22. THE TWIN LAKES, a distant view, as seen from an elevation of 800 feet above them, on one of the spurs of Mount Elbert. For description, see No. 89 of previous series.
- No. 23. THE UPPER TWIN LAKE.
- Nos. 24-26. THE TWIN LAKES, a panoramic view, in three sections. Same as No. 22.
- No. 27. NATURAL BRIDGE, on Twin Lake Creek, three miles above the lake, formed by a great granite boulder becoming stranded and suspended over a deep, gorge-like crevice, under which flows the creek. It is the result of glacial action.
- No. 28. FALLS ON TWIN LAKE CREEK, in the same crevice, over which hangs the suspended boulder mentioned in the preceding number, this view being made from above, looking down into it, the falls and the bridge being separated only a few yards.
- No. 29. A GRANITE BUTTRESS, 500 feet in height, standing out midway in Lake Creek Valley, the upper face of which has been rounded off and polished by glacial action.
- Nos. 30-34. PANORAMA FROM SUMMIT OF LA PLATA MOUNTAIN. (See Nos. 92-97 of 11 x 14 series, page 58.)
- No. 35. AMPHITHEATER ON WESTERN FACE OF SAWATCH RANGE, as seen from Red Mountain Pass. It lies at the head of a cañon emptying into Taylor River, a tributary of the Gunnison, about the mouth of which is an extensive series of lateral and terminal moraines. Elevation of pass, 11,841 feet.
- No. 36. RED ROCK FALLS, upon a small tributary of East River, among the Elk Mountains. The sandstones over which they flow are carboniferous, broken up into picturesque, castellated forms, and of a dark, almost maroon red.
- No. 37. TEOCALLI, from the aztec *teocalli*, or sacrificial mound, that were always built in a pyramidal form, and which this mountain closely resembles. Is situated upon a small tributary of Red Rock Creek, flowing into East River. Its height is 12,889 feet. (See No. 103 of previous series.)
- No. 38. GOTHIC MOUNTAIN, East River, a bold picturesque mountain

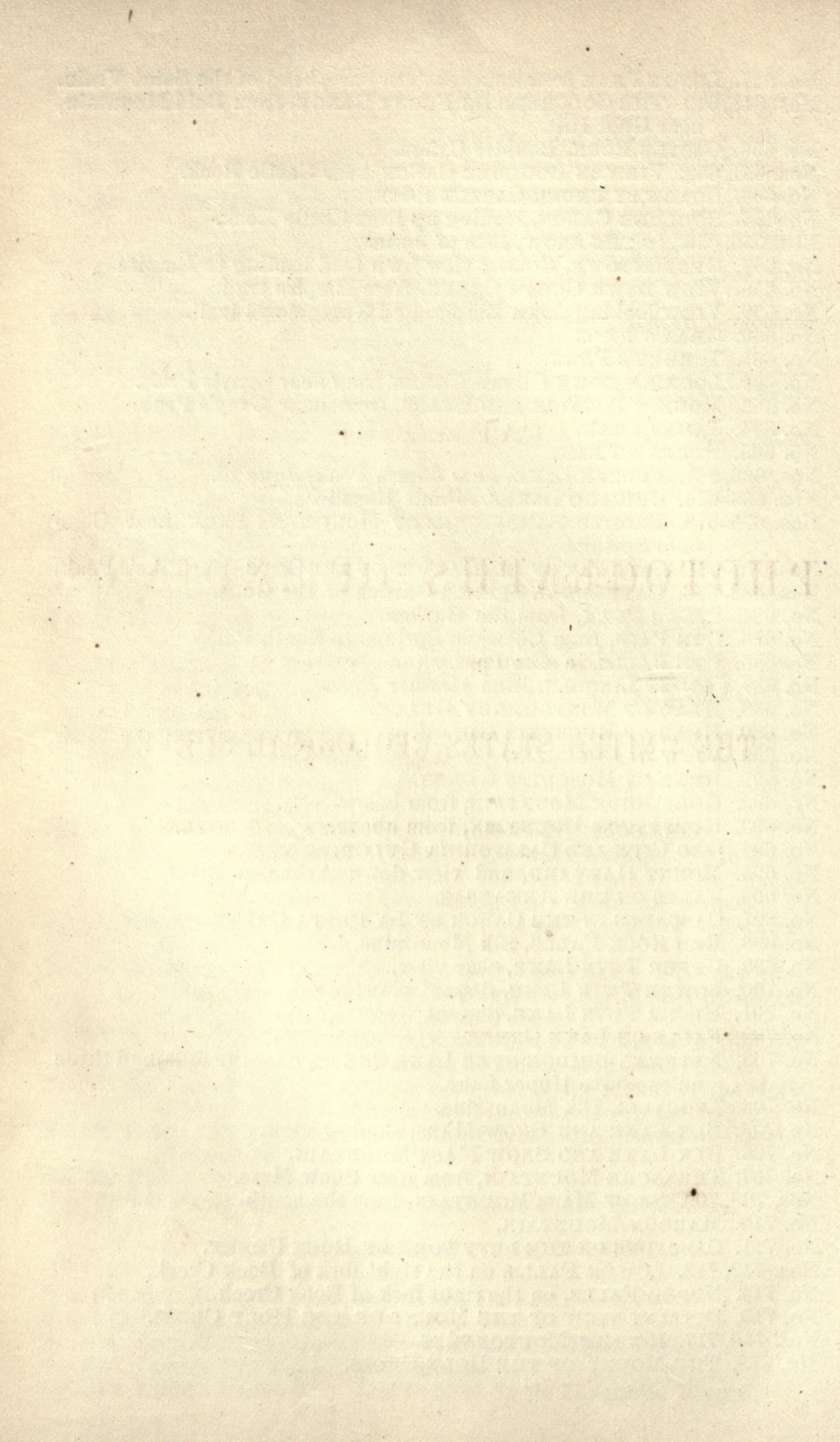
form, as well as a most instructive geological picture. The base of the mountain is cretaceous, then comes a broad, deep band of eruptive rock, covered with the cretaceous, which is again surmounted with the volcanic material forming its summit. Elevation, 13,323 feet.

- No. 39. WHITE ROCK MOUNTAIN, a portion of the granitic core of the Elk Mountain, lying some six or eight miles east of Gothic Mountain. (See No. 102 of 11 × 14 series, page 60.)
- No. 40. EAST RIVER PASS, looking across the head of East River and the pass that reaches the head of Rock Creek.
- No. 41. VIEW DOWN EAST RIVER, from the pass, showing Gothic Mountain and Crested Butte in the distance.
- No. 42. A SPUR OF THE ELK MOUNTAINS, lying near the head of East River, showing granitic eruption, with sedimentary beds lying up on either flank.
- No. 43. LOOKING SOUTH ACROSS ROCK CREEK, toward the Snow Mass and Capitol. (Same as No. 101 of previous series.)
- No. 44. TREASURE MOUNTAIN, and view down the cañon of Rock Creek, toward the Grand.
- No. 45. VIEW SOUTH, ACROSS EAST RIVER PASS.
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- No. 47. ELK LAKE, shadow view.
- No. 48. TREASURE MOUNTAIN.
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- No. 51. A PICTURESQUE FALL upon the right-hand branch of Rock Creek, flowing over almost coal-black shales, and running diagonally through them, under the falls, is a very distinctly marked trachytic dike.
- No. 52. FALLS ON ROCK CREEK, a few rods above the former.
- No. 53. ORO CITY, California Gulch, on the western slope of the Park Range, and directly opposite the view shown in Nos. 16 and 17 of this series. It is a mining town, pure and simple.
- No. 54. GRAND OR MASSIVE MOUNTAIN, from near mouth of California Gulch.
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- Nos. 57-58. ROCHES MOUTONNÉES, near foot of the Mount of the Holy Cross, the first looking up and the other down the valley.
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CATALOGUE

OF

PHOTOGRAPHS OF INDIANS,

FROM NEGATIVES IN THE POSSESSION OF

THE UNITED STATES GEOLOGICAL SURVEY,

COLLECTED FROM VARIOUS SOURCES, AND COVER-  
ING A PERIOD OF TWENTY-FIVE YEARS.

1874.

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PRELIMINARY REPORT

The following table of contents will give a general idea of the scope and contents of this report. It is divided into two parts, the first of which contains the general information and the second the detailed results of the work.

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The work was carried out under the supervision of the Director of the Bureau of Biological Research, and the assistance of the following persons is gratefully acknowledged: Mr. J. H. ...

The following table shows the results of the work carried out during the period from ... to ...

...	...
...	...
...	...



## PREFACE TO INDIAN CATALOGUE.

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The following series of Indian subjects is made up principally of the valuable additions which have been made to the original collections of this survey, through the munificent liberality of Wm. Blackmore, esq., of England, who has contributed them gratuitously for the advancement of ethnological studies.

The collection comprises about one thousand negatives, representing sixty-five tribes, and every possible phase of feature and mode of life.

The original collection of this survey, which has formed the nucleus about which to gather others, now numbers about two hundred negatives, chiefly scenes and studies among their habitations in the wilds of the far west.

The contributions of Mr. Blackmore comprise, first, a collection of over four hundred negatives, by Schindler, of Washington, D. C., who had gathered them from various sources, and which go back to the days of the daguerreotype, twenty-five years ago; second, a collection of about forty-five negatives, made to his order, of the Pueblos, Apaches, and Navajoes, in New Mexico, in 1871; third, a series of over three hundred very valuable negatives, purchased from Alex. Gardner, esq., of Washington, D. C., embracing all the prominent individuals who have visited their Great Father upon delegations during the last ten years.

During the past season other delegations have been secured by this survey, in negatives by Bell, Ulke, and Gardner.

Additions are being constantly made to the collections, both through the operations of the survey, and of others, so as to place it in a position of national importance.

The aborigines are rapidly fading away, and, in the near future, there will be no more trustworthy evidence of what they have been than these faithfully drawn sun-pictures.

At present, this catalogue merely enumerates them by tribes and individuals. Eventually a fully descriptive catalogue will be issued.

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 Nos. 172, 173. HA-V-KA-WASHITA, Good Hawk.  
 Nos. 174, 175. PE-HAÚ-SAU-MÁNI, Walking Crane.  
 Nos. 176, 177. WA-MDÍ-ZI, Yellow Eagle.

## CROWS.

*Montana Territory.*

- No. 940. KAM-NE-WA-CHE, Blackfoot, and squaw.  
 No. 941. IRON BULL and squaw.

- No. 942. SE-TA-PIT-SE, Bear Wolf, and squaw.  
 No. 943. OLD CROW and squaw.  
 No. 944. KAM-NE-WACHE; ICHE-HAS-KA, LONG HORSE, and WHITE CALF.  
 No. 945. MO-MUKH-PI-TCHE; Thin Belly, and PISH-KI-HA-DI-RI-KY-ISH, The One that Leads the Old Dog.  
 No. 946. KAM-NE-WA-CHE, Blackfoot.  
 No. 947. I-SA-SEESH, He shows his face.  
 No. 948. MIT-CHOO-ASH, Onion.  
 No. 949. GROUP OF CHIEFS.  
 No. 950. GROUP OF SQUAWS.  
 No. 951. INTERIOR OF LODGE.  
 No. 952. VILLAGE SCENE.  
 No. 953. "THE MISSION," or Agency buildings.  
 No. 954. MODE OF BURIAL.  
 No. 859. A GROUP 14×17, by Ulke, of Washington delegation.

## DELAWARE.

- Nos. 181-185. BLACK BEAR.  
 No. 185, 2d. LONG HORN.  
 No. 186. GREAT BEAR.

## TWO-KETTLE DAKOTAS.

*Dakota Territory.*

- Nos. 187-190. MA-WÁ-TA-NA, Long Mandan.  
 No. 191. SUK-TAN'-KA, GHE-LÉ-SKA, Spotted Horse.

## SISSETON DAKOTAS.

*Dakota Territory.*

- No. 192. HE-PTÉ-CE-DAN-CISTIN, Little Short Horn.

## WAHPETON DAKOTAS.

*Dakota Territory.*

- No. 193. AN-PÉ-TU TÓ-KE-KA, Other Day.

## SANS-ARC DAKOTAS.

*Dakota Territory.*

- Nos. 194-196. CE-TÁN-ZI, Yellow Hawk.

## MDEWAKANTON DAKOTAS.

*Dakota Territory.*

- Nos. 197, 198. CE-TÁN-WA-KÚ-AMANI, The Hawk that Hunts Walking.  
 No. 199. SON OF THE HAWK THAT HUNTS WALKING.  
 No. 200. SHÁK-PE, Six.

## SANTEE DAKOTAS.

*Dakota Territory.*

- Nos. 201, 202. WA-KÁ-TA, The Shooter.  
 No. 203. WÁ-PA-HÁ-SHA.  
 No. 204. WA-KAN-HDI-SÁ-PA, Black Lightning.  
 No. 205. Ó-WAN-CE-DÚ-TA, Scarlet all Over.  
 No. 206. CHO-TÁN-KU-HDI-NÁ-PE, Flute Player.  
 No. 207. A-K'I-CI-TA-NÁ-ZIN, Standing Soldier.  
 No. 208. WA-MDI-TA-PA-AMANI, Walks Following the Eagle.  
 No. 209. WÁ-PA-HÁ-SHA.  
 No. 210. TA-WÁ-HAM-KE-MAZI, His Man-horse.  
 No. 211. MA-HPE-YA-E-HUA-KU-DAN, Coming Among the Clouds.  
 No. 212. ZI-TKÁ-DAN-TO, Blue Bird.  
 No. 213. MA-HPÉ-YA-NÁ-ZIN-HAN, Standing Cloud.  
 No. 214. HAN-YE-TU-DÚ-TA, Scarlet Night.  
 No. 215. HU-SHA-SHA, Red Legs.  
 No. 216. RAPHAEL RECONTRE.  
 No. 248. A YOUNG BRAVE.  
 No. 249. PA-HA-UZA-TÁU-KA, Great Scalper.  
 No. 250. TA-TÁN-KA-NÁ-ZIN, Standing Buffalo.  
 No. 251. OLD BETTS.  
 No. 381. WA-KÁN-DA.  
 Nos. 382-384. GROUP WITH MISSIONARY HINMAN.

## YANKTON DAKOTAS.

*Dakota Territory.*

- No. 217. PA-DÁ-NI-A-PÁ-PI; or, Struck by the Ree.  
 Nos. 218, 219. I-PSI-CÁ-WA-KIN'-YAN, Jumping Thunder.  
 No. 220. SI-HA-HANSKA, Long Foot.  
 No. 221. MA-GÁ-SKA, White Swan.  
 Nos. 222, 224. PTE-WA-KÁN, Medicine Cow.  
 Nos. 225, 228. WA-HÚ-KE-ZA-NÓN-PA, Two Lance.  
 No. 229. WI-YA-CÓMI, Feather in the Ear.  
 Nos. 230, 231. ZI-TKÁ-DAN-CI-STIN, Little Bird.  
 Nos. 232, 233. WAN-MDI-SÁ-PA, Black Eagle.  
 No. 234. MA-TÓ-ISH'-TI-MA, Bear that Lies Down.  
 No. 235. TA-TAU-KA-ÍN-YAN-KA, Running Bull.  
 No. 236. HE-KHÁ-KA-AMANI, Walking Elk.  
 No. 237. HE-KHÁ-KA-NA-ZIN, Standing Elk.  
 No. 238. MA-TÓ-A-SÁ-PA, Smutty Bear.  
 No. 239. PA-DÁ-NI-A-PÁ-PI.  
 Nos. 240, 241. MA-TÓ-ASÁ-PA and PA-DÁ-NI-A-PÁ-PI.  
 No. 242. ALECK GWYNNE, Interpreter.  
 No. 243. FRANCOIS FRANDON.  
 No. 244. WAR-DANCE.  
 No. 245. GROUP.  
 Nos. 246, 247. YOUNG BRAVES.  
 No. 248. SI-HA-HANSKA.  
 No. 249. A SQUAW.

## BLACKFEET DAKOTAS.

*Dakota Territory.*

- Nos. 252, 254. PA-JE, Grass.  
 Nos. 255, 256. KAGE-U-TAÚ-KA, Sitting Crow.  
 Nos. 257, 258. MA-ZA-WA-NA-PE-Δ, Iron Scare.  
 No. 259. WI-A-KA-SHA, Red Plume.

## HUNC-PA-PA DAKOTAS.

*Dakota Territory.*

- Nos. 260, 261. MA-TÓ-TCHI-YUK-SA, Bear's Rib.  
 Nos. 262, 263. TA-TÓ-KA-DAN-ÍN-YAN-KA, Running Antelope.  
 Nos. 264, 265. HE-MÁ-ZA, Iron Horn.  
 Nos. 266, 267. WA-KÁ-TA-AMANI, Walking Shooter.  
 Nos. 268, 269. I-PSI-CÁ-CE-TAN, Thunder Hawk.  
 Nos. 797, 798. WE-WI-CÁI, Bloody Mouth.  
 Nos. 799, 800. WA-KAN-YU-KEA, Lost Medicine.  
 Nos. 801, 802. HE-SÁ-PA, Black Horn.  
 Nos. 803, 804. P-SA, Bull-rushes.

## UPPER YANCTONAI DAKOTAS.

*Dakota Territory.*

- Nos. 270, 271. NA-ZU-DA-TÁN-KA, Big Head.  
 Nos. 272, 273. I-STÁ SÁ-PA, Black Eye.  
 Nos. 274, 275. KA-SI-TÁN-KA, Big Razor.

## LOWER YANCTONAI DAKOTAS.

*Dakota Territory.*

- Nos. 276, 277. TA-TAÚKA-WI-NA-HI, Bull's Ghost.  
 Nos. 278, 279. MÁ-TO-WIT-KO-KO, Foolish Bear.  
 Nos. 280, 281. MÁ-TO-NÓN-PA, Two Bears.

## CUT HEAD DAKOTAS.

*Dakota Territory.*

- Nos. 282, 283. MÁ-TO-WA-KÁN, Medicine Bear.  
 Nos. 284, 285. MÁ-TO-KA-KI-PA, Afraid of the Bear.  
 Nos. 286, 287. MÁ-TO-PA-GE, Bear's Nose.  
 Nos. 288, 289. CHANTA-HA, Skin of the Heart.  
 Nos. 290, 291. TI-PI-SHA, Red Lodge.  
 Nos. 292, 293. WI-CHA-WA-MDI, Man who Packs the Eagle.  
 Nos. 294, 295. SQUAW OF THE MAN WHO PACKS THE EAGLE.

## OGALLALLA DAKOTAS.

*Dakota Territory.*

- Nos. 296, 297. MA-KPI-A-LU-TA, Red Cloud.  
 No. 298. RED CLOUD AND WM. BLACKMORE.

- Nos. 299, 300. SUNKA-LU-TA, Red Dog.  
 Nos. 301, 302. LONE WOLF.  
 Nos. 303, 304. VA-HOW-A-PA, Ear of Corn.  
 Nos. 305, 306. SI-HÁ-TÁNKA, Big Foot.  
 Nos. 307, 308. CE-TÁN-SKA, White Hawk.  
 Nos. 309, 310. WA-M'DI-KO-KI-PA, One afraid of the Eagle.  
 Nos. 311, 312. SUNKA-TO, Blue Horse.  
 Nos. 313, 314. VUA-SHA-PE, Stabber.  
 Nos. 315, 316. MA-KA-ASÁPA, Dirt Face.  
 Nos. 317, 318. TA-TAN-KA-WÁ-STE, Good Buffalo.  
 Nos. 319, 320. HE-HKA-KA-TAMA, Poor Elk.  
 Nos. 321, 322. HE-KHA-KA-NON-PA, Two Elks.  
 Nos. 323, 324. HIGH WOLF.  
 Nos. 325, 326. COYOTE.  
 Nos. 327, 328. CHAN-TÉ-SU-TÁ, Hard Heart.  
 Nos. 329, 330. TA-TAN'-KA-HUN'-KE-SUI, Slow Bull.  
 No. 331. ONE-HORNED ELK.  
 No. 332. OU-MA-TA-A-BI-TU-TA, War Eagle.  
 No. 333. CU-TU-KU-TAÚ-KA.  
 No. 334. MAN AFRAID OF HIS HORSES, AND CHIEFS.

## BRULÉ DAKOTAS.

*Dakota Territory.*

- Nos. 336, 337. SIN-TÉ-HDE-SKÂ-SKA, Spotted Tail.  
 No. 338. SPOTTED TAIL AND SQUAW.  
 Nos. 339, 340. SQUAW OF SPOTTED TAIL.  
 Nos. 341, 342. HE-VUA-SHE-TSON, Gassy.  
 Nos. 343, 344. I-TE-SAN-KE-AH, Whitewash his Face.  
 Nos. 345, 346. CE-TAN-VON-TAK-PA, Charge on the Hawk.  
 Nos. 347, 348. NÓN-PA-AP'A, Two Strikes.  
 Nos. 349, 350. SQUAW OF TWO STRIKES.  
 Nos. 351, 352. KAN-GA-SA'-PA, Black Crow.  
 Nos. 353, 354. HE-GMA-VUA-KUA, The one Who Runs the Tiger.  
 Nos. 355, 356. BALD EAGLE.  
 Nos. 357, 358. CHE-CHA-LUH, Thigh.  
 Nos. 359, 360. SQUAW OF THIGH.  
 Nos. 361, 362. TA-TAN'-KA-SA'-PA, Black Bull.  
 Nos. 363, 364. MÁ-TO-TCHÉ-TCHA, Wicked Bear.  
 Nos. 365, 366. TCHO-NE-TCHA-VUA-NIT-ZAH, No Flesh.  
 Nos. 367, 369. MA-ZA-PON-KES-KA, Iron Shell.  
 Nos. 370, 371. PE-HE-ZI-ZIH, Yellow Hairs.  
 Nos. 372, 373. I-SHTA-SKA, White Eyes.  
 Nos. 374, 375. MÁ-TO-LUSA, Swift Bear.  
 Nos. 376, 377. VUA-KE-OP-SKA, White Thunder.  
 Nos. 378, 380. MA-ZA-YUTI, Iron Nation.

## MISCELLANEOUS DAKOTA INDIANS.

- No. 889. A BOY.  
 No. 890. HE-YU-PA-MA-ZA, Iron Black-Bird.  
 No. 891. KA-ZAN-OP-KYAN, Flying Pipe.  
 No. 892. WA-KIN-JAN-CISTIN-NA, Little Thunder.  
 No. 893. TA-TAN'-KA-WA-KAN'-NA, Sacred Bull.  
 No. 894. FLYING BIRD.  
 No. 895.



- No. 896. PO-KI-YA-NI-KA-TA, He Kills First.  
 No. 897. NA-GI-WA-KAN, Sacred Ghost.  
 Nos. 898, 899. MA-TO-HO-KO TAN-KA, Bear With the Big Voice.  
 No. 900. TO-KAN-NAS-TE, Pretty Rock.  
 No. 901. JA-KA-O-US-PA, The One Who Catches the Enemy.  
 No. 902. KUA-SKIN-YAN-MANI, Mad-Hand Eagle.  
 No. 903. MA-TO-KTI-WANG-MANI, The Bear that Walks Lying Down.  
 Nos. 904, 905. MA-TO-WA-YU-MI, Little Blackfoot.  
 Nos. 906, 907. SI-HA-I-TOH-LOM-NI, Light Foot.  
 No. 908. TA-TAN'-KA-WA-KAN', Medicine Bull.  
 Nos. 909-911.  
 No. 853. SIOUX BURIAL.  
 No. 860. LARGE-GROUP, by Gurney, of New York.

## IOWAS.

- Nos. 385, 386. NA-GA-WASH, British.  
 No. 387. KRA-TEN-TE-WAY, Black-Hawk.  
 Nos. 388, 389. MA-HEE, Knife.  
 No. 390. KA-HI-KA-INGA, Little Chief.  
 Nos. 391, 392. TO-HEE, Bear.  
 Nos. 393, 394. NO-HE-INGA.  
 No. 395. TAR-A-KU, Deer Ham.  
 No. 396.

## KAW, OR KANSAS.

- No. 397. LITTLE BEAR.  
 Nos. 398, 399. KA-KE-GA-SHA.  
 No. 400. NO-PA-WY.  
 No. 401. AH-LE-GA-WAH.

## KIOWA.

- Nos. 402, 403. LONE WOLF.  
 Nos. 404-406. SQUAW OF LONE WOLF.  
 No. 407. SLEEPING WOLF AND SQUAW.  
 Nos. 408, 409. SON OF THE SUN.  
 No. 410. NATIVE DEAWING.

## KEECHIE.

- Nos. 411, 412. KNEE-WAR-WAR.

## MOHAVE.

*Arizona Territory.*

- Nos. 414, 415. JOSÉ POCATI.

## MOQUIS.

*Arizona Territory.*

- No. 416. DELEGATION TO BRIGHAM YOUNG.

## MONTAUK.

Nos. 417, 418.

## MIAMI.

No. 419. LUM-KI-KOM.

No. 420. THOMAS MILLER.

No. 421. JOE DICK.

Nos. 422-424. ROUBIDEAUX.

No. 425. THOMAS RICHARDWELL.

No. 426. ROUBIDEAUX AND RICHARDWELL.

## NEZ PERCÉ.

*Montana Territory.*

Nos. 427, 428. KAL-KAL-SHU-A-TASH, Jason.

Nos. 429, 431. TAMASON, Timothy.

No. 432. SON OF TIMOTHY.

Nos. 433, 434. VILLAGE ON THE YELLOWSTONE RIVER.

Nos. 435, 436. LODGES IN THE VILLAGE.

No. 437. THE CHIEF.

No. 438.

Nos. 439, 441. VILLAGE VIEWS.

## NAVAJOES.

*New Mexico.*

Nos. 442-456. A series of fourteen views of groups and individuals, made in New Mexico for Mr. William Blackmore, in 1871; at present without name and other data.

## OMAHAS.

*Nebraska.*

Nos. 457, 458. AGENCY BUILDING.

Nos. 459, 460. VIEW FROM BLACK-BIRD HILL.

Nos. 461, 462. THE VILLAGE.

No. 463. GIHEGA, chief.

No. 464. GIHEGA'S TENT.

Nos. 465, 466. GRA-DONA-ZHE, Standing Hawk, and squaw.

No. 467. OHAN-GA-NUZHE, Standing at the End.

No. 468. MOHA-NUZHE, Standing Bent.

Nos. 469, 470. BETSY.

No. 471. INDIAN CARPENTERS BUILDING THEIR HOUSES.

Nos. 472-476. GROUPS OF SCHOOL-CHILDREN.

No. 477.

No. 478. GROUP WITH AGENT PAINTER.

No. 479. VILLAGE SCENE.

## OTOES.

*Nebraska.*

No. 480. WOA-INGA, Pipe-Stem.

No. 481. TRUE EAGLE.

- Nos. 482-485. DA-NU-WA-INGA, Little Pipe.  
 No. 486. MON-TCHE-HON-TCHE, Big Bear.  
 No. 487. A-KI-KE-DA, The Herder.  
 No. 488. PAR-HO-CHIN-NA, Little Iowa.  
 Nos. 489, 490. WOA-INGA, Pipe-Stem.  
 No. 491. WOA-INGA and DA-NU-WA-INGA.  
 Nos. 492-494. T SHO-KE-HOE, Medicine Horse.  
 No. 495. TSHE-OANG-EH-KI-HI, Buffalo Chief.  
 No. 496. SHO-KE-HOE, TSHE-OANG-EH-KI-HI, and interpreter.  
 No. 497. SHO-KE-HOE, and interpreter.  
 No. 468. BLACK ELK.  
 No. 498.  
 Nos. 500, 501. GROUPS YOUNG BRAVES.  
 Nos. 502, 503. TWO CHIEFS.

## OTTAWAS.

*Indian Territory.*

- No. 504. SUCKER.  
 No. 505. CHE-PO-SAH, Lightning, or Henry Clay.  
 No. 506. PARTEE, or John Wilson.  
 No. 507. SHA-PON-DAH, Passing Through, or James Wind.

## OSAGE.

*Missouri.*

- No. 508. A CHIEF.  
 Nos. 509-515. VARIOUS BRAVES AND CHIEFS, without distinctive name.

## PONCAS.

*Nebraska.*

- Nos. 517, 518. GROUP: ASH-NOM-EKAH-GAHE, Lone Chief; TA-TONGA-NUZHE, Standing Buffalo; WA-GA-SA-PI, Iron Whip; WAS-TE-CO-MANI, Fast Walker.  
 No. 519. WA-GA-SA-PI, Iron Whip.  
 No. 520. A GROUP.  
 No. 521. A NATIVE DRAWING.

## POTTAWATOMIE.

*Kansas.*

- No. 522. MZHIK-KI-AN, Thunder Coming Down to the Ground.

## PAWNEE.

*Nebraska.*

- No. 523. VILLAGE.  
 No. 524. A MUD LODGE.  
 Nos. 525-527. GROUPS OF INDIAN CHILDREN attending the school.  
 Nos. 528, 529. GROUP OF CHIEFS.

- Nos. 530, 532. PE-TA-LA-SHARU, Man and Chief.  
 No. 533. THE EAGLE CHIEF.  
 No. 534. SHA-KO-RA-TA-WAR-RUX, Sun Chief.  
 No. 535. TER-RER-EKUX.  
 No. 536. GROUP OF SQUAWS.  
 Nos. 537-539. THE SCHOOL-BUILDING.  
 No. 540. NATIVE PAINTING ON ROBE.  
 Nos. 541, 542. THE AGENCY BUILDINGS.  
 Nos. 543, 544. KO-TOW-E-KAT-SU, Prairie Chicken.  
 Nos. 545, 546. SQUAW OF PRAIRIE CHICKEN.  
 No. 547. KI-NI-I-KUH, Buffalo Bull.  
 No. 548. TI-RI-WAT'KA-DA HUK, The Conquerer.  
 No. 549. LA-HAK-TA-DU HI-SHA A-DUE, Medicine Pipe Chief.  
 Nos. 550, 551. GROUPS OF CHIEFS.  
 Nos. 552, 553. GROUPS OF CHIEFS, with interpreter.  
 Nos. 554-557. BATISTE BAHAEAL, interpreter.  
 Nos. 558, 559. BLUE HORSE.  
 No. 560.  
 Nos. 561-563.  
 Nos. 564-566. GROUPS OF YOUNG BRAVES.  
 Nos. 567-572. GROUPS IN THEIR VILLAGE.  
 Nos. 573, 574. GROUPS OF CHIEFS IN THE VILLAGE.  
 No. 575. KE-WUK-TE-WA-NA.  
 No. 576. SA-KA-DE-TA.  
 Nos. 577-590. VARIOUS BRAVES AND CHIEFS without names.  
 Nos. 291-595. GROUPS OF BRAVES AND CHIEFS.  
 No. 596. TA-KA-DE-TER-ISK.  
 No. 597. KE-WUK.  
 No. 598. PRAIRIE CHICKEN.  
 Nos. 599-610. VARIOUS BRAVES OF THE TRIBE.  
 No. 611. SQUAW AND PAPOOSE.  
 No. 612. A SQUAW.

## PUEBLO.

*New Mexico.*

- Nos. 613-627. A SERIES OF PORTRAITS made in New Mexico in 1871,  
 for Mr. Blackmore; at present they are without other than  
 tribal name.  
 Nos. 628-642. VIEWS IN ISLETTA, Pueblo village.  
 No. 643. AMBROSIA ABEITA.  
 No. 644. ALEJANDRO PADILLO.  
 Nos. 645-648. GROUPS ABEITA AND PADILLO.  
 No. 649. GOVERNOR ARNY, of New Mexico.

## PAPAGO.

- Nos. 650, 651. ASCENSION RIOS.

## PIMOS.

- Nos. 653, 654. LUIG MORAGUE.  
 Nos. 655, 656. ANTONIO AZUL.

## SHOSHONES, OR SNAKES.

*[Idaho Territory.*

- Nos. 657, 658. VILLAGE IN SOUTH PASS.  
 Nos. 659, 660. WAR-CHIEF'S TENT.  
 Nos. 661, 662. WASH-A-KIE AND HIS WARRIORS.  
 Nos. 663, 664. WASH-A-KIE.  
 Nos. 665, 666. VIEWS IN VILLAGE.  
 No. 667. CHARLIE.  
 Nos. 668-673. OUT-DOOR GROUPS.  
 No. 676. VENUS AND ADONIS.

## SAC AND FOX.

*Kansas.*

- No. 667. KEO-KUK, Watchful Fox, sr.  
 Nos. 678-682. KEO-KUK, jr.  
 Nos. 683, 684. CHARLEY KEO-KUK.  
 Nos. 685, 686. MOLESS.  
 Nos. 687, 688. SAC-A-PEE.  
 Nos. 689, 690. MOLESS and SAC-A-PEE.  
 No. 691. KNA-SA-WA-KNUT, Geo. Gomez.  
 No. 692. DEAD INDIAN.  
 No. 693. THE SEA.  
 No. 694. BIG BEAR.  
 Nos. 695-699. MA-KO-HO-KO.  
 No. 700. MA-NO-TO-WAH.  
 Nos. 701, 702. GEO. GOMEZ.  
 No. 703. KEO-KUK, sr.  
 Nos. 706, 707. KEO-KUK, SON, AND THREE BRAVES.  
 No. 708. SAC CHIEF.  
 No. 709. GROUP OF SAC AND FOX CHIEFS.  
 No. 710. COMMISSIONER BOGY AND GROUP OF CHIEFS.  
 No. 805. GROUP OF FOX CHIEFS.  
 No. 806. COMMISSIONER BOGY READING TREATY.

## SHAWNEES.

- No. 711. WA-WA-SI-SI-MO.  
 No. 712. F. A. ROGERS.  
 No. 713. CHARLES TUCKER.  
 Nos. 716-727. BERTRAM.

## SEMINOLE.

*Florida.*

- No. 714. OH-LACTA-MICO, Billy Bow-Legs.

## - SENECA.

- No. 715. GENERAL PARKER'S DAUGHTER.

## TONKAWAY.

- Nos. 728-731. SKULL OF MEDICINE MAN.

## TOCHANA.

- Nos. 732, 733. HATONA, Many Horns.  
 Nos. 734, 735. I-STE-S'A PA, Black Eye.  
 Nos. 736, 737. TO-KAN-HAS-KA, Long Fox.

## TAWACARRO.

- Nos. 738, 739. DAVE.  
 Nos. 740, 741. CAW-HAC-ITS-CA, Dave's son.

## WACO.

- Nos. 742, 743. LONG SOLDIER.

## WICHITA.

- Nos. 744, 745. ESADEWUR.  
 Nos. 746, 747. ESQUITZCHEW.  
 No. 748. BLACK HORSE.

## YUMA.

*Arizona Territory.*

- Nos. 749, 750. CHARLIE ARRI-WA-WA.

## UTES.

*Utah and Colorado.*

- No. 751.  
 No. 752.  
 No. 753.  
 No. 754.  
 No. 755. YOUNG FRIDAY.  
 Nos. 756-758. AN-TE-RO, Graceful Walker.  
 Nos. 759, 760. WA-NE-RO, Yellow Pollen.  
 Nos. 761, 762. TAP-I-YU-NA, He who wins the race.  
 Nos. 763, 764. KO-MUS, the son of Another.  
 Nos. 765-767. OURAY.  
 No. 768. GUERRO.  
 No. 769. JOHN.  
 No. 770. KWA-KO-NUT, A King.  
 No. 771. CU-RA-CAN-TO.  
 No. 772, 773. SHA-VA-NO, War-Chief.  
 No. 774. WA-RETS and SHAVANO.  
 No. 775. GROUP: OURAY, GUERRO, SHAVANO, WARENCY, ANKATOSH.  
 No. 776. GROUP OF SEVEN.  
 No. 777. SHU-RI-PE, Lodge Pole's son.  
 No. 778. CHIPPIN, Always Riding.  
 No. 779. LITTLE SOLDIER.  
 No. 780. SQUAW OF LITTLE SOLDIER.  
 No. 781. TA-GA-CHA-NICK.  
 No. 782. WOLF.  
 No. 783. RAINBOW.  
 No. 784. NICOROD, Green Leaf.

- No. 785. PEAON, Black Tail Deer.  
 No. 786. SOBITA.  
 No. 787. SAPPX and son.  
 No. 788. CHU.  
 No. 789. KANOSH.  
 No. 790. A CHIEF.  
 No. 791. A GROUP.  
 No. 792. GROUP, HORSE-BACK.  
 No. 793. THE THREE GRACES.  
 Nos. 795-798. VARIOUS BRAVES.  
 Nos. 799, 800. BOY AND GIRL.  
 Nos. 801-806. VARIOUS GROUPS.  
 No. 935. COLORADO.

## WINNEBAGOES.

*Nebraska.*

- No. 807. WAR-CHIEF.  
 No. 808. GROUP OF BRAVES.  
 Nos. 809-811. A YOUNG HEREDITARY CHIEF.  
 Nos. 812, 813. YOUNG SQUAWS.  
 No. 814. SQUAW AND PAPOOSE.

## MISCELLANEOUS.

- No. 180. A CLALLAM MAN AND CHEMAKUM FEMALES.  
 No. 413. A LORETTO FAMILY; three generations.  
 No. 516. GROUP OF OCCOWAS OF BRITISH GUIANA.  
 Nos. 815-830. GROUPS AT FORT LARAMIE.  
 No. 831. INDIAN BURIAL.  
 No. 832. DEAF AND DUMB INDIAN.  
 No. 833.  
 No. 834. ENCAMPMENT AT FORT LARAMIE.  
 No. 835. INDIANS CROSSING LARAMIE RIVER.  
 No. 836. BLUFFS NEAR LARAMIE.  
 No. 837. LARAMIE RIVER.  
 No. 838. DELEGATION AT THE WHITE-HOUSE.  
 No. 839. SAINT MARY'S MISSION, Kansas.  
 Nos. 840, 841. GROUPS OF CHILDREN AT SAINT MARY'S MISSION.  
 No. 842. INSCRIPTION ROCK, Indian Cave, Kansas.  
 No. 843. INDIAN CAVE, Kansas.  
 No. 844. INSCRIPTION ROCK, Smoky Hill, Kansas.  
 No. 845. SERGEANT OF THE ESCORT.  
 No. 846. MOUNT AGAZZI, Teton Pass.  
 No. 847. ZUNI.  
 No. 848. ISLETTA.  
 No. 849. CHURCH AT ISLETTA.  
 No. 850. FORT LARAMIE.  
 Nos. 861-883. VARIOUS INDIAN AGENTS.  
 Nos. 848-888. Not determined.





DEPARTMENT OF THE INTERIOR,  
U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES.  
F. V. HAYDEN, U. S. GEOLOGIST-IN-CHARGE.

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MISCELLANEOUS PUBLICATIONS—No. 6.

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# METEOROLOGICAL OBSERVATIONS

MADE DURING

THE YEAR 1873 AND THE EARLY PART OF THE YEAR 1874

IN

COLORADO AND MONTANA TERRITORIES.

PREPARED FOR PUBLICATION BY

GEORGE B. CHITTENDEN.

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WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1874.



### NOTES.

The observations in Montana are the continuation of those published in 1873, as made by Mr. Peter Koch, and have been carried on by the same gentleman.

The observations on Mount Lincoln were made by Mr. William Cotton, those at Fairplay by Mr. Miller, and those at Cañon City by Mr. C. W. Talbot.

The barometer employed by Mr. Koch is an aneroid; at the other station, Green's Mountain, barometers are used, and thermometers, by the same maker.

The relative humidities are taken from Glaisher's Tables, as published by the Smithsonian Institution.



Meteorological register from March 23, 1873, to May 31, 1873, at Bozeman, Mont

FOR THE WEEK ENDING MARCH 29, 1873.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.			WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direction.	Amount.	Direction.			
1873 Mar. 23	7 a. m.	.....	.....	33.1	31.2	.78	.....	.....	.....	.....	.....	54.3	21.0	} Occasional snow showers; water in gauge, 0.20.
	9 p. m.	.....	.....	40.6	37.8	.77	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	31.9	30.4	.86	.....	.....	.....	.....	.....	.....	.....	
	7 a. m.	.....	.....	17.8	17.7	1.00	.....	.....	.....	.....	.....	.....	.....	
	2 p. m.	.....	.....	29.8	28.1	.84	.....	N. W.	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	13.2	12.9	.96	.....	.....	.....	.....	.....	.....	.....	
	7 a. m.	.....	.....	20.7	19.0	.49	.....	.....	.....	.....	.....	.....	.....	
25	9 p. m.	.....	.....	40.8	35.0	.58	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	32.3	30.2	.76	.....	S. W.	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	35.2	33.1	.81	.....	S. W.	.....	.....	.....	.....	.....	
26	7 a. m.	.....	.....	47.4	39.5	.52	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	37.8	34.9	.75	.....	.....	.....	.....	.....	.....	.....	
27	7 a. m.	.....	.....	27.7	27.3	.89	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	34.8	31.2	.65	.....	.....	.....	.....	.....	.....	.....	
28	9 p. m.	.....	.....	30.0	29.7	.93	.....	.....	.....	.....	.....	.....	.....	
	7 a. m.	.....	.....	32.8	31.4	.80	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	46.3	37.8	.47	.....	.....	.....	.....	.....	.....	.....	
29	9 p. m.	.....	.....	39.1	34.3	.63	.....	.....	.....	.....	.....	.....	.....	
	7 a. m.	.....	.....	29.1	29.0	1.00	.....	.....	.....	.....	.....	.....	.....	
9 p. m.	.....	.....	.....	38.1	33.2	.62	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	24.1	22.2	.54	.....	.....	.....	.....	.....	.....	.....	

FOR THE WEEK ENDING APRIL 12, 1873.

April 6	7 a. m.	.....	.....	29.0	27.0	.67	.....	.....	.....	.....	.....	.....	.....	} Snow, night; 8 a. m. 2.80 inches; water, 0.22 inch.
	9 p. m.	.....	.....	34.9	33.1	.81	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	13.6	13.0	.82	.....	.....	.....	.....	.....	.....	.....	
7	7 a. m.	.....	.....	26.0	23.1	.44	.....	.....	.....	.....	.....	.....	.....	
	9 p. m.	.....	.....	38.9	35.7	.76	.....	.....	.....	.....	.....	.....	.....	
8	9 p. m.	.....	.....	25.3	24.0	.63	.....	.....	.....	.....	.....	.....	.....	
	7 a. m.	.....	.....	28.4	26.2	.58	.....	.....	.....	.....	.....	.....	.....	
9 p. m.	.....	.....	47.0	39.8	.57	.....	.....	.....	.....	.....	.....	.....	.....	

Meteorological register, &c., at Bozeman, Mont.—Continued.  
 FOR THE WEEK ENDING APRIL 12, 1873—Continued.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.			WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direction.	Amount.	Direction.			
1873. April 9	9 p. m.		37.1	37.1	34.0	.75	10	Nimbus.		S. W.	4	48.0	27.5	Snow 1 p. m.; 10 a. m. 3.8 inches; water, 0.35 inch.
	7 a. m.		31.8	31.0	31.0	.87	10	do		W.	4			
10	2 p. m.		45.3	43.4	43.4	.92	6	Cirro-cumulus, cirrus			2			
	9 p. m.		32.9	31.3	31.3	.78	10	Nimbus	N.	S. W.	1			
	7 a. m.		40.0	35.1	35.1	.63	1	Cirro-cumulus, cirro-stratus	0	N. W.	1	50.5	28.0	
	2 p. m.		49.2	40.8	40.8	.53	1	Cirro-stratus	0	N. W.	1			
11	9 p. m.		33.0	29.9	29.9	.68	3	Cirrus, cirro-stratus	0	S. W.	1			
	7 a. m.		36.8	31.9	31.9	.61	9	Nimbus, cirrus	0		3	63.1	29.8	
	2 p. m.		58.1	44.2	44.2	.37	0			S. W.	0			
	9 p. m.		41.4	35.4	35.4	.58	5	Cirro-cumulus, cirro-stratus	S.	N.	1			
12	7 a. m.		37.0	35.8	35.8	.91	10	Nimbus, cirrus	S. W.	S. W.	2	46.0	32.4	Night, snow; water 0.09 inch.
	2 p. m.		38.3	34.6	34.6	.69	10	Nimbus		W.	3			
	9 p. m.		31.3	29.8	29.8	.80	10	do		S. W.	1			

FOR THE WEEK ENDING APRIL 19, 1873.

April 13	7 a. m.		32.5	30.8	30.8	.82	10	Nimbus			3	46.4	28.2	Snow, night; water in gauge 0.08 inch.
	2 p. m.		40.0	33.6	33.6	.57	5	Cumulus, cirro-cumulus	N. W.	N. W.	1			
14	9 p. m.		27.7	26.2	26.2	.70	4	do	N.	N.	1			
	7 a. m.		33.0	29.1	29.1	.52	0			S. E.	1	47.3	19.5	
	2 p. m.		45.7	34.6	34.6	.38	0			S. E.	2			
	9 p. m.		28.5	24.3	24.3	.40	0			E.	3			
15	7 a. m.		38.8	38.8	38.8	.50	2	Cirrus, cirro-stratus	0	S. E.	1	55.4	21.0	
	2 p. m.		52.6	40.5	40.5	.39	0			E.	2			
	9 p. m.		37.1	29.8	29.8	.49	0			E.	2			
	7 a. m.		44.1	35.9	35.9	.50	0			E.	2	62.1	25.7	
17	2 p. m.		62.1	47.7	47.7	.38	1	Cirro-stratus	N. W.	N. W.	1			
	9 p. m.		40.0	33.2	33.2	.52	0			S. E.	2			
	7 a. m.		42.7	35.8	35.8	.59	8	Cirrus, cirro-stratus	S. W.	S. W.	1	71.3	31.0	
	2 p. m.		65.0	46.8	46.8	.28	4	Cirrus, cirro-cumulus	S. W.	N. E.	1			
18	9 p. m.		48.4	36.8	36.8	.44	2	Nimbus, cirrus	S. E.	S. E.	4			
	7 a. m.		49.6	40.8	40.8	.49	9	do	S. W.	S. E.	1	66.6	40.2	

Time	63.5	47.4	35	1	Cumulus, cirro-cumulus.....	S. W.	0	S. W.	68.0	38.0
19 2 p. m.	63.5	47.4	35	1	Cumulus, cirro-cumulus.....	S. W.	0	S. W.	68.0	38.0
9 p. m.	46.9	40.5	61	1	Nimbus.....	S. W.	1	S. W.	68.0	38.0
7 a. m.	51.2	44.4	58	2	Cirrus, cirro-stratus.....	0	0	S.	68.0	38.0
2 p. m.	67.8	56.4	33	1	Cirro-cumulus.....	0	0	S. E.	68.0	38.0
9 p. m.	45.6	40.7	66	0	.....	0	2	S. E.	68.0	38.0

FOR THE WEEK ENDING APRIL 26, 1873.										
Time	50.6	44.2	64	9	Cirrus, cirro-stratus.....	S. W.	1	S. E.	76.8	37.1
20 7 a. m.	50.6	44.2	64	9	Cirrus, cirro-stratus.....	S. W.	1	S. E.	76.8	37.1
2 p. m.	76.8	54.1	25	1	Cirro-stratus.....	S. W.	1	W.	76.8	37.1
9 p. m.	57.8	44.2	39	6	Nimbus.....	S. W.	2	S. E.	76.3	49.3
7 a. m.	54.0	43.6	47	1	do.....	S. W.	1	S. E.	76.3	49.3
2 p. m.	72.3	54.2	32	8	Nimbus, cirro-cumulus.....	S. W.	0	S. W.	76.3	49.3
9 p. m.	37.5	36.8	96	10	Nimbus.....	0	1	S. W.	76.3	49.3
7 a. m.	34.3	33.9	95	10	do.....	0	2	S. W.	35.2	30.8
2 p. m.	23.3	24.9	87	10	do.....	0	5	S. E.	35.2	30.8
9 p. m.	14.3	14.1	89	4	do.....	0	7	E.	35.2	30.8
7 a. m.	18.3	17.8	82	10	do.....	0	6	E.	29.0	6.5
2 p. m.	23.8	21.2	44	4	Cumulus.....	E.	6	E.	29.0	6.5
9 p. m.	16.2	15.4	68	1	do.....	E.	4	E.	29.0	6.5
7 a. m.	23.0	21.6	60	1	Cumulus, cumulo-stratus.....	E.	0	E.	34.6	7.3
2 p. m.	33.9	30.8	71	1	Cumulus.....	E.	4	E.	34.6	7.3
9 p. m.	23.0	21.7	72	0	.....	0	3	E.	34.6	7.3

Rain and snow 7 p. m. ; 1 p. m., water, 0.42 inches.

FOR THE WEEK ENDING MAY 10, 1873.										
Time	59.5	49.2	50	2	Cirro-cumulus.....	0	1	S. W.	66.5	40.0
May 4 7 a. m.	59.5	49.2	50	2	Cirro-cumulus.....	0	1	S. W.	66.5	40.0
2 p. m.	63.2	48.9	39	10	do.....	0	2	N. W.	66.5	40.0
9 p. m.	46.5	43.8	85	10	Nimbus.....	0	1	N. W.	66.5	40.0
7 a. m.	54.2	45.0	51	4	Cirro-cumulus, cumulus.....	N. W.	1	N. W.	61.2	40.0
2 p. m.	50.0	44.1	63	9	Nimbus.....	0	1	N. W.	61.2	40.0
9 p. m.	34.3	30.1	63	1	Cirrus.....	0	1	S. W.	61.2	40.0
7 a. m.	51.3	42.2	50	1	Cirro-cumulus.....	S. W.	2	S. W.	57.6	26.5
2 p. m.	51.4	39.5	39	9	Nimbus, cumulus.....	S. W.	2	S. W.	57.6	26.5
9 p. m.	33.0	32.5	94	10	Nimbus.....	0	1	S. W.	57.6	26.5
7 a. m.	35.0	34.5	98	10	do.....	0	1	N. W.	45.1	29.5
2 p. m.	43.2	40.3	78	8	do.....	0	1	N. W.	45.1	29.5
9 p. m.	32.0	30.0	76	7	Nimbus, cirro-cumulus.....	N. E.	1	N. E.	45.1	29.5

Observer absent; no record kept; nor for the week ending May 3, 1873.

Rain 8 p. m.; 12 p. m., 0.20 inch.  
Showers; 0.02 inch.  
Snow 9 p. m.; 7 a. m., water, 0.52 inch.

FOR THE WEEK ENDING MAY 10, 1873—Continued.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.		WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Amount.	Direction.			
1873. May 8	7 a. m.	.....	45.9	45.9	41.0	.66	3	Cumulus, cirro-cumulus.....	0	.....	51.4	32.0	Showers, 0.01 inch.
	2 p. m.	.....	49.9	49.9	40.0	.45	9	Nimbus, cirro-cumulus.....	2	N. E.	.....	.....	
	9 p. m.	.....	33.1	33.1	32.0	.80	2	Cirro-cumulus, cirro-stratus.....	1	N. E.	.....	.....	
9	7 a. m.	.....	45.8	45.8	37.4	.45	2	Cumulus, cirro-cumulus.....	1	S. W.	56.4	30.5	.....
	2 p. m.	.....	55.8	55.8	43.7	.42	1	Cirro-cumulus.....	1	W.	.....	.....	
	9 p. m.	.....	38.1	38.1	33.2	.62	0	.....	0	S. W.	.....	.....	
10	7 a. m.	.....	56.1	56.1	45.6	.48	0	Cirro-stratus.....	0	.....	68.8	39.1	.....
	2 p. m.	.....	68.6	68.6	49.7	.53	1	.....	0	N. W.	.....	.....	
	9 p. m.	.....	44.3	44.3	37.2	.55	0	.....	2	S. W.	.....	.....	

FOR THE WEEK ENDING MAY 17, 1873.

May 11	7 a. m.	.....	61.8	61.8	50.0	.44	8	Cirrus, cirro-stratus.....	0	N. W.	75.0	36.9	.....
	2 p. m.	.....	68.9	68.9	52.3	.35	8	Cirro-cumulus, nimbus.....	2	W.	.....	.....	
	9 p. m.	.....	47.0	47.0	41.2	.61	2	Cirro-cumulus, cirro-stratus.....	0	S. W.	78.7	39.9	
12	7 a. m.	.....	65.8	65.8	51.7	.42	1	Cirrus.....	1	.....	.....	.....	.....
	2 p. m.	.....	57.1	57.1	51.3	.66	8	Nimbus, cirrus.....	0	S. W.	.....	.....	
	9 p. m.	.....	46.2	46.2	46.3	.85	10	Nimbus.....	0	.....	.....	.....	
13	7 a. m.	.....	55.1	55.1	50.2	.70	6	Cumulus, cirro-cumulus.....	0	W.	64.0	30.3	Rain, night; 0.09 inch.
	2 p. m.	.....	62.3	62.3	46.4	.33	7	.....do.....	2	N. W.	.....	.....	
	9 p. m.	.....	43.4	43.4	39.0	.71	8	Nimbus, cumulus.....	0	W.	64.8	32.3	
14	7 a. m.	.....	52.7	52.7	44.2	.51	8	Cumulus, cirro-cumulus.....	0	W.	.....	.....	.....
	2 p. m.	.....	62.7	62.7	47.0	.43	6	Nimbus, cumulus.....	0	W.	.....	.....	
	9 p. m.	.....	42.9	42.9	38.1	.65	0	.....	4	E.	55.6	37.8	
15	7 a. m.	.....	45.0	45.0	39.0	.61	9	Nimbus, cumulus.....	3	E.	.....	.....	.....
	2 p. m.	.....	53.4	53.4	42.1	.43	9	Cirrus, cirro-cumulus.....	4	E.	.....	.....	
	9 p. m.	.....	43.9	43.9	35.7	.54	10	Nimbus.....	3	E.	50.0	38.8	
16	7 a. m.	.....	45.6	45.6	42.3	.60	10	.....do.....	2	E.	.....	.....	.....
	2 p. m.	.....	48.9	48.9	42.3	.62	10	.....do.....	2	E.	.....	.....	
	9 p. m.	.....	38.5	38.5	36.7	.85	4	Nimbus, cirrus.....	0	E.	58.0	37.0	
17	7 a. m.	.....	49.0	49.0	44.1	.67	9	Nimbus, cumulus.....	2	E.	.....	.....	Rain, night; 0.02 inch.
	2 p. m.	.....	55.2	55.2	46.2	.52	5	.....	0	E.	.....	.....	
	9 p. m.	.....	41.6	41.6	37.8	.71	1	Stratus.....	3	E.	.....	.....	



FOR THE WEEK ENDING MAY 24, 1873.

18	7 a. m.	57.5	45.3	.42	1	Cumulus, cirro-cumulus	0	1	N.	67.5	33.2
	2 p. m.	62.3	45.2	.31	1	Cumulus	0	1	N.		
	9 p. m.	48.1	42.0	.62	10	Cumulus, cirro-cumulus	E.	5	E.	53.8	37.0
19	7 a. m.	38.2	37.3	.91	10	Nimbus		2	N.		
	2 p. m.	40.6	43.1	.62	10	do		1	N.		
	9 p. m.	42.0	38.8	.76	10	do		1	N.W.		
20	7 a. m.	52.8	46.2	.59	8	Nimbus, cirrus	N. W.	0	W.	60.8	37.0
	2 p. m.	58.4	47.7	.49	9	Nimbus, cumulus	W.	0	W.		
	9 p. m.	40.1	39.8	.98	10	Nimbus		0	S. W.	43.0	33.0
21	7 a. m.	34.5	34.4	.99	10	do		1	S. W.		
	2 p. m.	40.2	39.6	.95	10	do		1	S. W.		
	9 p. m.	34.3	33.2	.88	10	do		1	S. W.	51.9	33.2
22	7 a. m.	38.3	37.7	.95	10	do		1	S. W.		
	2 p. m.	45.0	42.5	.81	10	do	N. W.	0	N. W.		
	9 p. m.	39.8	38.5	.89	8	do		2	N. E.	50.0	38.3
23	7 a. m.	41.8	42.4	.82	10	do		3	E.		
	2 p. m.	46.7	43.1	.75	10	do		1	E.		
	9 p. m.	42.0	38.4	.73	10	do		1	E.		
24	7 a. m.	37.0	36.3	.91	10	do		2	S. E.	44.0	35.0
	2 p. m.	42.3	40.2	.84	10	do		2	E.		
	9 p. m.	38.8	37.7	.91	10	do		1	E.		

From 8 p. m. of the 20th to 10 p. m. of the 24th, it rained nearly all the time. The first night several inches of snow fell; afterward it changed to a cold rain, with frequent intervals, a struggle evidently going on all the time between the E. and W. winds. Water in gauge, 2.37 inches.

FOR THE WEEK ENDING MAY 31, 1873.

25	7 a. m.	48.8	44.2	.70	3	Cumulus	S. W.	1	S. W.	61.8	33.2
	2 p. m.	50.8	49.4	.59	3	Cirrus, cumulus, cirro-cumulus	0	0	N. W.		
	9 p. m.	44.9	40.9	.72	3	Cirrus, cirro-stratus	0	0	N. W.		
26	7 a. m.	66.3	50.0	.35	5	do	0	2	S. W.	72.2	36.6
	2 p. m.	63.3	50.8	.42	10	Nimbus	0	0	S. W.		
	9 p. m.	42.9	41.8	.92	7	Nimbus, cirrus		0	S. W.	65.1	33.9
27	7 a. m.	51.9	45.0	.63	3	Nimbus, cumulus	S. W.	1	S. W.		
	2 p. m.	62.6	49.0	.41	5	Cumulus	S. W.	1	S. W.		
	9 p. m.	42.0	40.7	.92	10	Nimbus		3	E.	47.4	37.0
28	7 a. m.	45.0	42.4	.81	10	do		0	S. W.		
	2 p. m.	44.8	41.4	.78	10	do		1	S. W.		
	9 p. m.	39.0	37.4	.85	10	do		1	N. W.	58.4	37.4
29	7 a. m.	46.4	44.7	.85	10	do		1	S. W.		
	2 p. m.	57.8	50.6	.61	9	do		0	S. W.		
	9 p. m.	42.0	41.8	.98	10	do		0	S. W.		
30	7 a. m.	34.2	34.1	.98	10	do		0	S. W.		
	2 p. m.	42.8	40.4	.80	6	Nimbus, cirro-cumulus	S. W.	0	S. W.	51.9	32.2
	9 p. m.	35.2	35.1	.99	10	Nimbus, cirro-cumulus		1	N. W.		
31	7 a. m.	48.1	41.4	.55	7	Nimbus, cirro-cumulus	S. W.	2	S. W.	57.8	31.0
	2 p. m.	56.2	46.3	.48	5	do	S. W.	2	S. W.		
	9 p. m.	39.8	35.0	.64	4	Cumulus, cirro-cumulus	S. W.	1	S. W.		

Rain, night; 0.03 inch.  
 Rain, night; 0.02 inch.  
 Rain 6 p. m.; water 0.09 inch.  
 Rain 6 p. m.; 1 p. m. 0.49 inch.  
 Rain, night 0.17 inch.  
 Rain 3 p. m.; 12 m. 1.21 inches.  
 Rain 6 p. m.; 2 a. m. 0.46 inch.

*Meteorological register from November 10, 1873, to January 31, 1874, at Judith Basin, Mont.*

FOR THE WEEK ENDING NOVEMBER 15, 1873.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.			WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direction.	Amount.	Direction.			
1873. Nov. 10	6½ a. m.	25.03	50°				9	Nimbus, cirro-stratus.	S. W.	1	S. W.			At crossing of Muscelshehl. At springs on west side of Judith Gap.
	5 p. m.	24.32	37°				2	Nimbus, cumulus.	N. W.	5	N. W.			
11	9 p. m.						3	Cirrus, cirro-cumulus.	N. W.	2	N. W.			At Judith Gap. Do.
	5½ p. m.	24.57	30°				0			0				
12	9 p. m.	24.48	28°				1	Cirrus.	N. W.	1	N. W.			Do. At the base of the Big Snower's, near Beaver Creek.
	7 a. m.	24.28	27°				0			1	S.			
13	9 p. m.	24.40	37°				0							At the mouth of the cañon of Big Cottonwood Creek. Do.
	7 a. m.	24.33	33°				0			1	S. E.			
14	1 p. m.	24.37	63°				0			2	N. E.			At Big Cottonwood. At Fort Defiance, a trading post on Trout Creek, (or Big Spring Creek,) where all the subsequent observations are taken.
	6 p. m.	24.30	49°				0	Cirrus, cirro-stratus.	0	1	S. E.			
15	7 a. m.	24.41	40°				2	Cumulus, cumulo-stratus.	S. W.	1	S. W.			Dense, smoky atmosphere.
	5 p. m.	24.85	44°				7			2				
15	9 p. m.						5	Cirrus-cumulus, cirrus.	S. E.	2	S. E.			
	7 a. m.	24.98	24°				4			2	S. W.			
	5 p. m.	25.02	43°				0			3	S. W.			

FOR THE WEEK ENDING NOVEMBER 22, 1873.

Nov. 16	2 a. m.		30°											It began raining at 11 p. m.; rained hard and blew furiously from S. W. to 1 a. m., when the wind fell and the rain changed to snow, 4 inches deep.
	7 a. m.	25.08	47°				10	Nimbus.	S. W.	2	S. W.			
	2 p. m.	24.90	64°				9	Nimbus, cirro-cumulus.	S. W.	5	S. W.			

17	6 p. m.	24.90	55	2	Cumulus, cumulo-stratus.	S. W.	4	S. W.
	8 a. m.	25.02	32°	5	Nimbus, cirrus	N. W.	4	N. W.
	3 p. m.	25.28	35°	6	do	N. W.	2	N. W.
	7 p. m.	25.40	30°	0	do		0	
18	8 a. m.	25.38	18°	0	do		0	
	6 p. m.	25.12	19°	0	do		0	
	8 p. m.	25.10	13°	0	Cirrus, cirro-stratus.	N. W.	0	
19	2 a. m.	24.94	20°	8	Nimbus, cirrus.	W.	2	W.
	2 p. m.	25.33	47°	3	do		3	S. W.
	8 p. m.	25.17	36°	0	do	0	0	
20	8 a. m.	25.17	17°	0	do	0	0	
	2 p. m.	25.02	38°	0	do	0	0	
	8 p. m.	24.93	16	3	Cirrus, cirro-stratus.	W.	2	S. E.
21	2 a. m.	24.88	27°	10	Nimbus.	E.	3	E.
	2 p. m.	24.78	37°	10	do	E.	1	E.
	8 p. m.	24.72	31°	10	do		1	S. W.
22	8 a. m.	25.03	31°	1	do	S. W.	1	N. W.
	2 p. m.	25.07	39°		do	N. W.		
	9 p. m.							

Began snowing at 8 p. m.; fell 2 inches during night. Snow melting rapidly.

FOR THE WEEK ENDING NOVEMBER 29, 1873.

Nov. 23	8 a. m.	25.02	39	0	Nimbus.	S. W.	2	S. W.
	8 p. m.	24.98	38	2	do		3	S. W.
24	9 p. m.	25.13	35°	10	Nimbus.		1	S. W.
	8 a. m.	25.05	35	10	do		1	S.
	9 p. m.							
25	9 a. m.	24.78	51°	7	Nimbus, cirrus, cirro-stratus.	S. W.	5	S. W.
	2 p. m.	24.62	56°	6	Nimbus, cirrus.	S. W.	2	S. W.
	8 p. m.	24.58	46°	9	Nimbus.	W.	8	W.
26	7½ a. m.	25.03	10°	10	do		2	W.
	3 p. m.	25.07	20	10	do		2	W.
	8 p. m.	25.07	14	10	do		0	
27	8 a. m.	25.15	6°	0	Cirrus.	0	2	S. E.
	3½ p. m.	25.04	8°	0	do		0	
	9 p. m.	24.90	+ 1°	0	do		0	
28	8 a. m.	24.90	- 9°	0	do		0	
	2 p. m.	24.93	9°	1	Cirrus, cirro-stratus.	N. W.	0	N. E.
	9 p. m.	24.90	3°	8	Cirrus, cirro-cumulus.	S. W.	1	N. W.

Drizzling. Sprinkling; day soft and cloudy, with occasional showers of rain and snow.

A warm "Chenook" wind took all the snow off; at sun-down the wind turned westerly, blew furiously in the early part of the night; afterward calmed down and snow fell 2 inches deep. Snowing all day to the depth of 4 inches.

At 3 p. m. a cold, raw, fresh wind came from N. W.; cleared off at 8 p. m.

*Meteorological register, &c., at Judith Basin, Mont.—Continued.*

FOR THE WEEK ENDING NOVEMBER 29, 1873—Continued.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.		WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direction.	Amount.			
1873 Nov. 29	8 a. m. . . . .	25.05	0	.....	.....	.....	10	Nimbus.....	.....	1	N. W.	.....	Snowing lightly all day; $\frac{1}{4}$ inches deep.
	2 p. m. . . . .	25.05	6°	.....	.....	.....	10	do.....	.....	2	N. W.	.....	
	9 p. m. . . . .	25.03	3	.....	.....	.....	10	do.....	.....	0	.....	.....	

FOR THE WEEK ENDING DECEMBER 6, 1873.

Nov. 30	8 a. m. . . . .	25.02	- 5°	.....	.....	.....	8	Nimbus, cirrus, cirro-stratus..	S. W.	1	S. W.	.....	.....
	3 p. m. . . . .	24.90	5°	.....	.....	.....	6	Cirrus, cirro-stratus.....	W. W.	2	N. E.	.....	.....
Dec. 1	9 p. m. . . . .	24.78	4	.....	.....	.....	10	Nimbus.....	W. W.	2	N. E.	.....	.....
	8 a. m. . . . .	24.86	- 3°	.....	.....	.....	10	do.....	W. W.	2	S. W.	.....	.....
2	2 p. m. . . . .	24.90	0	.....	.....	.....	8	Nimbus, cirrus.....	S. S.	2	S. W.	.....	.....
	9 p. m. . . . .	24.92	14	.....	.....	.....	10	Nimbus.....	W. W.	1	S. W.	.....	.....
3	8 a. m. . . . .	24.98	- 11	.....	.....	.....	10	do.....	W. W.	1	S. W.	.....	.....
	2 p. m. . . . .	25.03	0	.....	.....	.....	4	Cirro-cu., cirrus, cirro-stratus.	S. W.	1	S. W.	.....	.....
4	9 p. m. . . . .	25.00	20°	.....	.....	.....	0	.....	.....	0	.....	.....	.....
	9 a. m. . . . .	24.92	6°	.....	.....	.....	0	.....	.....	0	.....	.....	.....
5	5 p. m. . . . .	24.76	10°	.....	.....	.....	0	.....	.....	0	.....	.....	.....
	9 p. m. . . . .	24.75	10°	.....	.....	.....	0	.....	.....	0	.....	.....	.....
6	7 a. m. . . . .	24.87	7	.....	.....	.....	2	Stratus, cirro-stratus.....	S. W.	0	.....	.....	.....
	3 p. m. . . . .	24.93	3	.....	.....	.....	0	.....	.....	2	S.	.....	.....
7	9 p. m. . . . .	24.93	14°	.....	.....	.....	0	.....	.....	0	.....	.....	.....
	9 a. m. . . . .	24.90	5°	.....	.....	.....	0	.....	.....	1	S.	.....	.....
8	5 p. m. . . . .	24.78	+ 13°	.....	.....	.....	0	.....	.....	2	S.	.....	.....
	9 p. m. . . . .	24.72	8	.....	.....	.....	0	.....	.....	2	S.	.....	.....
9	8 a. m. . . . .	24.70	9°	.....	.....	.....	0	.....	.....	0	.....	.....	.....
	5 p. m. . . . .	24.65	18	.....	.....	.....	0	.....	.....	0	.....	.....	.....
10	9 p. m. . . . .	24.58	22	.....	.....	.....	10	Nimbus, cirrus.....	.....	0	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

FOR THE WEEK ENDING DECEMBER 13, 1873.

Dec. 7	7 a. m. . . . .	24.59	25°	.....	.....	.....	8	Cirrus, nimbus.....	S. W.	0	.....	.....	Raw, disagreeable day, with occasional snow showers $\frac{1}{2}$ in. deep.
	12½ p. m. . . . .	24.63	27°	.....	.....	.....	10	Nimbus.....	S. W.	3	S. W.	.....	

A thin frost-mist most of the day.

FOR THE WEEK ENDING DECEMBER 20, 1873.

8	9 p. m.	24.88	13	10	do	S.W.	4	S.W.
	7 1/2 a. m.	25.07	4°	7	Nimbus, cirrus.	S.W.	3	S.W.
	2 p. m.	25.10	18	3	Cirrus	S.W.	0	
	10 p. m.	25.10	-8°	0			0	
9	8 a. m.	25.05	-10°	0			0	N. E.
	1 p. m.	25.02	12°	3	Cirrus	S.W.	3	N. E.
	9 p. m.	24.87	9	10	Nimbus	0	0	
10	7 a. m.	24.78	10°	5	Cirrus, cirro-stratus.	S.W.	0	
	1 p. m.	24.80	33°	4	Cumulus, cirro-cumulus	W.	3	W.
	9 p. m.	24.82	11°	0			0	
11	8 a. m.	24.84	6°	0			0	
	10 p. m.	25.08	0	0			0	
12	9 p. m.	25.10	0	0			0	
	7 a. m.	25.08	32°	0			0	
	2 p. m.	25.11	17°	0			0	S.
13	9 p. m.	25.13	17°	0			0	
	7 a. m.	25.04	31°	0			0	S.
	2 p. m.	25.04	31°	0			0	
	9 p. m.	24.98	16°	0			0	

Dec. 14	7 a. m.	24.89	22	0	Cirro-cumulus, cirrus	S.W.	1	S.
	2 p. m.	24.89	29	3	Nimbus	S.W.	3	S.W.
15	9 p. m.	24.84	28	6	Cirrus, cirro-cum., cirro-stratus	S.W.	0	
	7 a. m.	24.84	20	2	Cirrus, cirro-cum., cirro-stratus	S.W.	1	S.W.
	2 p. m.	24.87	30	3	Cirrus, cirro-cumulus	S.W.	2	S.W.
	9 p. m.	24.77	31	7	Nimbus	S.W.	3	S.W.
16	7 a. m.	24.83	26	0			5	S.W.
	2 p. m.	24.79	39	2	Cirrus	0	0	
	9 p. m.	24.80	25	8	Cirrus, cirro-stratus.	S.W.	0	
17	7 a. m.	24.83	26	5	Cirrus, cirro-cum., cirro-stratus	S.W.	2	S.W.
	2 p. m.	24.98	31	0	Misty		0	
	9 p. m.	25.09	24	1	Siratus	S.W.	2	S. E.
18	7 a. m.	25.22	9	9	Nimbus, cirro-stratus	S.W.	0	
	2 p. m.	25.19	31	7	Nimbus, cirrus	0	3	S.W.
	9 p. m.	25.15	17	8	Cumulus, cirro-cumulus.	S.W.	2	N. E.
19	7 a. m.	25.32	15°	0			0	
	2 p. m.	25.22	22	0			0	
	9 p. m.	25.07	7	3	Cirrus	S.W.	1	S. E.
20	7 a. m.	24.87	5	0			0	
	2 p. m.	24.82	28	0			0	
	9 p. m.	24.72	10	0			0	

{ Snowed in the morning, 0.1 inch; cleared off warm; at sundown a raw frost-mist came up.

FOR THE WEEK ENDING DECEMBER 27, 1873.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.			WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direction.	Amount.	Direction.			
1873. Dec. 21	7 a. m.	24.71	28	.....	.....	.....	7	Cirrus, cirro-cumulus	W.	3	W.	.....	A soft chenook wind.	
	2 p. m.	24.73	37	.....	.....	.....	10	Nimbus	W.	4	W.	.....		
	9 p. m.	24.74	27	.....	.....	.....	2	do	S. W.	3	W.	.....		
	7 a. m.	24.80	27	.....	.....	.....	9	Nimbus, cirrus, cirro-stratus	S. W.	2	S. W.	.....		
	2 p. m.	24.82	36	.....	.....	.....	9	Nimbus, cirrus	S. W.	1	S. W.	.....		
	9 p. m.	24.88	26	.....	.....	.....	0	do	S. W.	0	S. W.	.....		
	7 a. m.	25.18	19	.....	.....	.....	3	Cirrus, cirro-cum, cirro-stratus	S. W.	2	S. E.	.....		
22	2 p. m.	25.17	27	.....	.....	.....	0	Nimbus	S.	0	S.	.....	The warm chenook wind settling the snow much.	
	9 p. m.	25.17	14	.....	.....	.....	5	Nimbus	S. W.	3	S. W.	.....		
	7 a. m.	25.08	33	.....	.....	.....	9	Nimbus, cirrus	S. W.	4	S. W.	.....		
	2 p. m.	24.97	42	.....	.....	.....	10	do	S. W.	5	S. W.	.....		
	9 p. m.	24.83	34	.....	.....	.....	7	do	S. W.	4	S. W.	.....		
	7 a. m.	24.93	33	.....	.....	.....	10	do	S. W.	3	W.	.....		
	2 p. m.	24.93	32	.....	.....	.....	10	do	W.	2	W.	.....		
26	9 p. m.	25.06	19	.....	.....	.....	1	Cumulo-stratus	S. W.	3	W.	.....		
	7 a. m.	25.17	13	.....	.....	.....	0	do	S. W.	1	S. E.	.....		
	2 p. m.	25.10	30	.....	.....	.....	0	do	S. W.	0	S. E.	.....		
	9 p. m.	24.95	13	.....	.....	.....	0	do	S. W.	0	S. E.	.....		
	7 a. m.	24.88	80	.....	.....	.....	0	Cirrus, cirro-stratus	W.	0	N. W.	.....		
	2 p. m.	24.80	33	.....	.....	.....	2	Nimbus	S. W.	1	S. W.	.....		
	9 p. m.	24.73	21	.....	.....	.....	10	do	S. W.	2	S. W.	.....		
Dec. 26	7 a. m.	25.02	22	.....	.....	.....	10	Nimbus	S. W.	2	S. W.	.....	Snowing from sun-up to dark, 2.5 inches.	
	2 p. m.	25.08	21	.....	.....	.....	10	do	N. E.	3	N. E.	.....		
	9 p. m.	25.12	3	.....	.....	.....	10	do	N. E.	3	N. E.	.....		
	7 a. m.	25.03	27	.....	.....	.....	0	do	S. E.	3	S. E.	.....		
	2 p. m.	25.03	27	.....	.....	.....	4	Cirrus, cirro-stratus	S. W.	1	S. E.	.....		
	9 p. m.	24.93	14	.....	.....	.....	0	do	S. W.	2	S. W.	.....		
	7 a. m.	24.79	32	.....	.....	.....	9	Nimbus, cirrus, cirro-stratus	S. W.	4	S. W.	.....		

FOR THE WEEK ENDING JANUARY 3, 1874.

Dec. 26	7 a. m.	25.02	22	.....	.....	.....	10	Nimbus	S. W.	2	S. W.	.....	Snowing from sun-up to dark, 2.5 inches.
	2 p. m.	25.08	21	.....	.....	.....	10	do	N. E.	3	N. E.	.....	
	9 p. m.	25.12	3	.....	.....	.....	10	do	N. E.	3	N. E.	.....	
	7 a. m.	25.03	27	.....	.....	.....	0	do	S. E.	3	S. E.	.....	
	2 p. m.	25.03	27	.....	.....	.....	4	Cirrus, cirro-stratus	S. W.	1	S. E.	.....	
	9 p. m.	24.93	14	.....	.....	.....	0	do	S. W.	2	S. W.	.....	
	7 a. m.	24.79	32	.....	.....	.....	9	Nimbus, cirrus, cirro-stratus	S. W.	4	S. W.	.....	

31	2 p. m. . . . .	24.74	39	4	Cirrus, cirro-stratus . . . . .	S. W.	2	S. W.		
	9 p. m. . . . .	24.65	35	0	.....	.....	3	S. W.		
	7 a. m. . . . .	24.05	34	0	.....	.....	3	S. W.		
	2 p. m. . . . .	24.09	39	3	Cirrus . . . . .	S. W.	2	S. W.		
	9 p. m. . . . .	24.09	31	4	do . . . . .	S. W.	0	S. W.		
1874.										
Jan. 1	7 a. m. . . . .	24.55	34	3	Cirrus, cirro-cumulus . . . . .	S. W.	4	S. W.		Snow nearly gone.
	2 p. m. . . . .	24.50	39	4	Cumulus and cirro-cumulus . . . . .	S. W.	6	S. W.		
	9 p. m. . . . .	24.37	34	1	Stratus . . . . .	S. W.	5	S. W.		
2	7 a. m. . . . .	24.42	22	10	Nimbus . . . . .	.....	0	.....		
	2 p. m. . . . .	24.42	7°	10	do . . . . .	.....	2	N. W.		
	9 p. m. . . . .	24.47	3	10	do . . . . .	.....	2	N. W.		
3	7 a. m. . . . .	24.77	-4°	7	Nimbus, cirrus . . . . .	N. W.	1	N. W.		
	2 p. m. . . . .	24.76	+4	3	Cirro-cumulus, cirrus . . . . .	N. W.	0	N. W.		
	9 p. m. . . . .	24.78	1	0	.....	.....	0	.....		

FOR THE WEEK ENDING JANUARY 10, 1874.

Jan. 4	7 a. m. . . . .	24.78	8°	0	Cirrus, cirro-cumulus . . . . .	S. W.	0	S. W.		
	2 p. m. . . . .	24.78	29°	2	Nimbus . . . . .	S. W.	3	S. W.		
	9 p. m. . . . .	24.69	29	9	Nimbus, cirro-cumulus . . . . .	S. W.	7	S. W.		
5	7 a. m. . . . .	24.78	27	5	Nimbus, cirro-cumulus . . . . .	S. W.	2	S. W.		
	2 p. m. . . . .	24.87	30	1	Cirrus, cumulus . . . . .	W.	4	S. W.		
	9 p. m. . . . .	24.93	17	0	.....	.....	2	S. W.		
6	7 a. m. . . . .	24.92	18	2	Cirro-stratus, cirrus . . . . .	W.	1	W.		
	2 p. m. . . . .	.....	.....	.....	.....	.....	.....	.....		
	9 p. m. . . . .	.....	.....	.....	.....	.....	.....	.....		
7	7 a. m. . . . .	.....	.....	.....	.....	.....	.....	.....		
	2 p. m. . . . .	.....	.....	.....	.....	.....	.....	.....		
	9 p. m. . . . .	.....	.....	.....	.....	.....	.....	.....		
8	7 a. m. . . . .	24.78	24°	0	.....	.....	0	.....		
	2 p. m. . . . .	24.87	31°	0	.....	.....	0	.....		
	9 p. m. . . . .	.....	.....	.....	.....	.....	.....	.....		
9	9 p. m. . . . .	24.75	20°	0	Nimbus, cirrus . . . . .	S. W.	0	S. W.		
	7 a. m. . . . .	24.67	31°	8	.....	.....	1	.....		
	2 p. m. . . . .	24.68	44°	7	Nimbus, cirro-cumulus . . . . .	S. W.	7	S. W.		
	9 p. m. . . . .	24.80	26	10	Nimbus . . . . .	N. W.	2	N. W.		
10	7 a. m. . . . .	24.86	25°	10	do . . . . .	.....	2	S. W.		
	2 p. m. . . . .	24.89	27°	9	do . . . . .	.....	3	W.		
	9 p. m. . . . .	24.98	20	10	do . . . . .	.....	0	.....		

Absent; weather soft and cloudy with a raw S. W. wind.

A thin mist over the whole sky. Two sun-dogs with light belts extending half around the sky at 3 p. m.

Warm until 6 p. m., when the wind changed to the N. W., and it began snowing; fell 1½ inch deep.

Snowing off and on all day.

FOR THE WEEK ENDING JANUARY 17, 1874.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.			WIND.		Maximum.	Minimum.	Remarks.	
							Amount.	Kind.	Direct'n.	Amount.	Direction.				
1874. Jan. 11	7 a. m.	24.82	20°				10	Nimbus, cirrus.	0		0				
	2 p. m.	24.65	28°				10	Nimbus.	0		0				
	9 p. m.	24.65	17°				0				0				
	7 a. m.	24.99	-10°				5	Stratus, cirro-stratus.	N. W.		1				
	2 p. m.	23.05	0				10	Nimbus.			2				
13	9 p. m.	23.16	-10°				3	Misty.	0		2			A dense frost-mist, changing into snow that fell 1.2 inches deep.	
	7 a. m.	23.22	-14°				3	Cirro-stratus, stratus, cirrus.			2				
14	2 p. m.	25.18	0					Misty.			1			Turned warm with a Chenook at 7 p. m.	
	9 p. m.	25.18	-11°					do			3				
	7 a. m.	24.88	1°				7	Nimbus, cirrus.	S. W.		2				
15	2 p. m.	24.75	12°				4	Cirrus.	S. W.		1			The warm wind took off all the snow on the bottom and table lands, except the heaviest drifts. The bottom was covered with water 1 to 3 inches deep, and even the mountains began to look bare. The ground was covered in many places with green grass an inch long.	
	9 p. m.	24.69	30°				2	do	S. W.		4				
	7 a. m.	24.28	37				2	Cirrus, cirro-stratus.	S. W.		2				
16	2 p. m.	24.33	45				5	Cirrus, cirro-cumulus.	S. W.		3			Snowing from 4 to 8 p. m.; 0.1 inch.	
	9 p. m.	24.29	38				2	Cirro-stratus.	S. W.		5				
	7 a. m.	24.04	38				8	Nimbus, cirrus, cirro-stratus.	S. W.		5				
17	2 p. m.	23.93	48				6	Cirrus, cirro-cumulus.	S. W.		6				
	9 p. m.	23.89	36				2	Nimbus.	S. W.		2				
	7 a. m.	24.01	30				1	Cumulus.	S. W.		1				
18	2 p. m.	24.03	37				10	Nimbus.	S. W.		2				
	9 p. m.	24.12	29				10	do			2				
Jan.	7 a. m.	24.51	0				0				1				
	2 p. m.	24.45	21				0				0				
	9 p. m.	24.33	25				0				0				

FOR THE WEEK ENDING JANUARY 24, 1874.



19	7 a. m.	24.34	26	1	Cumulo-stratus	0	1	S. W.	
	9 p. m.	24.98	39	5	Cirrus, cirro-stratus	S.	2	S. W.	
20	7 a. m.	24.33	-11	0	Cirrus	N. W.	3	N. W.	
	9 p. m.	24.32	-3	9	Nimbus		2	N. W.	
	2 p. m.	24.32	-12	10			0		
21	7 a. m.	24.32	-15	0	Cirro-stratus	0	1	N. W.	
	9 p. m.	24.38	-2	4	Cirro-cumulus, cirrus	S. W.	1	S. W.	
22	7 a. m.	24.50	-11	0	Nimbus, cirrus	W.	1	W.	Slightly misty.
	9 p. m.	24.52	-11	8	Cirro-stratus, cirrus	W.	1	W.	
	2 p. m.	24.46	+ 2	1	Cirro-cumulus	W.	1	W.	
23	7 a. m.	24.73	3	8	Nimbus, cirrus	W.	1	W.	
	9 p. m.	24.76	12	3	Cirrus, cirro-cumulus	W.	0		
24	7 a. m.	24.74	18	10	Nimbus	S. W.	5	S. W.	
	9 p. m.	24.86	24	9	Nimbus, cirro-stratus	S. W.	3	S. W.	
	2 p. m.	24.87	35	8	Cirro-stratus, cirrus, stratus	S. W.	2	S. W.	
	9 p. m.	24.79	26	10	Nimbus	S. W.	0		

During night 0.2 inch of snow fell.

FOR THE WEEK ENDING JANUARY 31, 1874.

Jan.	25	7 a. m.	24.73	34	1	Cirro-stratus	S. W.	5	S. W.	
		9 p. m.	24.68	44	9	Nimbus, cirrus, cirro-stratus	S. W.	2	S. W.	
26	7 a. m.	24.52	30	3	Cirro-stratus, cirrus	0	0			
	9 p. m.	24.52	35	7	Nimbus, cirrus, cirro-stratus	S. W.	3	S. W.		
	2 p. m.	24.47	42	10	Nimbus	S. W.	3	S. W.		
27	7 a. m.	24.52	35	8	Nimbus, cirrus	S. W.	3	S. W.		
	9 p. m.	24.67	30	1	Cirro-stratus	S. W.	4	S. W.		
	2 p. m.	24.64	39	8	Nimbus, cirro-cumulus, cirrus	S. W.	3	S. W.		
28	7 a. m.	24.64	36	1	Cirro-stratus	0	4	S. W.		
	9 p. m.	24.63	37	7	Cirro-stratus, cirrus, stratus	S. W.	5	S. W.		
	2 p. m.	24.67	48	9	Nimbus	S. W.	3	S. W.		
29	7 a. m.	24.59	32	10	do	S. W.	1	S. W.		
	9 p. m.	24.81	3	9	Nimbus, stratus	N. W.	1	N. W.		
	2 p. m.	24.79	12	2	Cirrus, cirro-stratus	0	2	N. E.		
30	7 a. m.	24.75	16	0	Nimbus	0	0			
	9 p. m.	24.73	20	7	Nimbus, cirro-stratus, cirrus	0	0			
	2 p. m.	24.69	43	8	Nimbus, cirro-cumulus, cirrus	S. W.	2	S. W.		
31	7 a. m.	24.69	27	3	Cumulus, cirro-cumulus	S. W.	1	S. W.		
	9 p. m.	24.67	20	4	Cumulus, cirro-cumulus	0	0			
	2 p. m.	24.63	40	0		0	0			
	9 p. m.	24.68	26	4	Cirrus, cirro-stratus	0	0			
Mean of January			20° .73							

0.1 inch of snow fell during night.

FOR THE WEEK ENDING FEBRUARY 7, 1874.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.		WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direct'n.	Amount.			
1874. Feb. 1	7 a. m.	24.65	.....	27	.....	.....	5	Cirrus, cirro-cum., cirro-stratus	0	.....	.....	.....	Snowing from 7 p. m., 9. a. m. 2.2 inches.
	2 p. m.	24.60	.....	39	.....	.....	4	do	W.	.....	.....	.....	
	9 p. m.	24.59	.....	30	.....	.....	10	Nimbus.....	0	W.	.....	.....	
2	7 a. m.	24.72	.....	27	.....	.....	10	do	.....	.....	.....	.....	A chenoook took all the snow off.
	2 p. m.	24.72	.....	33	.....	.....	9	Nimbus, cirro-cumulus, cirrus.	0	W.	.....	.....	
3	9 p. m.	24.71	.....	17	.....	.....	3	Cirro-cumulus, cirrus	0	S. W.	.....	.....	Several hail-showers in the afternoon.
	7 a. m.	24.63	.....	8	.....	.....	0	.....	.....	S. E.	.....	.....	
2	2 p. m.	24.62	.....	34	.....	.....	3	Cirro-stratus, cirrus	0	.....	.....	.....	
	2 p. m.	24.63	.....	34	.....	.....	3	Nimbus, cirrus	0	S. W.	.....	.....	
4	9 p. m.	24.67	.....	16	.....	.....	3	Nimbus, cirro-stratus	0	S. E.	.....	.....	
	7 a. m.	24.67	.....	16	.....	.....	3	Nimbus, cirro-stratus	0	S. E.	.....	.....	
2	7 a. m.	24.68	.....	37	.....	.....	8	Nim., cirrus, cirro-strat., cirro-cum.	0	N. W.	.....	.....	
	2 p. m.	24.68	.....	37	.....	.....	10	Nimbus.....	0	.....	.....	.....	
5	9 p. m.	24.69	.....	27	.....	.....	10	Nimbus, cirro-stratus, stratus, cirrus	0	S. E.	.....	.....	A chenoook took all the snow off.
	7 a. m.	24.72	.....	23	.....	.....	4	Cirro-stratus, stratus, cirrus	0	S. W.	.....	.....	
2	2 p. m.	24.70	.....	39	.....	.....	2	Cirro-cumulus	0	W.	.....	.....	
	2 p. m.	24.62	.....	23	.....	.....	2	Cumulo-stratus	0	W.	.....	.....	
6	7 a. m.	24.48	.....	39	.....	.....	2	Nimbus, cirrus, cirro-stratus	0	S. W.	.....	.....	Several hail-showers in the afternoon.
	7 a. m.	24.48	.....	33	.....	.....	3	Nimbus, cirro-stratus, cirrus	0	S. W.	.....	.....	
7	2 p. m.	24.35	.....	45	.....	.....	8	Nimbus, cirro-stratus, cirrus	0	S. W.	.....	.....	
	2 p. m.	24.20	.....	39	.....	.....	3	Cirrus, cirro-stratus	0	S. W.	.....	.....	
2	7 a. m.	24.46	.....	21	.....	.....	3	Cirro-stratus, cirrus, cirro-cum.	0	S. W.	.....	.....	
	2 p. m.	24.48	.....	33	.....	.....	7	Cirro-cumulus, nimbus, cum.	0	N. W.	.....	.....	
9	9 p. m.	24.62	.....	25	.....	.....	2	Cirro-stratus	0	N. W.	.....	.....	

FOR THE WEEK ENDING FEBRUARY 14, 1874.

8	7 a. m.	24.75	.....	15	.....	.....	2	Cirrus, cirro-stratus	W.	S. E.	.....	.....	.....
	2 p. m.	24.68	.....	30	.....	.....	0	.....	.....	S. W.	.....	.....	
9	9 p. m.	24.63	.....	35	.....	.....	7	Cirrus, cirro-stratus	.....	S. W.	.....	.....	.....
	7 a. m.	24.56	.....	34	.....	.....	8	Nimbus, cirrus, cirro-stratus	.....	S. W.	.....	.....	
10	2 p. m.	24.52	.....	45	.....	.....	0	.....	.....	S. W.	.....	.....	.....
	9 p. m.	24.48	.....	34	.....	.....	0	.....	.....	S. W.	.....	.....	
10	7 a. m.	24.45	.....	35	.....	.....	6	Cirrus, cirro-cum., cirro-strat.	S. W.	S. W.	.....	.....	

2 p. m.	24.24	48	9	Nimbus, cirro-cumulus, cumulo-stratus, cirro-stratus.	S. W.	4	S. W.	
9 p. m.	24.16	37	10	Nimbus	S. W.	1	S. W.	
7 a. m.	24.13	9	10	do	W.	3	W.	Snowing 6-7 a. m., 0.1 inch.
2 p. m.	24.10	11	2	Cirrus, cirro-cumulus		0	S.	
9 p. m.	24.08	12	1	Slightly misty	S. W.	1	N. W.	
7 a. m.	24.06	3	4	Cirro-stratus	N. W.	2	S. W.	
2 p. m.	24.99	20	10	Cirro-cumulus, cumulus-strat., cirro-stratus.		1	S. W.	A few snow-flakes fell at 3 p. m. Snowing 10-12 a. m., and 3-8 p. m. 0.2 inch.
9 p. m.	24.03	9	10	Nimbus		0		
7 a. m.	24.24	3	8	Nimbus, cirro-cumulus	N.	2	S.	
2 p. m.	24.24	14	4	Slightly misty	W.	1	N. E.	
9 p. m.	24.30	0	8	Cirro-stratus, cirrus, stratus	S. W.	5	S. W.	
7 a. m.	24.23	32	0	Nimbus, cirro-cumulus		6	S. W.	
2 p. m.	24.12	24						
9 p. m.	24.17							

FOR THE WEEK ENDING FEBRUARY 21, 1874.

Feb. 15	7 a. m.	24.37	24	0	Cumulo-stratus	S. W.	4	S. W.	
	2 p. m.	24.32	40	1	Cirro-stratus		4	S. W.	
	9 p. m.	24.43	23	0	Cirrus, cirro-stratus	0	2	S. E.	
16	7 a. m.	24.42	14	1	Cirrus, cirro-stratus	S. W.	4	S. W.	
	2 p. m.	24.32	47	0	Stratus, cirrus, cirro-stratus	S. W.	4	S. W.	
	9 p. m.	24.28	29	2	Cirro-cum., cirrus, cirro-stratus	S. W.	4	S. W.	
17	7 a. m.	24.23	33	6	Nimbus	S. W.	4	S. W.	
	2 p. m.	24.14	42	10	Nimbus, cirro-cumulus	S. W.	1	S. W.	
	9 p. m.	24.08	37	9	Nimbus		3	S. W.	
18	7 a. m.	24.08	24	10	Nimbus		3	S. W.	
	2 p. m.	24.19	29	10	do		2	S. W.	
	9 p. m.	24.49	11	0	Cirro-stratus, cirro-cumulus	S. W.	3	S. W.	
19	7 a. m.	24.40	16	3	Cirro-stratus, cirro-cumulus	S. W.	3	S. W.	
	2 p. m.	24.29	40	10	Nimbus		5	S. W.	
	9 p. m.	24.29	32	10	do		2	N. W.	
20	7 a. m.	24.62	16	10	do		2	N. W.	
	2 p. m.	24.77	15	10	do		2	N. W.	
21	9 p. m.	24.78	-	0	Cirro-stratus, cirrus	0	1	S. E.	
	7 a. m.	24.67	5	2	Cumulus, cirro-cumulus	N. W.	2	N. W.	
	2 p. m.	24.59	23	1	Cirro-stratus	0	0		
	9 p. m.	24.65	10						

Snowing, 8 a. m. to 8 p. m., off and on; 0.2 inch.

Blowing a very hard gale during the night, and snowing 11 a. m.; 1.5 inch.

Cleared off at 4 p. m.

*Meteorological record, &c., at Trout Creek, Judith Basin, Mont.—Continued.*  
 FOR THE WEEK ENDING FEBRUARY 28, 1874.

Date.	Time.	Barometer.	Attached thermometer.	Dry bulb.	Wet bulb.	Relative humidity.	CLOUDS.			WIND.		Maximum.	Minimum.	Remarks.
							Amount.	Kind.	Direction.	Amount.	Direction.			
1874. Feb. 22	7 a. m.	24.91	.....	2	.....	.....	10	Nimbus.	.....	4	N. W.	.....	.....	Snowing through night; 8 a. m., 0.2 inch.
	2 p. m.	24.91	.....	5	.....	.....	4	Cirrus, cirro-stratus.	N. W.	1	N. W.	.....	.....	
	9 p. m.	24.92	.....	7	.....	.....	0	.....	.....	1	N. W.	.....	.....	
	7 a. m.	24.93	.....	-14	.....	.....	0	.....	.....	0	.....	.....	.....	
	2 p. m.	24.87	.....	0	.....	.....	0	.....	.....	0	.....	.....	.....	
	9 p. m.	24.85	.....	-16	.....	.....	0	.....	.....	2	S. E.	.....	.....	
	7 a. m.	24.74	.....	-17	.....	.....	0	.....	.....	0	.....	.....	.....	
24	2 p. m.	24.63	.....	12	.....	.....	5	Cirrus	S. W.	2	S. W.	.....	.....	
	9 p. m.	24.54	.....	2	.....	.....	10	Nimbus	.....	2	S. W.	.....	.....	
25	7 a. m.	24.52	.....	11	.....	.....	0	.....	.....	3	W.	.....	.....	Faint aurora borealis between 8 and 9 p. m.; white streamer rising from a cloud back in the north, about 35°.
	2 p. m.	24.48	.....	21	.....	.....	0	.....	.....	0	.....	.....	.....	
26	9 p. m.	24.43	.....	1	.....	.....	1	Cirro-stratus.	S. W.	5	S. W.	.....	.....	The mean temperature of the month is 22° 42.
	7 a. m.	24.37	.....	18	.....	.....	.....	.....	.....	.....	.....	.....	.....	
27	2 p. m.	24.38	.....	35	.....	.....	7	Nimbus, cirro-cumulus.	S. W.	4	S. W.	.....	.....	
	9 p. m.	24.38	.....	27	.....	.....	3	Cirro-stratus, cirrus.	S. W.	4	S. W.	.....	.....	
	7 a. m.	24.53	.....	31	.....	.....	9	Nimbus, cirro-stratus.	S. W.	1	S. W.	.....	.....	
	2 p. m.	24.46	.....	49	.....	.....	2	Cirro-stratus, cirrus.	S. W.	2	S. W.	.....	.....	
	9 p. m.	24.42	.....	40	.....	.....	4	Cirro-cum., cirro-stratus, cirrus	S. W.	6	S. W.	.....	.....	
	28	7 a. m.	24.49	.....	37	.....	.....	2	Cirro-stratus, cirrus	S. W.	3	S. W.	.....	.....
		2 p. m.	24.46	.....	49	.....	.....	2	.....do	S. W.	4	S. W.	.....	.....
9 p. m.	24.40	.....	39	.....	.....	8	Cirrus, cirro-stratus.	S. W.	5	S. W.	.....	.....		
FOR THE WEEK ENDING MARCH 7, 1874.														
Mar. 1	7 a. m.	24.18	.....	40	.....	.....	9	Nimbus, cirro-stratus	S. W.	6	S. W.	.....	.....	About 5.30 p. m., a terrible squall of wind and snow came up from W., lasted about one hour, with 0.2 inch snow.
	2 p. m.	24.03	.....	51	.....	.....	4	Cirro-cumulus	S. W.	8	S. W.	.....	.....	
9 p. m.	24.09	.....	27	.....	.....	9	Nimbus, cirrus	S. W.	1	S. W.	.....	.....		

2	7 a. m.	24.22	.....	24	.....	0	Nimbus, cirro-cumulus.....	.....	N. W.	3	S. W.	.....
	2 p. m.	24.28	.....	19	.....	8	Nimbus.....	.....	N. W.	2	N. W.	.....
	9 p. m.	23.73	.....	4	.....	10	Nimbus.....	.....	N. W.	4	N. W.	.....
3	7 a. m.	23.70	.....	1	.....	10	do.....	.....	N. E.	3	N. E.	.....
	2 p. m.	23.66	.....	10	.....	9	Nimbus, cirro-stratus.....	.....	N. E.	2	N. E.	.....
	9 p. m.	23.62	.....	10	.....	10	Nimbus.....	.....	N.	0	N. E.	.....
4	7 a. m.	23.62	.....	2	.....	5	Nimbus, cirrus, cirro-stratus.....	.....	N.	2	S. E.	.....
	7 a. m.	23.54	.....	31	.....	7	Cirro-cumulus, cirro-stratus.....	.....	W.	2	W.	.....
	9 p. m.	23.55	.....	21	.....	4	Nimbus, cirro-cumulus.....	.....	S. W.	0	W.	.....
5	7 a. m.	23.48	.....	17	.....	2	Nimbus, cirro-stratus.....	.....	S. W.	1	S. W.	.....
	2 p. m.	23.47	.....	31	.....	4	Cirro-cum., cirrus.....	.....	W.	2	N. W.	.....
	9 p. m.	23.62	.....	8	.....	1	Cirro-stratus.....	.....	N. W.	2	N. W.	.....
6	7 a. m.	23.77	.....	7	.....	10	Nimbus.....	.....	N. E.	0	N. E.	.....
	2 p. m.	23.74	.....	22	.....	8	Nimbus, cirro-stratus.....	.....	N. E.	2	N. E.	.....
	9 p. m.	23.77	.....	12	.....	0	Cirro-stratus.....	.....	N. W.	0	N. E.	.....
7	7 a. m.	23.82	.....	10	.....	2	Nimbus, cirro-stratus, cirro-cu.....	.....	E.	1	E.	.....
	9 p. m.	23.78	.....	31	.....	6	Nimbus.....	.....	N. E.	7	N. E.	.....
	9 p. m.	23.80	.....	19	.....	6	Nimbus.....	.....	N. E.	7	N. E.	.....

Snowing slightly 7 to 8 a. m.

*Meteorological register at summit of Mount Lincoln, Colorado.*

Date.	Hour.	Barometer at 30° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.			WIND.		Remarks.	
								Kind.	Directn.	Amount.	Direction.	Amount.		
1873. July	21	7 a. m.	18.040	51.5	38	35	34.5							
		9 p. m.	18.018	54.4	40	34								
	22	7 a. m.	18.010	42.5	37	62	41							
		9 p. m.	18.044	54.5	42	40	34		3	N. N. W.	2			
	23	7 a. m.	18.074	51.5	38	35			10	N. N. W.	4			
		9 p. m.	18.098	39.5	37	83	72		5	S. S. E.	1			
	24	7 a. m.	18.116	49.0	39	43		34	0		0			
		9 p. m.	18.143	54.0	42.5	40			4		0			
	25	7 a. m.	18.137	41.0	38	77	74		1	W.	2			
		9 p. m.	18.137	50	39	35	35		1	W.	2			
	26	7 a. m.	18.127	36.5	35	91	69		7	S. E.	10			
		9 p. m.	18.111	37	35	83		31	0		0			
27	7 a. m.	18.061	48.5	40	52			2	S. W.	2				
	9 p. m.	18.045	48.5	39.5	48			4	N. W.	1				
28	7 a. m.	18.055	36.5	34	82	59		0		0				
	9 p. m.	18.025	42	32.5	40		29	3	N.	6				
29	7 a. m.	18.041	47	37.5	43			3	S. W.	3				
	9 p. m.	18.031	36.5	30.5	53	56		1	N. W.	1				
30	7 a. m.	18.003	51.5	37.5	32	29.5		1	N. W.	2				
	9 p. m.	18.010	45.5	34.5	38			7	S. E.	5				
31	7 a. m.	18.024	37	33	68	64.5		0		0				
	9 p. m.	17.995	49	38.5	41		28	0	W.	3				
Aug. 1	7 a. m.	17.993	48.5	35.5	33			4	N. E.	4				
	9 p. m.	18.001	35.5	30.5	58	61		2	N. W.	5				
2	7 a. m.	17.963	47	39	39		26	1	N.	6				
	9 p. m.	17.974	47.5	37	43			6	N. W.	2				
3	7 a. m.	17.975	36.5	32	67	69		0		0				
	9 p. m.	17.929	53.5	38	31		31	3	W.	3				
4	7 a. m.	17.930	50.5	39.5	41			2	S. W.	1				
	9 p. m.	17.948	36.5	32	67	65		2	N. W.	8				
5	7 a. m.	17.717	41	32.5	47		31.5	0		0				
	9 p. m.	17.980	57	41	31			4	S. W.	2				
6	7 a. m.	17.974	37	30.5	49	59.5		0		0				
	9 p. m.	17.963	51	38.5	35		30	2	W.	3				
7	7 a. m.	18.017	39.5	34	63			8	S. E.	6				
	9 p. m.	18.020	33	32	89	76		7	S. W.	10				
8	7 a. m.	18.014	59	45	37		29	3		3				
	9 p. m.	18.011	37.5	33	68	66		0		0				
9	7 a. m.	18.029	37	34	74			0		0				
	9 p. m.	18.029	37	34	74			0		0				

A very severe snow-storm.  
Still snowing.

Rain and snow with heavy fog in the valleys.

A severe snow-storm at 1.30 p. m. to 3 p. m., attended by a strong electric current.

Electric current very strong.

Snow-storm.

3	7 a. m. . . . .	18.016	56	39	28	29	2	3
	9 p. m. . . . .	18.027	52	37	30		1	2
	9 p. m. . . . .	18.005	35	32.5	73		4	5
4	7 a. m. . . . .	17.971	41	29.5	31	74	3	8
	9 p. m. . . . .	17.955	50	38	38		10	10
	9 p. m. . . . .	17.966	39	37	83	64.5	5	2
	7 a. m. . . . .	17.833	36	35	91		4	4
	2 p. m. . . . .	18.037	52	42	46		0	0
	9 p. m. . . . .	18.045	37.5	33.5	68	53.5	2	1
6	7 a. m. . . . .	18.050	52	40.5	39		6	2
	2 p. m. . . . .	18.060	48	42	62		0	0
	9 p. m. . . . .	18.027	38	35	76	67	2	1
7	7 a. m. . . . .	17.986	54	42	40		10	3
	2 p. m. . . . .	17.984	49	39	45		4	1
	9 p. m. . . . .	17.972	38	38.5	38	47	4	2
8	2 p. m. . . . .	17.993	38.5	38	91		3	6
	9 p. m. . . . .	17.995	36	35	91	71	5	10
9	7 a. m. . . . .	18.006	35.5	33	81		3	6
	2 p. m. . . . .						5	10
10	9 p. m. . . . .							
	2 p. m. . . . .							
11	7 a. m. . . . .							
	2 p. m. . . . .							
12	7 a. m. . . . .							
	2 p. m. . . . .	18.004	47.5	40	57		8	3
13	9 p. m. . . . .	18.030	53.5	43	47		2	0
	2 p. m. . . . .	18.033	47.5	41.5	61		8	2
	9 p. m. . . . .	18.052	35	34	90	57	10	5
14	7 a. m. . . . .	18.030	42.5	39	77		0	0
	2 p. m. . . . .	18.038	44.0	42	85		10	3
	9 p. m. . . . .	18.043	37.5	36.5	91	68	10	4
15	7 a. m. . . . .	18.030	34.5	34	90		10	2
	2 p. m. . . . .	18.016	45	42	78		10	4
	9 p. m. . . . .	18.012	36	33.5	91	49	10	2
16	7 a. m. . . . .	17.958	38	34	69		10	4
	2 p. m. . . . .	17.968	43	39	71		5	8
	9 p. m. . . . .	17.981	34	32	80	45	5	5
17	7 a. m. . . . .	17.987	44	37	55		8	5
	2 p. m. . . . .	18.026	47	39	52		3	6
	9 p. m. . . . .	18.049	35	31.5	65	28.5	4	3
18	7 a. m. . . . .	18.033	41	34	53		2	2
	2 p. m. . . . .	18.059	44	36	50	56.5	0	6
	9 p. m. . . . .	18.076	36.5	31	60		4	8
19	7 a. m. . . . .	18.047	50	39	41		5	6
	2 p. m. . . . .	18.073	47	37	43	30	0	1
	9 p. m. . . . .	18.017	34	32	80		3	5
	2 p. m. . . . .						7	4
	9 p. m. . . . .						3	6

*Meteorological register at summit of Mount Lincoln, Colorado—Continued.*

Date.	Hour.	Barometer at 33° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direction.	Amount.	Direction.	
1873. Aug. 20	7 a. m.	17.970	45	37	50	.....	29.5	.....	.....	S.W.	3	
	2 p. m.	17.972	50	36	32	.....	.....	.....	.....	N.W.	2	
	9 p. m.	17.959	35	31	65	49.5	.....	.....	.....	N.E.	10	
21	7 a. m.	17.961	51.5	40.5	42	.....	29	.....	.....	W.	3	
	9 p. m.	17.964	50	40	45	79.5	.....	.....	.....	S.E.	8	
	2 p. m.	17.910	39	33	57	.....	31.5	.....	.....	S.W.	10	
22	7 a. m.	17.914	35	32	73	.....	.....	.....	.....	S.W.	4	
	2 p. m.	17.901	43	39	71	.....	.....	.....	.....	N.	3	
	9 p. m.	17.909	37	35	63	79	.....	.....	.....	N.W.	4	
23	7 a. m.	17.931	33.5	31	71	.....	30.5	.....	.....	.....	10	
	2 p. m.	17.971	50	33	24	.....	.....	.....	.....	W.	2	
	9 p. m.	17.998	38.5	36	63	53	.....	.....	.....	S.W.	3	
24	7 a. m.	17.992	48.5	45	79	.....	28.5	.....	.....	N.W.	2	
	2 p. m.	17.988	48	40	52	.....	.....	.....	.....	W.	3	
	9 p. m.	17.999	34.5	31	71	75.5	.....	.....	.....	S.W.	4	
25	7 a. m.	17.955	69	35.5	69	.....	28.5	.....	.....	N.W.	8	
	2 p. m.	17.986	52	39.5	38	.....	.....	.....	.....	S.W.	3	
	9 p. m.	18.002	37	33	68	57	.....	.....	.....	S.W.	0	
26	7 a. m.	18.018	48	44.5	73	.....	31	.....	.....	E.	2	
	2 p. m.	18.034	54.5	38	29	.....	.....	.....	.....	.....	2	
	9 p. m.	18.031	41.5	34	53	76.5	.....	.....	.....	E.	0	
27	7 a. m.	18.017	53	41	40	.....	34	.....	.....	S.W.	4	
	2 p. m.	18.039	60	43	36	.....	.....	.....	.....	W.	2	
	9 p. m.	18.033	45.5	36	46	78	.....	.....	.....	E.	3	
28	7 a. m.	18.054	52	43	50	.....	33.5	.....	.....	S.E.	3	
	2 p. m.	18.072	52	39.5	36	.....	.....	.....	.....	.....	0	
	9 p. m.	18.064	40	37	77	78.5	.....	.....	.....	S.W.	4	
29	7 a. m.	18.058	52	41	43	.....	32.5	.....	.....	N.W.	3	
	2 p. m.	18.067	38.5	34	53	.....	.....	.....	.....	S.W.	5	
	9 p. m.	18.042	37	34	75	39.5	.....	.....	.....	W.	10	
30	7 a. m.	18.062	45	40	66	.....	32	.....	.....	N.W.	5	
	2 p. m.	18.068	57	46	45	.....	.....	.....	.....	N.W.	4	
	9 p. m.	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	
31	7 a. m.	18.047	55	45	48	.....	31	.....	.....	N.W.	9	
	2 p. m.	18.034	48	38	44	.....	.....	.....	.....	S.W.	3	
	9 p. m.	18.019	35	32	73	70.5	.....	.....	.....	S.E.	1	
Sept. 1	7 a. m.	18.008	37	31	55	.....	30.5	.....	.....	N.W.	7	
	2 p. m.	17.977	48	41.5	57	.....	.....	.....	.....	W.	2	
	9 p. m.	17.950	37	33.5	68	65.5	.....	.....	.....	S.W.	4	

Snow-storm from 7.00 p. m. till 10.00 p. m.



2	7 a. m.	17.912	40.5	35	63	28.5	.....	2	N. W.	8
	2 p. m.	17.912	51.5	42	50	.....	.....	0	N. W.	5
3	9 p. m.	17.907	37.5	32.5	61	52.5	.....	7	N. W.	8
	7 a. m.	17.844	40	34.5	58	.....	.....	4	S. W.	5
	2 p. m.	17.872	44	36	50	.....	.....	3	N. W.	6
	9 p. m.	17.928	33.5	30	68	44.5	.....	4	N. W.	6
4	7 a. m.	17.904	39	33.5	57	.....	.....	3	S. W.	5
	2 p. m.	17.943	42.5	33.5	44	.....	.....	1	N. W.	4
5	9 p. m.	18.014	33.5	30.5	68	48	.....	2	N. W.	4
	7 a. m.	17.980	44.5	34.5	41	.....	.....	5	N. W.	2
	2 p. m.	18.016	43	35	49	.....	.....	3	N. W.	2
	9 p. m.	18.070	33	29	56	71	.....	10	S. E.	8
6	7 a. m.	18.049	30	27	58	.....	.....	4	N. W.	3
	2 p. m.	18.067	40.5	35.5	63	.....	.....	10	S. E.	8
	9 p. m.	18.066	38	32	56	42	.....	10	S. E.	4
7	7 a. m.	18.066	34	30	63	.....	.....	10	S. E.	4
	2 p. m.	18.029	37	34	75	.....	.....	8	N. E.	4
8	9 p. m.	18.014	32.5	29	66	40.5	.....	10	N. W.	5
	7 a. m.	17.987	32	30	76	.....	.....	6	S. W.	3
	2 p. m.	18.004	38	33	62	.....	.....	5	S. W.	3
	9 p. m.	18.001	31	30	86	39.5	.....	2	W.	1
9	7 a. m.	17.972	45	34	38	.....	.....	1	S. W.	3
	2 p. m.	17.986	48	37	40	.....	.....	2	S. E.	4
	9 p. m.	17.987	34	28	49	57.5	.....	2	S. W.	2
10	7 a. m.	17.967	39	30.5	41	.....	.....	2	W.	3
	2 p. m.	17.930	41	36	64	.....	.....	4	N. E.	4
	9 p. m.	17.928	33	28	52	.....	.....	8	N. N.	7
11	7 a. m.	17.896	28	28	32	.....	.....	6	N. N.	8
	2 p. m.	17.921	29.5	26	67	.....	.....	5	N. E.	4
	9 p. m.	17.949	36	30	53	.....	.....	0	N. W.	4
12	7 a. m.	17.959	36	30	53	.....	.....	3	S. W.	2
	2 p. m.	17.900	45	34	38	.....	.....	0	N. N.	4
	9 p. m.	17.909	32.5	28.5	56	45.5	.....	3	N. W.	6
13	7 a. m.	17.945	35.5	30	58	.....	.....	2	N. W.	6
	2 p. m.	17.981	44	34.5	41	.....	.....	0	N. N.	8
	9 p. m.	17.979	32	26	42	46.5	.....	3	N. W.	6
14	7 a. m.	17.952	41	30.5	35	.....	.....	1	N. N.	3
	2 p. m.	17.991	50	35	29	.....	.....	0	N. N.	3
	9 p. m.	18.028	37.5	29	44	50	.....	2	N. N.	2
15	7 a. m.	18.018	46	34	35	.....	.....	4	W.	1
	2 p. m.	18.045	50	38	38	.....	.....	3	N. N.	2
	9 p. m.	18.060	38.5	29	40	69	.....	9	N. W.	4
16	7 a. m.	18.004	38	29.5	40	.....	.....	6	N. W.	4
	2 p. m.	17.991	54	37	26	.....	.....	1	N. N.	5
	9 p. m.	17.922	38.5	28.5	36	58.5	.....	2	N. W.	6
17	7 a. m.	17.825	38	32	56	.....	.....	6	N. W.	6
	2 p. m.	17.874	44.5	31	31	.....	.....	8	N. W.	8
	9 p. m.	17.877	35.5	32.5	73	47.5	.....	4	N. W.	6
18	7 a. m.	17.855	35	28	46	.....	.....	5	W.	3
	2 p. m.	17.889	43	30	30	.....	.....	4	N. W.	6
	9 p. m.	17.911	34	25	30	49.5	.....	5	W.	3
19	7 a. m.	17.815	29	28	82	.....	.....	10	S. W.	2

Snowing.

Snow.

Snowing.

Meteorological register at summit of Mount Lincoln, Colorado—Continued.

Date.	Hour.	Barometer at 32° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct'n.	Amount.	Direct'n.	
1873. Sept. 19	2 p. m.	17.735	29.5	.....	.....	30.5	.....	.....	.....	.....	.....	5
	9 p. m.	17.779	25.5	94	75	.....	.....	.....	.....	.....	.....	8
	7 a. m.	17.750	24	22	54	.....	21.5	.....	.....	.....	.....	8
	9 p. m.	17.765	29	26	54	.....	.....	.....	.....	.....	.....	7
	9 p. m.	17.823	23.5	23	51	.....	.....	.....	.....	.....	.....	7
	7 a. m.	17.760	27.5	24	43	.....	20.5	.....	.....	.....	.....	9
	2 p. m.	17.823	37	32	61	.....	.....	.....	.....	.....	.....	3
	9 p. m.	17.823	27	23	36	.....	.....	.....	.....	.....	.....	3
	7 a. m.	17.803	28	22	25	.....	19	.....	.....	.....	.....	4
	9 p. m.	17.845	38	26.5	.....	.....	.....	.....	.....	.....	.....	4
9 p. m.	17.804	26.5	22	30	.....	20.5	.....	.....	.....	.....	6	
7 a. m.	17.799	32	27	48	.....	.....	23.5	.....	.....	.....	6	
2 p. m.	17.763	42.5	30	31	.....	.....	.....	.....	.....	.....	8	
9 p. m.	17.791	30.5	26.5	48	.....	42.5	.....	.....	.....	.....	5	
7 a. m.	17.698	27.5	23.5	36	.....	22.5	.....	.....	.....	.....	6	
2 p. m.	17.724	43.5	32.5	37	.....	.....	.....	.....	.....	.....	9	
9 p. m.	17.733	30.5	25	40	.....	43.5	.....	.....	.....	.....	5	
7 a. m.	17.653	33.5	27	41	.....	26	.....	.....	.....	.....	7	
9 p. m.	17.680	46.5	30.5	24	.....	.....	.....	.....	.....	.....	8	
9 p. m.	17.659	35.5	29	52	.....	47.5	.....	.....	.....	.....	4	
7 a. m.	17.635	37.5	31	55	.....	.....	27.5	.....	.....	.....	4	
2 p. m.	17.686	48.5	33	27	.....	.....	.....	.....	.....	.....	5	
9 p. m.	17.728	37	26.5	.....	.....	47	.....	.....	.....	.....	3	
9 p. m.	17.728	39	32.5	51	.....	.....	.....	.....	.....	.....	4	
7 a. m.	17.696	50	32.5	22	.....	29	.....	.....	.....	.....	4	
2 p. m.	17.696	50	32.5	22	.....	.....	.....	.....	.....	.....	9	
9 p. m.	17.756	36.5	27	46.5	.....	.....	.....	.....	.....	.....	2	
7 a. m.	17.673	32.5	27	48	.....	46.5	.....	.....	.....	.....	6	
2 p. m.	17.720	42.5	32	40	.....	.....	23.5	.....	.....	.....	7	
9 p. m.	17.735	27	19	.....	.....	42	.....	.....	.....	.....	2	
7 a. m.	17.790	26	20	19	.....	.....	15.5	.....	.....	.....	6	
9 p. m.	17.824	32	27	48	.....	.....	.....	.....	.....	.....	3	
2 p. m.	17.862	26	23	44	.....	33	.....	.....	.....	.....	3	
9 p. m.	17.741	32	25.5	42	.....	.....	18.5	.....	.....	.....	4	
7 a. m.	17.863	50	35.5	29	.....	.....	.....	.....	.....	.....	2	
2 p. m.	17.852	32	25	54	.....	60	.....	.....	.....	.....	1	
9 p. m.	17.806	31	24	32	.....	.....	21	.....	.....	.....	1	
7 a. m.	17.832	44.5	30.5	28	.....	.....	.....	.....	.....	.....	2	
9 p. m.	17.874	42	32	40	.....	59.5	.....	.....	.....	.....	2	
7 a. m.	17.802	33	28	52	.....	.....	14	.....	.....	.....	3	



Meteorological register at summit of Mount Lincoln, Colorado—Continued.

Date.	Hour.	Barometer at 330 F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.			WIND.		Remarks.	
								Kind.	Direct'n from.	Amount.	Direction.	Amount.		
1873. Oct. 18	9 p. m.	17.890	27	22	28		3				10	N. W.	10	Observations prevented by the storm.
	7 a. m.	17.903	35	27.5	43						4	N. E.	4	
	2 p. m.	17.899	21	17	23	40					4	N. W.	4	
	9 p. m.	17.837	27	19.5	14		15.5				4	N. E.	4	
	7 a. m.	17.733	35	27	41						3	N. E.	3	
	9 p. m.	17.673	21	15.5	12	51					2	N. E.	2	
	7 a. m.	17.525	18	16	46		13.5				1	N. W.	1	
22	9 p. m.	17.491	16								6	N. W.	6	Snowing for last six days, almost without intermission; wind shifting every few hours.
	9 p. m.	17.487	15	7.5		34.5					10	N. W.	10	
	9 p. m.	17.484	—	—	3.5		—15				4	N. E.	4	
	2 p. m.	17.368	6								2	N. E.	2	
	9 p. m.	17.393	3.5								10	N. E.	10	
	9 p. m.	17.427	21	16.5	19		—12				4	N. E.	4	
	9 p. m.	17.430	10								6	N. W.	6	
24	9 p. m.	17.403	9			25					8	N. W.	8	Storm continues unabated; snow drifted in places 20 or 30 feet deep; wind so strong a man can not keep his feet.
	7 a. m.	17.384	15				4.5				8	S. E.	8	
	9 p. m.	17.448	14	13	67	16					10	N. W.	10	
25	9 p. m.	17.470	10	11.5			5.5				10	S. W.	10	
	7 a. m.	17.458	16.5	15	55						8	W.	8	
26	9 p. m.	17.420	7.5	08		16.5					10	S. W.	10	Storm continues unabated; snow drifted in places 20 or 30 feet deep; wind so strong a man can not keep his feet.
	9 p. m.	17.388	—	—	3.5	—18					3	N. E.	3	
	2 p. m.	17.465	—	—	04						10	N. E.	10	
	9 p. m.	17.576	5	07			—19				10	S. E.	10	
27	9 p. m.	17.627	13	14							10	N. E.	10	Storm continues unabated; snow drifted in places 20 or 30 feet deep; wind so strong a man can not keep his feet.
	9 p. m.	17.674	10	11		12					10	N. W.	10	
	7 a. m.	17.502	23	18	19		5				5	N. W.	5	
	2 p. m.	17.794	17	16.5							2	N. W.	2	
29	9 p. m.	17.783	11	12	84	22.5					6	N. E.	6	Storm continues unabated; snow drifted in places 20 or 30 feet deep; wind so strong a man can not keep his feet.
	9 p. m.	17.810	23	19	14		3.5				0	N. E.	0	
	2 p. m.	17.797	20	16	22						0	S. W.	0	
	9 p. m.	17.811	15	13	45	30					0	S. W.	0	
30	7 a. m.	17.746	17	11.5	09		11				2	N. E.	2	

Nov.	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	17.757	17.730	17.665	17.633	17.596	17.546	17.503	17.482	17.822	17.873	17.803	17.731	17.756	17.701	17.725	17.721	17.761
	17.730	17.703	17.638	17.606	17.569	17.519	17.476	17.455	17.795	17.846	17.776	17.801	17.746	17.770	17.766	17.806	17.844
	17.665	17.638	17.606	17.574	17.524	17.481	17.440	17.419	17.758	17.809	17.739	17.764	17.709	17.733	17.729	17.769	17.807
	17.633	17.606	17.574	17.542	17.492	17.449	17.408	17.387	17.726	17.777	17.707	17.732	17.677	17.701	17.697	17.737	17.775
	17.596	17.569	17.537	17.505	17.455	17.412	17.371	17.350	17.689	17.740	17.670	17.695	17.640	17.664	17.660	17.700	17.738
	17.546	17.519	17.487	17.455	17.405	17.362	17.321	17.300	17.640	17.691	17.621	17.646	17.591	17.615	17.611	17.651	17.689
	17.503	17.476	17.444	17.412	17.362	17.319	17.278	17.257	17.597	17.648	17.578	17.603	17.548	17.572	17.568	17.608	17.646
	17.482	17.455	17.423	17.391	17.341	17.298	17.257	17.236	17.576	17.627	17.557	17.582	17.527	17.551	17.547	17.587	17.625
	17.822	17.873	17.803	17.731	17.756	17.701	17.725	17.721	17.860	17.911	17.841	17.866	17.811	17.835	17.831	17.871	17.909
	17.873	17.846	17.814	17.782	17.832	17.807	17.803	17.832	17.971	18.022	17.952	17.977	17.922	17.946	17.942	17.982	18.020
	17.803	17.776	17.744	17.712	17.762	17.737	17.733	17.762	18.001	18.052	17.982	18.007	17.952	17.976	17.972	18.012	18.050
	17.731	17.704	17.672	17.640	17.690	17.665	17.661	17.690	18.001	18.052	17.982	18.007	17.952	17.976	17.972	18.012	18.050
	17.756	17.729	17.697	17.665	17.715	17.690	17.686	17.715	18.001	18.052	17.982	18.007	17.952	17.976	17.972	18.012	18.050
	17.701	17.674	17.642	17.610	17.660	17.635	17.631	17.660	18.001	18.052	17.982	18.007	17.952	17.976	17.972	18.012	18.050
	17.725	17.721	17.750	17.789	17.838	17.887	17.936	17.985	18.034	18.083	18.132	18.181	18.230	18.279	18.328	18.377	18.426
	17.721	17.748	17.787	17.836	17.885	17.934	17.983	18.032	18.081	18.130	18.179	18.228	18.277	18.326	18.375	18.424	18.473
	17.761	17.800	17.839	17.878	17.917	17.956	17.995	18.034	18.073	18.112	18.151	18.190	18.229	18.268	18.307	18.346	18.385
	17.795	17.834	17.873	17.912	17.951	17.990	18.029	18.068	18.107	18.146	18.185	18.224	18.263	18.302	18.341	18.380	18.419
	17.732	17.771	17.810	17.849	17.888	17.927	17.966	18.005	18.044	18.083	18.122	18.161	18.200	18.239	18.278	18.317	18.356
	17.697	17.736	17.775	17.814	17.853	17.892	17.931	17.970	18.009	18.048	18.087	18.126	18.165	18.204	18.243	18.282	18.321
	17.630	17.669	17.708	17.747	17.786	17.825	17.864	17.903	17.942	17.981	18.020	18.059	18.098	18.137	18.176	18.215	18.254
	17.705	17.744	17.783	17.822	17.861	17.900	17.939	17.978	18.017	18.056	18.095	18.134	18.173	18.212	18.251	18.290	18.329
	17.808	17.847	17.886	17.925	17.964	18.003	18.042	18.081	18.120	18.159	18.198	18.237	18.276	18.315	18.354	18.393	18.432
	17.844	17.883	17.922	17.961	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468
	17.910	17.949	17.988	18.027	18.066	18.105	18.144	18.183	18.222	18.261	18.300	18.339	18.378	18.417	18.456	18.495	18.534
	18.001	18.040	18.079	18.118	18.157	18.196	18.235	18.274	18.313	18.352	18.391	18.430	18.469	18.508	18.547	18.586	18.625
	18.001	18.040	18.079	18.118	18.157	18.196	18.235	18.274	18.313	18.352	18.391	18.430	18.469	18.508	18.547	18.586	18.625
	18.001	18.040	18.079	18.118	18.157	18.196	18.235	18.274	18.313	18.352	18.391	18.430	18.469	18.508	18.547	18.586	18.625
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195	18.234	18.273	18.312	18.351	18.390	18.429	18.468	18.507	18.546	18.585	18.624
	18.000	18.039	18.078	18.117	18.156	18.195											



30	9 p. m.	17.692	14.5	11	15	8	3	N. W.	6
	7 a. m.	17.671	22	16	10		4	N. W.	4
	9 p. m.	17.672	14.5	10	14	21.5	4	W.	7
1	7 a. m.	17.464	9.5	10		6	7	W.	8
	9 p. m.	17.356	15	12.5	.38		8	N. W.	6
	9 p. m.	17.349	9	7		14	8	W.	6
2	7 a. m.	17.181	3	1		- 8	4	N.	6
	2 p. m.	17.083	3.5	4.5			5	N. W.	6
	9 p. m.	17.074	- 5	- 3		5	8	S. W.	3
3	7 a. m.	16.967				- 38	10	N.	9
	9 p. m.	17.033					7	N.	9
4	7 a. m.	17.201	- 8			- 31	8	N.	8
	9 p. m.	17.224		2			5	N.	6
	9 p. m.	17.329	- 1	2		- 1	8	N. E.	4
5	7 a. m.	17.393	3	5		- 7	10	N. E.	5
	2 p. m.	17.407	12	10	45		8	N. W.	4
	9 p. m.	17.389	7	9		13	10	N. W.	4
6	7 a. m.	17.319	2	5		- 3	10	N.	6
	9 p. m.	17.334	6	10			10	N. W.	6
	2 p. m.	17.367	1	6			4	W.	6
7	7 a. m.	17.319	5	7.5		7.5	10	E.	5
	9 p. m.	17.232	8	9		- 6.5	10	E.	8
8	9 p. m.	17.380					8		7
	7 a. m.	17.448	- 7	2		- 15	8	N. W.	10
	2 p. m.	17.520	- 1	5	30		3	N. W.	4
9	7 a. m.	17.506	- 2	5.5		9	0	N. W.	4
	9 p. m.	17.501	9.5	11		- 7	0	N. W.	3
	9 p. m.	17.538	4	5			3	N.	8
10	7 a. m.	17.427	4.5	6		8	4	N. W.	10
	2 p. m.	17.424	12	14		- 2	8	N. W.	9
	9 p. m.	17.415	5	11			6	N.	8
11	7 a. m.	17.308	3	10		13	6	N. W.	8
	2 p. m.	17.216	9	14		- 1	6	N. W.	4
	9 p. m.	17.248	- 7	0		8	7	N.	4
12	7 a. m.	17.383				- 24	8	N.	3
	2 p. m.	17.433	4	3			7	N. W.	8
	9 p. m.	17.584	6	8		- 2	2	N.	0
13	7 a. m.	17.719	3	7		- 12.5	0	N.	0
	2 p. m.	17.756	11	14			0	N. W.	2
	9 p. m.	17.760	5	16		- 10.5	0	N. W.	0
14	7 a. m.	17.637	4	6		- 2	0	N. W.	0
	2 p. m.	17.621	10	11			0	N. E.	4
15	9 p. m.								5
	7 a. m.								
	2 p. m.								
	9 p. m.								
16	7 a. m.								
	2 p. m.								
	9 p. m.								

Dec.

*Meteorological register at summit of Mount Lincoln, Colorado—Continued.*

Date.	Hour.	Barometer at 320 F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Directn.	Amount.	Direction.	
1873. Dec. 17	7 a. m.											
	2 p. m.											
18	7 a. m.	17.556	-9	-1			-11					
	9 p. m.	17.613	-6	0		3						
19	7 a. m.	17.596	-7	0			-13					
	2 p. m.	17.548	-9	0								
	9 p. m.	17.537	0	3		2						
20	7 a. m.	17.497	-4	8			-12					
	2 p. m.	17.460	4									
	9 p. m.	17.446	10			24						
21	7 a. m.	17.408	4.5	6			-4					
	9 p. m.	17.438	0	8								
22	7 a. m.	17.470	16.5	14	.38	17	-4.5					
	2 p. m.	17.494	4	2								
23	7 a. m.	17.586	4.5	3.5	.39	19	-9					
	2 p. m.	17.504	18.5	16								
24	7 a. m.	17.489	5	5.5								
	2 p. m.	17.496	-4	2								
25	7 a. m.	17.580	7	9		11.5	-14					
	2 p. m.	17.611	-5	-								
26	7 a. m.	17.690	6	3.5								
	2 p. m.	17.764	14	10		13	3.5					
27	7 a. m.	17.776	17	10								
	2 p. m.	11.667	8.5	6	.24							
28	7 a. m.	17.578	14	10.5								
	2 p. m.											
29	7 a. m.	17.469	-5	-2			-13					
	2 p. m.	17.507	14.5	6								
30	7 a. m.	17.595	6	5	.15	5.5	-4					
	2 p. m.	17.588	15	10.5								
31	7 a. m.	17.611	17	10.5								
	2 p. m.	17.619	14.5	7		18.5	7					
32	7 a. m.	17.634	17	14	.30							
	2 p. m.	17.643	23	17	.11							
33	7 a. m.	17.639	14.5	11	.23	24	8					
	2 p. m.	17.647	11									
34	7 a. m.	17.727	14									
	9 p. m.	17.746	11			16						



1874.  
Jan.

30	7 a. m.	17.732	16.5					9.5		10	N.W.	7
	9 p. m.	17.736	14							8	N.W.	7
31	7 a. m.	17.701	14	.45	12			13		8	N.	6
	9 p. m.	17.592	11.5		9			7.5		3	N.W.	5
	7 a. m.	17.630	16.5	.45	14.5					8	N.	4
	9 p. m.	17.577	9	10.5				16.5		10	N.W.	8
1	7 a. m.	17.530	3.5	5				- 3		0	N.E.	10
	9 p. m.	17.590	13.5	12	.55					2	N.E.	7
2	7 a. m.	17.600	10.5	11.5				14		7	N.	6
	9 p. m.	17.424	13	17.5				7		10	N.	8
3	7 a. m.	17.334	16					16		10	S.W.	9
	9 p. m.	17.182	15.5					-15		10		9
4	7 a. m.	17.990	- 9							10	N.	8
	9 p. m.	17.019	- 9.5							6	N.W.	5
5	7 a. m.	17.137						- 5		9	N.	9
	9 p. m.	17.248								0	N.	8
6	7 a. m.	17.362	- 4	- 2				-36.5		0	N.E.	5
	9 p. m.	17.518	0	1				7.5		0	N.	5
7	7 a. m.	17.569	8	8.5				- 9		2	N.	3
	9 p. m.	17.544	2	3				9		2	N.W.	7
8	7 a. m.	17.587	2	4.5				- 6		10	N.	10
	9 p. m.	17.677	15.5	11	.15					0	N.W.	9
9	7 a. m.	17.703	11.5	7				16		0	N.E.	6
	9 p. m.	17.676	7.5							0	N.	4
10	7 a. m.	17.628	10					4		10	N.	10
	9 p. m.	17.613	10					10.5		4	N.	9
11	7 a. m.	17.575	0					- 2.5		10	N.	9
	9 p. m.	17.475	4							4	N.	10
12	7 a. m.	17.542	12					7		10	N.W.	8
	9 p. m.	17.555	4							7	N.	6
13	7 a. m.	17.574	5.5					- 2		8	N.	9
	9 p. m.	17.610	13.5							4	N.W.	7
14	7 a. m.	17.620	6					12		4	N.	4
	9 p. m.	17.536	3.5					1		0	N.E.	4
15	7 a. m.	17.558	15					16.5		1	N.E.	3
	9 p. m.	17.549	7							0	N.	3
16	7 a. m.	17.518	6					1		7	N.	4
	9 p. m.	17.504	21.5							3	W.	4
17	7 a. m.	17.465	5.5					20.5		7	N.W.	2
	9 p. m.	17.503	4.5							7	N.E.	8
18	7 a. m.	17.487	15.5							6	N.E.	5
	9 p. m.	17.524	3.5					14.5		2	N.W.	4
19	7 a. m.	17.515	3					2		2	W.	3
	9 p. m.	17.553	6					10.5		5	N.W.	4
20	7 a. m.	17.552	- 2							3	N.E.	3
	9 p. m.	17.590	- 3					- 3		3	N.	9
21	7 a. m.	17.650	13					18		2	N.	2
	9 p. m.	17.514	6							2	N.	6
22	7 a. m.	17.485	12.5							4	N.W.	8
	9 p. m.	17.557	11.5					13		10	N.	9

The wet bulb thermometer broken.

Meteorological register at summit of Mount Lincoln, Colo.—Continued.

Date.	Hour.	Barometer at 330 F.	Dry bulb.	Wet bulb.	Relative hu- midity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct n Amount.	Direct Amount.	Dirac- tion.	
1874. Jan. 16	7 a. m.	17.503	5				5.5					
	2 p. m.	17.433	17								N.	7
	9 p. m.	17.447	15.5			19.5					N.	8
17	7 a. m.	17.375	14				12.5				N.	7
	2 p. m.	17.418	21								W.	8
	9 p. m.	17.365	14.5			23.5					N.W.	9
18	7 a. m.	17.989	13.5								W.	8
	9 p. m.	17.934	13								W.	10
	9 p. m.	17.427	4			15					W.	8
19	7 a. m.	17.398	1								W.	10
	2 p. m.	17.391	3								W.	10
	9 p. m.	17.370	4.5			9					N.W.	4
20	7 a. m.	17.188	2								N.W.	4
	9 p. m.	17.127	1.5								W.	6
	9 p. m.	17.142	3			4.5					W.	7
21	7 a. m.	17.131	6								N.W.	10
	9 p. m.	17.131	3.5								W.	5
	9 p. m.	17.087	12			3.5					N.W.	9
22	7 a. m.	17.093	13								N.E.	4
	9 p. m.	17.019	13								N.E.	5
	2 p. m.	17.050	13								N.E.	6
23	9 p. m.	16.964				1					N.E.	7
	7 a. m.	17.139									N.E.	10
	2 p. m.	17.271	2								N.E.	8
24	9 p. m.	17.461				17					N.W.	10
	7 a. m.	17.673	7								N.	10
	2 p. m.	17.708	12.5								N.	9
25	9 p. m.	17.620	6			15.5					N.	4
	7 a. m.	17.750	7.5								N.E.	3
	2 p. m.	17.620	23								N.	4
26	9 p. m.	17.808	13			21					N.	3
	7 a. m.	17.681	16				9				N.	0
	2 p. m.	17.564	17								N.E.	1
27	9 p. m.	17.421	3			10.5					N.W.	2
	7 a. m.	17.521	2				9				N.W.	4
	2 p. m.	17.586	3.5								N.W.	8
28	9 p. m.	17.661	1			4					N.W.	9
	7 a. m.	17.712	0				7.5				N.W.	10
	2 p. m.	17.641	13								N.	2
9 p. m.	17.786	6			13.5					N.	1	

Minimum thermometer out of order.

Meteorological register at Fairplay, Colo.

Day	Time	17.671	6.5		3.5				8	N.W.	
29	7 a. m.	17.671	6.5						8	N.W.	4
	2 p. m.	17.638	9.5						0	N.W.	5
	9 p. m.	17.625	0	9					0	N.W.	3
30	7 a. m.	17.573	4		— 8				5	N.W.	4
	2 p. m.	17.536	18						5	N.	2
	9 p. m.	17.469	4		26.5				4	W.	2
31	7 a. m.	17.360	— 3		— 8.5				6	W.	2
	2 p. m.	17.352	23						4	W.	2
	9 p. m.	17.411	— 9	26					8	W.	1
<hr/>											
1873.											
July	17										
	7 a. m.										
	2 p. m.	21.170	30.1			68	43.5				
	9 p. m.	21.159	63.2			55	54.4				
18	7 a. m.	21.155	62.6			41	49.5				
	2 p. m.	21.127	50.2			58	43.4				
	9 p. m.	21.195	59.5			50	49.9				
19	7 a. m.	21.143	68.1			39	44.9				
	2 p. m.	21.177	45.2			55	37.8				
	9 p. m.	21.134	61.0			33	45.5				
20	7 a. m.	21.066	68.8			23	46.0				
	2 p. m.	21.098	51.0			46	41.2				
	9 p. m.	21.021	64.0			36	49.1				
21	7 a. m.	20.994	73.9			27	52.2				
	2 p. m.	21.041	52.5			59	45.2				
	9 p. m.	21.058	64.5			42	51.1				
22	7 a. m.	21.079	59.8			47	49.1				
	2 p. m.	21.135	53.5			69	47.9				
	9 p. m.	21.140	63.5			44	52.0				
23	7 a. m.	21.123	72.2			30	52.7				
	2 p. m.	21.177	53.5			55	45.6				
	9 p. m.	21.170	66.2			40	52.0				
24	7 a. m.	21.174	51.2			86	49.5				
	2 p. m.	21.191	50.3			79	47.0				
	9 p. m.	21.130	56.0			70	51.0				
25	7 a. m.	21.085	63.0			36	48.5				
	2 p. m.	21.179	48.5			73	44.8				
	9 p. m.	21.113	56.0			56	48.5				
26	7 a. m.	21.089	67.5			26	47.0				
	2 p. m.	21.061	50.5			63	44.3				
	9 p. m.	21.067	59.0			40	46.0				
27	7 a. m.	21.068	61.0			35	46.2				
	2 p. m.	21.101	49.3			62	43.5				
	9 p. m.	21.041	52.8			64	45.7				
28	7 a. m.	21.008	60.5			30	43.0				
	2 p. m.	21.068	47.0			72	43.5				
	9 p. m.										

Taken an hour late.

Rain.

Meteorological register at Fairplay, Colo.—Continued.

Date.	Hour.	Barometer at 32° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct'n From.	Amount.	Direction.	
1873. July 29	7 a. m.	21.048	55.0	42.3	38							
	2 p. m.	20.989	64.2	44.5	25							
	9 p. m.	21.016	47.5	41.0	61							
30	7 a. m.	20.981	52.5	45.0	59							
	2 p. m.	20.948	63.2	45.5	29							
	9 p. m.	20.999	40.5	42.5	57							
31	7 a. m.	20.980	50.0	47.0	43							
	2 p. m.	20.867	69.5	47.3	23							
	9 p. m.	21.040	43.5	38.3	65							
Aug. 1	7 a. m.	21.057	56.5	51.0	61							
	2 p. m.	21.032	52.7	...	...							
	9 p. m.	21.120	43.0	...	...							
2	7 a. m.	21.070	51.0	43.5	54							
	2 p. m.	21.053	63.5	48.5	36							
	9 p. m.	21.094	46.0	42.7	78							
3	7 a. m.	21.104	53.0	42.5	43							
	2 p. m.	21.053	64.5	45.5	27							
	9 p. m.	21.082	50.0	41.5	49							
4	7 a. m.	21.024	55.0	48.5	60							
	2 p. m.	21.002	63.5	51.5	44							
	9 p. m.	21.029	48.5	45.0	79							
5	7 a. m.	21.057	58.0	46.5	85							
	2 p. m.	21.053	65.5	50.0	37							
	9 p. m.	21.085	58.5	45.0	39							
6	7 a. m.	21.113	54.5	49.5	69							
	2 p. m.	21.109	59.5	48.0	46							
	9 p. m.	21.109	50.0	48.0	86							
7	7 a. m.	21.050	56.0	52.0	75							
	2 p. m.	21.020	57.0	49.5	57							
	9 p. m.	21.025	49.0	46.0	79							
8	7 a. m.	21.008	56.3	47.0	52							
	2 p. m.	21.025	60.5	48.0	43							
	9 p. m.	21.085	53.0	46.0	59							
9	7 a. m.	21.096	56.0	50.0	65							
	2 p. m.	21.069	60.2	49.0	47							
	9 p. m.	21.110	53.2	49.0	74							
10	7 a. m.	21.124	50.0	47.0	79							
	2 p. m.	21.047	61.7	48.7	41							
	9 p. m.	21.090	53.5	48.5	69							

11	7 a. m. . . . .	21.092	57.0	50.5	61
	2 p. m. . . . .	21.021	68.0	51.0	33
	9 p. m. . . . .	21.047	54.5	49.0	69
12	7 a. m. . . . .	21.042	58.0	50.5	57
	2 p. m. . . . .	20.993	68.0	53.0	38
	9 p. m. . . . .	21.052	50.0	47.5	79
13	7 a. m. . . . .	21.076	59.5	53.5	66
	2 p. m. . . . .	21.037	65.2	52.5	81
	9 p. m. . . . .	21.116	49.5	48.0	93
14	7 a. m. . . . .	21.095	55.7	53.0	81
	2 p. m. . . . .	21.075	56.2	49.0	61
	9 p. m. . . . .	21.102	47.0	46.0	92
15	7 a. m. . . . .	21.139	47.5	46.5	92
	2 p. m. . . . .	21.094	53.5	50.5	80
	9 p. m. . . . .	21.106	46.5	45.0	92
16	7 a. m. . . . .	21.054	43.0	44.0	92
	2 p. m. . . . .	21.016	61.0	49.0	44
	9 p. m. . . . .	21.043	45.0	43.0	85
17	7 a. m. . . . .	21.104	53.0	48.5	69
	2 p. m. . . . .	21.072	64.0	47.5	31
	9 p. m. . . . .	21.097	46.5	43.0	78
18	7 a. m. . . . .	21.119	53.5	47.0	64
	2 p. m. . . . .	21.113	58.2	43.0	34
	9 p. m. . . . .	21.121	47.0	39.5	52
19	7 a. m. . . . .	21.131	48.0	41.0	57
	2 p. m. . . . .	21.099	59.5	44.0	34
	9 p. m. . . . .	21.084	49.0	41.0	53
20	7 a. m. . . . .	21.041	55.0	45.0	48
	2 p. m. . . . .	21.029	57.0	45.8	45
	9 p. m. . . . .	21.035	48.0	42.5	67
21	7 a. m. . . . .	21.020	46.4	42.5	72
	2 p. m. . . . .	20.991	63.0	49.0	34
	9 p. m. . . . .	20.995	51.5	45.0	63
22	7 a. m. . . . .	20.976	50.0	47.0	79
	2 p. m. . . . .	20.927	60.5	50.5	50
	9 p. m. . . . .	20.924	52.0	49.0	80
23	7 a. m. . . . .	20.964	50.1	46.5	73
	2 p. m. . . . .	20.998	63.5	52.0	43
	9 p. m. . . . .	21.056	49.0	47.5	86
24	7 a. m. . . . .	21.118	51.0	42.0	50
	2 p. m. . . . .	21.051	60.0	48.5	43
	9 p. m. . . . .	21.036	68.0	42.0	17
25	7 a. m. . . . .	21.036	56.0	41.0	33
	2 p. m. . . . .	21.021	61.0	55.0	67
	9 p. m. . . . .	21.033	60.0	40.0	23
26	7 a. m. . . . .	21.054	47.0	42.5	67
	2 p. m. . . . .	21.053	68.0	49.0	28
	9 p. m. . . . .	21.061	49.5	41.0	53
27	7 a. m. . . . .	21.070	48.0	42.5	62
	2 p. m. . . . .	21.033	72.5	51.0	26
	9 p. m. . . . .	21.033	51.0	45.0	63
28	7 a. m. . . . .	21.084	50.0	43.0	58

Meteorological register at Fairplay, Colo.—Continued.

Date.	Hour.	Barometer at 32° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct'n.	Amount.	Direct'n.	
1873. Aug. 28	6 p. m.	21.068	68.0	50.0	31							
	9 p. m.	21.120	59.0	48.0	74							
	7 a. m.	21.124	48.0	44.0	73							
29	3 p. m.	21.107	60.0	48.5	43							
	9 p. m.	20.995	48.0	45.0	79							
	7 a. m.	21.114	49.0	45.5	73							
30	2 p. m.	21.079	61.0	53.0	58							
	9 p. m.	21.088	53.0	52.0	93							
	7 a. m.	21.105	54.5	49.0	69							
31	2 p. m.	21.074	62.0	48.0	38							
	9 p. m.	21.095	52.0	46.0	64							
	7 a. m.	21.072	47.5	44.0	79							
Sept. 1	2 p. m.	21.025	62.5	49.5	41							
	9 p. m.	21.036	45.0	42.0	78							
	7 a. m.	20.995	43.0	41.0	85							
2	2 p. m.	20.932	61.3	48.0	41							
	9 p. m.	20.839	45.5	39.5	65							
	7 a. m.	20.916	48.0	43.0	67							
3	2 p. m.	20.923	61.5	45.5	33							
	9 p. m.	20.935	45.5	36.5	46							
	7 a. m.	20.987	43.0	35.5	42							
4	2 p. m.	20.987	61.5	45.0	33							
	9 p. m.	21.060	41.5	35.0	58							
	7 a. m.	21.047	40.5	38.2	84							
5	2 p. m.	21.056	62.5	46.5	33							
	9 p. m.	21.038	44.0	40.5	72							
	7 a. m.	21.162	45.0	42.0	78							
6	2 p. m.	21.166	47.5	45.0	82							
	9 p. m.	21.195	41.5	40.5	92							
	7 a. m.	21.197	42.0	41.0	92							
7	2 p. m.	21.136	52.0	47.0	69							
	9 p. m.	21.137	42.5	42.0	96							
	7 a. m.	21.089	44.5	40.0	69							
8	2 p. m.	21.077	51.5	43.0	52							
	9 p. m.	21.092	37.0	35.0	83							
	7 a. m.	21.071	37.5	35.5	83							
9	2 p. m.	21.036	57.0	42.0	1.00							
	9 p. m.	21.046	42.0	37.0	65							
	7 a. m.	21.633	38.5	35.0	72							

11	9 p. m.	21,033	65.0	44.5	25
	9 p. m.	20,986	45.0	40.0	66
	7 a. m.	20,968	50.0	42.0	53
	2 p. m.	20,984	52.0	42.0	46
	9 p. m.	21,037	46.5	39.5	58
12	7 a. m.	21,058	46.0	38.5	51
	2 p. m.	21,053	60.5	45.0	35
	9 p. m.	21,071	42.0	37.5	65
13	7 a. m.	21,070	37.5	33.0	64
	2 p. m.	21,032	60.5	44.0	32
	9 p. m.	21,057	41.0	34.0	53
14	7 a. m.	21,048	48.5	42.0	62
	2 p. m.	21,021	64.5	45.5	27
	9 p. m.	21,020	44.0	36.5	50
15	7 a. m.	21,065	41.0	34.0	52
	2 p. m.	21,067	64.5	44.0	25
	9 p. m.	21,089	45.5	42.5	78
16	7 a. m.	21,076	34.5	30.0	63
	2 p. m.	21,027	63.0	43.0	25
	9 p. m.	20,948	57.5	42.5	33
17	7 a. m.	20,952	40.5	35.5	63
	2 p. m.	20,925	62.5	48.0	38
	9 p. m.	20,940	50.0	38.0	38
18	7 a. m.	20,964	38.5	33.0	60
	2 p. m.	20,946	60.5	41.0	24
19	7 a. m.	20,900	40.5	38.0	84
	2 p. m.	20,860	45.5	45.0	96
	9 p. m.	20,867	42.0	38.0	71
20	7 a. m.	20,880	41.5	36.0	64
	2 p. m.	20,867	53.5	41.0	40
	9 p. m.	20,911	43.0	38.5	65
21	7 a. m.	20,900	46.2	38.0	51
	2 p. m.	20,886	51.0	39.0	39
	9 p. m.	20,935	43.0	35.0	49
22	7 a. m.	20,928	44.0	34.0	41
	2 p. m.	20,917	55.0	39.5	29
	9 p. m.	20,987	45.0	38.5	55
23	7 a. m.	20,918	48.5	35.0	33
	2 p. m.	20,820	64.5	40.0	18
	9 p. m.	20,850	46.0	37.0	47
24	7 a. m.	20,792	46.5	34.5	35
	2 p. m.	20,766	60.0	41.0	25
	9 p. m.	20,789	48.0	35.0	33
25	7 a. m.	20,705	52.0	39.5	36
	2 p. m.	20,671	63.0	49.0	39
	9 p. m.	20,680	48.0	38.0	44
26	7 a. m.	20,674	52.0	39.0	36
	2 p. m.	20,653	62.0	43.0	26
	9 p. m.	.....	.....	.....	.....

Meteorological register at Cañon City, Colo.

Date.	Hour.	Barometer at 33° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.			WIND.		Remarks.
								Kind.	Direct'n from.	Amount.	Direction.	Amount.	
1873. July 19	7 a. m.	25.021	18										
	2 p. m.	25.026	38										Clear.
	9 p. m.	24.915	72.5										Raining.
20	7 a. m.	24.835	80										Cloudy; sky overcast.
	2 p. m.	24.900	90										Clear.
	9 p. m.	24.761	78.3										Cloudy; sky overcast.
21	7 a. m.	24.758	88.3										Cloudy; sky overcast.
	2 p. m.	24.645	96.3										Cumuli and misty.
	9 p. m.	24.685	83										Cloudy; sky overcast.
22	7 a. m.	24.832	94.5										Cloudy; sky overcast.
	2 p. m.	24.731	96										Cloudy; sky overcast.
	9 p. m.	24.866	69.5										Few cumuli; clearing.
23	7 a. m.	24.895	82.5										Clear.
	2 p. m.	24.844	90										Rain.
	9 p. m.	24.930	80.5										Clear.
24	7 a. m.	24.967	89										Rain.
	2 p. m.	24.858	92.5										Clear.
	9 p. m.	25.038	68										Rain.
25	7 a. m.	24.966	69										Cloudy; sky overcast.
	2 p. m.	24.868	72.5										Clear.
	9 p. m.	25.010	63										Do.
26	7 a. m.	25.006	80										Clear.
	2 p. m.	24.852	80										Rain.
	9 p. m.	24.866	72										Clear.
27	7 a. m.	24.896	80.5										Cloudy; sky overcast.
	2 p. m.	24.886	74							S.			Do.
	9 p. m.	24.963	66										Clear.
28	7 a. m.	24.895	69.5										Few cumuli; clearing.
	2 p. m.	24.824	75										Cloudy and calm; sky overcast.
	9 p. m.	24.928	63										Clear.
29	7 a. m.	24.905	73										Do.
	2 p. m.	24.793	79.5							S.			Clear and calm.
	9 p. m.	24.816	69.5							N. E.			Do.
30	7 a. m.	24.726	79										Rain-clouds; calm.
	2 p. m.	24.743	80.5										Clear.
	9 p. m.	24.732	68										Do.
31	7 a. m.	24.735	80										Clear and calm.
	2 p. m.	24.687	88							N. W.			Do.
	9 p. m.	24.788	70							N. E.			Clear and calm.





Meteorological register at Cañon City, Colo.—Continued.

Date.	Hour.	Barometer at 32° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct'n.	Amount.	Direction.	
1873.												
Aug. 18	2 p. m.	24.840	79					Nimbus.			E.	Rain.
	9 p. m.	24.885	68					Stratus.			Calm.	
19	7 a. m.	24.863	83					Clear.			N. W.	
	2 p. m.	24.782	89					Nimbus.			Calm.	
	9 p. m.	24.813	73					Stratus.			Calm.	
20	7 a. m.	24.744	86					do			E.	Do.
	2 p. m.	24.683	91					Cumulo-nimbus.				
	9 p. m.	24.825	73					Clear.				
21	7 a. m.	24.780	84					Stratus.			Calm.	
	2 p. m.	24.716	70					Nimbus, cumulus.			Calm.	
	9 p. m.	24.736	76					do			Calm.	
22	7 a. m.	24.750	82					Cumulus.			Calm.	
	2 p. m.	24.480	86					Nimbus, cumulus.			N.	
	9 p. m.	24.668	75					Stratus.			W.	
23	7 a. m.	24.745	85					do			N.	
	2 p. m.	24.723	87					Stratus, nimbus.			N. E.	Do.
	9 p. m.	24.861	70					Nimbus, cumulus.			E.	Do.
24	7 a. m.	24.840	80					Stratus.			Calm.	Do.
	2 p. m.	24.766	74					Nimbus.			E.	
	9 p. m.	24.866	68					Nimbus, stratus.				
25	7 a. m.	24.837	84					Stratus.			Calm.	
	2 p. m.	24.776	86					Cumulus, stratus.			Calm.	
	9 p. m.	24.767	72					Cumulus.			Calm.	
26	7 a. m.	24.826	75					do			Calm.	
	2 p. m.	24.743	90					Cirrus.			Calm.	
	9 p. m.	24.766	75					Clear.				
27	7 a. m.	24.712	87								Calm.	Constantly clear.
	2 p. m.	24.669	92								N. E.	
	9 p. m.	24.476	76								N. E.	
28	7 a. m.	24.813	96					Cirrus.			N. E.	
	2 p. m.	24.822	91					Cumulus.			S. W.	
	9 p. m.	24.924	75.5								S. W.	Sky overcast.
29	7 a. m.	24.896	90					Stratus.				
	2 p. m.	24.847	87					Nimbus.				Do.
	9 p. m.	24.835	72.5									
30	7 a. m.	24.897	85									
	2 p. m.	24.893	92					Cirrus.				
	9 p. m.	24.861	74									
31	7 a. m.	24.863	87					Cumulus.				





Heavy east wind during the night of the 4th, commenced again at 9 a. m. of the 5th.  
Clear and hazy.

Oct. 1	9 p. m.	24. 716	60	Clear	Calin.	Calin.
	7 a. m.	24. 750	74	do	Calin.	Calin.
	2 p. m.	24. 669	73	do	Calin.	Calin.
2	9 p. m.	24. 661	74	Cirrus	Calin.	Calin.
	7 a. m.	24. 752	68	Cumulus	S.	S.
	2 p. m.	24. 637	81	Clear	Calin.	Calin.
3	9 p. m.	24. 672	64	do	E.	E.
	7 a. m.	24. 757	73	do	E.	E.
	2 p. m.	24. 731	90	do	Calin.	Calin.
4	9 p. m.	24. 807	55	Cumulus	Calin.	Calin.
	7 a. m.	24. 718	59	do	Calin.	Calin.
	2 p. m.	24. 708	85	Clear	Calin.	Calin.
5	9 p. m.	24. 787	62	Stratus, cumulus	Calin.	Calin.
	7 a. m.	24. 924	87	do		
	2 p. m.	24. 904	67	Clear	Calin.	Calin.
6	9 p. m.	24. 973	55	do	N. E.	N. E.
	7 a. m.	24. 012	61	do	Calin.	Calin.
	2 p. m.	24. 898	67	do	N. E.	N. E.
7	9 p. m.	24. 763	35	Cumulus	Calin.	Calin.
	7 a. m.	24. 793	69	do	N. W.	N. W.
	2 p. m.	24. 588	88	do	Calin.	Calin.
8	9 p. m.	24. 553	66.5	Clear	Calin.	Calin.
	7 a. m.	24. 612	66.5	do	N. E.	N. E.
	2 p. m.	24. 580	87	do	Calin.	Calin.
9	9 p. m.	24. 654	67	do	N. E.	N. E.
	7 a. m.	24. 737	74	Cirrus	Calin.	Calin.
	2 p. m.	24. 676	86	Clear	Calin.	Calin.
10	9 p. m.	24. 752	61	Cumulus, stratus	Calin.	Calin.
	7 a. m.	24. 902	50.5	Clear	E.	E.
	2 p. m.	24. 896	67	do		
	9 p. m.	25. 009	58	Hazy		
11	7 a. m.	25. 080	64	do	E.	E.
	2 p. m.	24. 994	71	do	Calin.	Calin.
	9 p. m.	24. 993	56	do	S. E.	S. E.
12	7 a. m.	24. 903	74	do		
	2 p. m.	24. 742	86	do	Overcast.	Overcast.
	9 p. m.	.....	.....	do	Do.	Do.
13	7 a. m.	24. 770	69.5	Hazy	N. E.	N. E.
	2 p. m.	24. 676	76	Clear	S. E.	S. E.
14	9 p. m.	24. 667	58	do	Calin.	Calin.
	7 a. m.	24. 615	65	do		
	2 p. m.	24. 454	78.5	Cumulus	Calin.	Calin.
15	9 p. m.	24. 406	64	Nimbus	S. W.	S. W.
	7 a. m.	24. 552	59	do	S. E.	S. E.
	2 p. m.	24. 612	63	do	S. E.	S. E.
16	9 p. m.	24. 747	51.5	do	Calin.	Calin.
	2 a. m.	24. 924	31.5	do	E.	E.
	7 p. m.	24. 708	51	do	E.	E.
17	9 p. m.	24. 670	43	do	N. E.	N. E.
	7 a. m.	24. 690	47	do	N. E.	N. E.
	2 p. m.	24. 456	45	do	S. E.	S. E.
	9 p. m.	24. 849	44	do	Overcast.	Overcast.

Meteorological register at Canon City, Colo.—Continued.

Date.	Hour.	Barometer at 330 ft.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct'n from.	Amount.	Direction.	
1873. Oct. 18	7 a. m.	24.968	44					Cirrus.			Calm.	
	2 p. m.	24.922	51					Clear			Calm.	
19	7 a. m.	24.988	35					do			Calm.	
	2 p. m.	24.947	58					do			Calm.	
20	7 a. m.	24.846	65					do			Calm.	
	2 p. m.	24.870	43					do			Calm.	
21	7 a. m.	24.794	61					do			Calm.	
	2 p. m.	24.617	70					do			Calm.	
22	7 a. m.	24.605	54					do			Calm.	
	2 p. m.	24.516	61.5					do			Calm.	
23	7 a. m.	24.425	58					do			S.	Overcast.
	2 p. m.	24.356	41					Clear			Calm.	
24	7 a. m.	24.798	32					do			Calm.	
	2 p. m.	24.462	34.5					do			Calm.	
25	7 a. m.	24.755	31					do			Calm.	
	2 p. m.	24.620	37					do			S. E.	
26	7 a. m.	24.498	45					Cumulus			S. W.	
	2 p. m.	24.518	31					Cumulus, stratus			S. E.	Do.
27	7 a. m.	24.569	39					Cumulus			Calm.	
	2 p. m.	24.627	29					Cumulus			N.	Overcast; snow.
28	7 a. m.	24.731	19									
	2 p. m.	24.766	25									
29	7 a. m.	24.698	35					Cumulus			Calm.	Snow on ground.
	2 p. m.	24.690	38					Clear			Calm.	
30	7 a. m.	24.692	32					do			Calm.	
	2 p. m.	24.672	43					Cumulus			S. W.	
31	7 a. m.	24.612	38					Nimbus			S. E.	Snow all gone except on the main range.
	2 p. m.	24.879	39					Clear			Calm.	
32	7 a. m.	24.960	44					do			Calm.	
	2 p. m.	24.876	59					do			Calm.	
33	7 a. m.	24.876	38					do			Calm.	
	2 p. m.	24.915	45					do			Calm.	
34	7 a. m.	24.823	64					do			Calm.	
	2 p. m.	24.825	37					do			Calm.	
35	7 a. m.	24.632	50					do			Calm.	
	2 p. m.	24.845	54					do			S. W.	
36	7 a. m.	24.935	36					do			Calm.	
	2 p. m.	24.935	36					do			Calm.	

Day	Time	Temp	Wind	Clouds	Pressure	Direction	Remarks
Nov. 1	31 7 a. m.	24.893	31	88	do	Calm.	
	2 P. m.	24.786	49	40	do	Calm.	
	9 P. m.	24.294	32	30	Cirro-cumulus		Overcast. Do.
2	7 a. m.	24.605	44.5	86	do		
	2 P. m.	24.650	52.5	87	Cirro-cumulus		
	9 P. m.	24.792	44	86	Clear		
3	7 a. m.	24.916	51	49	do		
	2 P. m.	24.923	54	76	do		
	9 P. m.	24.953	40	34	Clear		Hazy.
4	7 a. m.	24.835	39	31	do		
	2 P. m.	24.705	63	57	Clear		
	9 P. m.	24.356	49	42	do		
5	7 a. m.	24.732	48	37	Clear		
	2 P. m.	24.726	63	46	do		
	9 P. m.	24.812	40	34.5	do		
6	7 a. m.	24.863	56	43	do		
	2 P. m.	24.728	68	52	do		
	9 P. m.	24.795	48	44.5	do		Sky overcast.
7	7 a. m.	24.617	56	54	do		
	2 P. m.	24.560	70	62	do		
	9 P. m.	24.632	52	49	Clear		
8	7 a. m.	24.793	57	44	do		
	2 P. m.	24.753	60	56	do		
	9 P. m.	24.881	44	36	do		
9	7 a. m.	24.934	60	46	Clear		
	2 P. m.	24.920	66	65	do		
	9 P. m.	25.260	48	50	do		
10	7 a. m.	25.570	59	46	do		
	2 P. m.	25.404	73	65	do		
	9 P. m.	25.315	50	47	do		
11	7 a. m.	24.955	47	76	do		
	2 P. m.	24.844	69	65	do		
	9 P. m.	24.901	47	45	do		
12	7 a. m.	24.913	47	45	do		
	2 P. m.	24.374	56	54	do		
	9 P. m.	25.037	35	28	do		
13	7 a. m.	24.997	34	27.5	do		
	2 P. m.	24.893	47	43	do		
	9 P. m.	24.804	35	29	do		
14	7 a. m.	24.767	53	43	do		
	2 P. m.	24.676	69	68	do		
	9 P. m.	24.693	44	35	do		
15	7 a. m.	24.562	49	47	Clear		
	2 P. m.	24.564	70	67	Cumulus		
	9 P. m.	24.649	57	56	Clear		
16	7 a. m.	24.774	50	40	do		
	2 P. m.	24.718	67	50	do		
	9 P. m.	24.711	52	41	Cumulus		
17	7 a. m.	24.902	50	40	do		
	2 P. m.	24.805	71.5	54	do		
	9 P. m.	24.691	55	43	Clear		
		24.630	67	65	do		Heavy wind blowing.

Meteorological register at Cañon City, Colo.—Continued.

Date.	Hour.	Barometer at 32° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.		WIND.		Remarks.
								Kind.	Direct'n from.	Amount.	Direc- tion.	
1873, Nov. 17	2 p. m.	24.508	58	41	.37			Clear			W.	
	9 p. m.	24.965	37	30	.54			Clear			Calm.	
18	7 a. m.	24.955	44	35	.50			do			N. E.	
	9 p. m.	24.901	28	23	.50			do			Calm.	
19	7 a. m.	24.807	37.5	27	.39			do			W.	
	9 p. m.	24.655	58	41	.37			do			N. W.	
	9 p. m.	24.635	36	27.5	.42			Clear			Calm.	
20	7 a. m.	24.618	50.5	30	.46			do			Calm.	
	2 p. m.	24.667	55	38	.37			Stratus			S. E.	
	9 p. m.	24.612	32	25.5	.56			do			Calm.	
21	7 a. m.	24.990	34	28	.58			Cumulus.			N.	Overcast.
	2 p. m.	24.547	53	42.5	.50			do			N.	Overcast; snowing on Greenhorn range.
22	7 a. m.	24.507	42					do				Overcast.
	9 p. m.	24.509	30	32	.54			do				Overcast.
	9 p. m.	24.472	52	41	.47			Clear			W.	
	9 p. m.	24.689	44	32	.38			do			W.	
23	7 a. m.	24.819	40	33.5	.58			do			Calm.	
	2 p. m.	24.763	46	35.5	.44			do			Calm.	Snow on the range.
	9 p. m.	24.816	37	30	.54			do			N.	
24	7 a. m.	24.874	40.5	31.5	.50			do			N.	
	2 p. m.	24.707	55	41.5	.44			Cirrus			W.	
	9 p. m.	24.910	50	39	.46			Clear			N. W.	
25	7 a. m.	24.840	46	36.5	.48			Stratus			W.	
	2 p. m.	24.655	60.5	45	.42			Cirrus			Calm.	
	9 p. m.	24.573	55	40.5	.41			Clear			W.	
26	7 a. m.	24.495	39	35	.35			do			W.	Heavy gale all p. m.
	2 p. m.	24.637	62	43	.33			do			W.	Heavy gale.
	9 p. m.	24.694	32.5	25.5	.56			Cirrus			W.	
27	7 a. m.	24.615	35	30	.64			Clear			W.	
	2 p. m.	24.620	35	28	.53			do				
	9 p. m.	24.797	34	27	.57			do				
28	7 a. m.	24.715	23					do				
	2 p. m.	24.560	52	40	.44			Clear			W.	Heavy wind all p. m.
	9 p. m.	24.640	50	38	.42			do			W.	
29	7 a. m.	24.714	48	37.5	.44			Cirrus			N. E.	
	2 p. m.	24.683	61	48	.47			do			W.	
	9 p. m.	24.732	50.5	40	.50			Clear			Calm.	
30	7 a. m.	24.702	53.5	43.5	.50			Cirrus			Calm.	



Dec.	1	2 p. m.	24.610	61	47	44	Stratus	W.	Heavy west wind all night and day.
		9 p. m.	24.522	52	45	62	Clear	Calm.	
2	2	7 a. m.	24.453	56	42.5	44	Cirrus	W.	Heavy bank of clouds over the range. Shifting wind. Snowing.
		9 p. m.	24.337	60.5	44	45	Cirrus		
		9 p. m.	24.305	55	43.5	49	Cumulus	E.	
		7 a. m.	24.258	52	42	50	do	E.	
		9 p. m.	24.233	37	30.5	54	Clear	E.	
3	3	9 p. m.	24.363	32.5	22	24	do		Four inches of snow fell last night.
		7 a. m.	24.504	24	20	24	do		
		9 p. m.	24.495	22	23	1.00	do		
4	4	9 p. m.	24.490	30	25	30	Clear	Calm.	Overcast.
		7 a. m.	24.446	35	30	64	Clear	Calm.	
		7 a. m.	24.440	42.5	35.5	58	Clear	Calm.	
		9 p. m.	24.541	24	29	1.00	Clear	Calm.	
5	5	7 a. m.	24.585	28	29	29	Clear	S.	Do.
		9 p. m.	24.556	28	23	23	Clear	Calm.	
		9 p. m.	24.576	29	26	58	Clear	Calm.	
		7 a. m.	24.526	24	26	58	Clear	Calm.	
6	6	9 p. m.	24.515	20.5	25	24	Clear	Calm.	Overcast; snowing on main range.
		7 a. m.	24.530	20.5	17	46	Clear	Calm.	
		9 p. m.	24.530	30.5	17	46	Clear	Calm.	
		7 a. m.	24.481	22	30	74	Cirrus	W.	
7	7	9 p. m.	24.356	33	30	30	Stratus	N.W.	High wind.
		9 p. m.	24.462	34	27.5	56	Clear	Calm.	
		7 a. m.	24.685	31.5	27.5	57	Clear	Calm.	
		9 p. m.	24.679	38	31	53	do	Calm.	
8	8	9 p. m.	24.641	30	28	71	do	Calm.	Overcast; snowing on main range.
		7 a. m.	24.769	22	28	71	do	Calm.	
		9 p. m.	24.666	31	28	71	do	Calm.	
		9 p. m.	24.632	26	28	49	Clear	Calm.	
9	9	9 p. m.	24.543	36.5	36.5	49	Cirrus	W.	Overcast.
		7 a. m.	24.461	46	38.5	48	Clear	W.	
		9 p. m.	24.483	42	34	54	Clear	Calm.	
		7 a. m.	24.437	36.5	31.5	64	Nimbus	Calm.	
10	10	9 p. m.	24.329	42	35	58	Clear		Snowing. One-half inch of snow. Overcast.
		9 p. m.	24.509	32.5	26.5	58	Clear		
		7 a. m.	24.718	36	29	54	Clear	Calm.	
		9 p. m.	24.681	42	32.5	46	Clear	N.W.	
11	11	9 p. m.	24.853	30	24	50	Clear	N.W.	Overcast.
		7 a. m.	24.919	30.5	26	50	Clear	N.W.	
		9 p. m.	24.880	44	34	46	do	Calm.	
		9 p. m.	24.900	42	33.5	49	do	Calm.	
12	12	7 a. m.	24.708	35	30.5	64	do	W.	Overcast.
		9 p. m.	24.946	44	34.5	56	do	W.	
		9 p. m.	24.827	48	30.5	52	do	N.W.	
		7 a. m.	24.683	48	39	52	do	N.W.	
13	13	9 p. m.	24.571	53.5	45	58	Clear	S.E.	Do.
		7 a. m.	24.591	62.5	49	47	do	E.	
		9 p. m.	24.575	48	42	65	do	Calm.	
		7 a. m.	24.634	56	45.5	53	do	W.	
14	14	9 p. m.	24.626	52.5	45	62	do	N.W.	Do.
		7 a. m.	24.604	54.5	44.5	50	do	N.W.	
		9 p. m.	24.629	54	44	50	do	W.	
		9 p. m.	24.629	54	44	50	do	W.	

Meteorological register at Cañon City, Colo.—Continued.

Date.	Hour.	Barometer at 32° F.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.			WIND.	Amount.	Remarks.
								Kind.	Directn.	Amount.			
1873. Dec. 17	9 p. m.	24.669	56	44	49			Clear			S.W.		
	7 a. m.	24.866	54.5	43	47			do			W.		
18	2 p. m.	24.876	52	41	47			Few cumulus			W.		
	9 p. m.	24.866	48	40	56			Clear			S.W.		
19	7 a. m.	24.782	52.5	42	50			do			S.		
	2 p. m.	24.720	59	38	25			Few cumulus			S. E.		
20	9 p. m.	24.824	45	38	39			Clear			N. E.		
	7 a. m.	24.719	44	35	50			do			Calm.		
21	2 p. m.	24.531	42.5	37	68			do			Calm.		
	9 p. m.	24.521	42	39	80			do			W.		
22	7 a. m.	24.545	42.5	34	54			do			N. W.		
	2 p. m.	24.486	48	38	48			do			Calm.		
23	9 p. m.	24.608	38	34	70			do			Calm.		
	7 a. m.	24.651	45	38	39			Stratus			Calm.		
24	2 p. m.	24.578	45	34	43			Clear			Calm.		
	9 p. m.	24.614	39	31.5	43			do			Calm.		
25	7 a. m.	24.688	41	32	50			Clear			S.W.		Overcast. Snowing most on the range.
	2 p. m.	24.745	44	34	46			do			W.		
26	9 p. m.	24.954	36	28	49			do			Calm.		
	7 a. m.	24.991	35.5	28	53			do			Calm.		
27	2 p. m.	24.914	44	39	68			do			Calm.		
	9 p. m.	24.882	44	39	68			do			W.		Overcast.
28	7 a. m.	24.779	45	36	51			do			W.		Do.
	2 p. m.	24.903	55	39	35			do			Calm.		Heavy wind during the night.
29	9 p. m.	24.933	51.5	37.5	35			Clear			Calm.		
	7 a. m.	24.735	49	38	44			do			Calm.		
30	2 p. m.	24.724	44	36	54			do			Calm.		
	9 p. m.	24.730	33	28	61			do			Calm.		
31	7 a. m.	24.674	40.5	31	50			do			Calm.		
	2 p. m.	24.612	46.5	36.5	48			Cirrus			Calm.		
32	9 p. m.	24.621	41.5	33	54			Clear			Calm.		
	7 a. m.	24.594	48	35	37			Cirrus			Calm.		
33	2 p. m.	24.551	55	42	46			Clear			N. E.		
	9 p. m.	24.614	51	39	43			do			Calm.		
34	7 a. m.	24.940	36.5	30	58			do			Calm.		
	2 p. m.	24.918	37	29	49			Cirrus			Calm.		
35	9 p. m.	24.921	36.5	32	54			Clear			Calm.		
	7 a. m.	24.784	42	30.5	46			Cirrus-stratus			Calm.		
36	2 p. m.	24.743	54	41.5	40			Cirrus			W.		

31	1874.	9 p. m.	24.945	37.5	34	Clear	N. W.	Heavy winds from westward.
	Jan. 1	7 a. m.	24.614	36	35	do	N. W.	
		2 p. m.	24.542	58	42	Few stratus	N. W.	
		9 p. m.	24.547	37	37	Clear	Calm.	
	2	7 a. m.	24.406	52	40	do	Calm.	
		2 p. m.	24.208	58	44	Nimbus	W.	
		9 p. m.	24.154	50	42	do	Calm.	Overcast.
	3	7 a. m.	24.124	41	34	do	N.	Do.
		2 p. m.	24.346	40.5	32	Clear	S.	Two inches of snow on the ground.
		9 p. m.	24.399	22.5	30	do	Calm.	
	4	7 a. m.	24.782	26	23	do	Calm.	
		2 p. m.	24.760	24.5	22	do	Calm.	
		9 p. m.	24.787	18	12	do	Calm.	
	5	7 a. m.	24.683	22	18	do	Calm.	
		2 p. m.	24.616	47	36	do	Calm.	
		9 p. m.	24.776	36	49	do	Calm.	
	6	7 a. m.	24.906	34	28	do	Calm.	
		2 p. m.	24.790	44	35	do	Calm.	
		9 p. m.	24.753	38	30	do	W.	
	7	7 a. m.	24.656	44	32	Cumulus	N. W.	Sky overcast.
		2 p. m.	24.593	55	44	Clear	Calm.	Show all gone.
		9 p. m.	24.624	48.5	37	Nimbus, cirrus	N. W.	
	8	7 a. m.	24.557	46	33	Cumulus	E.	
		2 p. m.	24.555	56	40	Clear	E.	Heavy wind.
		9 p. m.	24.662	48.5	36	do	N. W.	Overcast.
	9	7 a. m.	24.662	46	35	do	W.	
		2 p. m.	24.550	56	41	Cirro-cumulus	W.	
		9 p. m.	24.637	47.5	34	Few cirrus	W.	
	10	7 a. m.	24.613	46	35	Clear	W.	
		2 p. m.	24.490	56	40	do	W.	Sky overcast.
		9 p. m.	24.570	46.5	35	do	W.	Do.
	11	7 a. m.	24.730	34.5	30	do	W.	Do.
		2 p. m.	24.640	35	28	do	W.	Do.
		9 p. m.	24.396	34	28	Nimbus	S. W.	
	12	7 a. m.	24.564	40.5	31	Clear	Calm.	
		2 p. m.	24.521	49.5	38	do	Calm.	
		9 p. m.	24.579	38	32	do	Calm.	
	13	7 a. m.	24.662	36	26	do	Calm.	
		2 p. m.	24.759	32	25	do	S.	Do.
		9 p. m.	24.799	32	25	do	Calm.	Do.
	14	7 a. m.	24.865	32.5	25	do	Calm.	Foggy.
		2 p. m.	24.797	36	27	do	S. E.	Overcast.
		9 p. m.	24.761	34	26	do	Calm.	
	15	7 a. m.	24.661	36	27	Cumulo-stratus, nimbus	Calm.	
		2 p. m.	24.534	49	37	do	N. E.	
		9 p. m.	24.549	46	36	do	W.	
	16	7 a. m.	24.492	47	35	do	N.	Do.
		2 p. m.	24.341	45	33	Few stratus, cumulus	W.	

*Meteorological register at Cañon City, Colo.—Continued.*

Date.	Hour.	Barometer at 350 H.	Dry bulb.	Wet bulb.	Relative humidity.	Maximum.	Minimum.	CLOUDS.			WIND.		Remarks.
								Kind.	Direct'n from.	Amount.	Direction.	Amount.	
1874. Jan. 16	9 p. m.	24.346	54	41	.40			Cirrus			W.	Overcast.	
	7 a. m.	24.338	52.5	44	.58						N. E.	Do.	
17	2 p. m.	24.311	50	44	.49			Clear			Calm.	Do.	
	9 p. m.	24.312	50	40	.50						Calm.	Overcast; snowing on the range, 15 miles south.	
18	7 a. m.	24.290	44	36	.54						Calm.	Overcast; snowing.	
	2 p. m.	24.410	51	42	.53						Calm.	Overcast; snowing.	
19	9 p. m.	24.719	40	35	.68			Cirrus			N. E.	Snow gone.	
	7 a. m.	24.609	40	34	.63			Clear			S. W.	Foggy.	
20	2 p. m.	24.524	36	31	.64			Clear			Calm.		
	9 p. m.	24.461	36	31	.64			Clear			Calm.		
21	7 a. m.	24.315	38	30	.48			Nimbus.			Calm.		
	2 p. m.	24.206	48	38	.48			Clear			Calm.		
22	9 p. m.	24.313	36	30	.48			Clear			Calm.		
	7 a. m.	24.650	33.5	24.5				Cumuli.			W.	Snowing.	
23	2 p. m.	24.378	36.5	30.5	.58						Calm.	Overcast.	
	9 p. m.	24.384	32	24							Calm.		
24	7 a. m.	24.431	22	22	1.00			Cirrus			Calm.		
	2 p. m.	24.386	34	29	.63			Clear			N.	Do.	
25	9 p. m.	24.498	34	30	.69			do			W.	Snow gone.	
	7 a. m.	24.771	19.5	15	.15			Few cumulis			N. W.		
26	2 p. m.	24.810	29	26				Clear			Calm.		
	9 p. m.	25.006	21	21				do			N.		
27	7 a. m.	25.076	24.5	23	.76			do			Calm.		
	2 p. m.	25.074	41	30	.42			do			Calm.		
28	9 p. m.	25.292	32	27				do			Calm.		
	7 a. m.	24.942	32	24				Cirrus			N.		
29	2 p. m.	24.809	49	36	.33			Clear			Calm.		
	9 p. m.	24.842	40	32	.63			do			Calm.		
30	7 a. m.	24.613	34	27	.39			Cirrus			N. E.		
	2 p. m.	24.406	50.5	37	.39			Clear			Calm.		
31	9 p. m.	24.566	44	36	.54			do			Calm.		
	7 a. m.	24.561	46	38	.55			do			Calm.		
32	2 p. m.	24.724	40	31	.50			do			N. E.		
	9 p. m.	24.730	49	36	.37			do			Calm.		
33	7 a. m.	24.924	40	32	.53			do			Calm.		
	2 p. m.	24.839	57	47	.56			do			W.		
34	9 p. m.	24.861	46	37	.51			do			Calm.		
	7 a. m.	24.733	46	38	.55			do			Calm.		

Day	Time	Temp	Wind	Clouds	Bar	Humidity	Direction	Remarks
30	2 p. m.	24.673	W.	do	62	45	W.	Sky overcast.
	9 p. m.	24.763	W.	do	80	40	Calm.	
	7 a. m.	24.780	W.	Nimbus.	68	35	W.	
31	2 p. m.	24.664	S.	do	63	38	Calm.	Snowing. Clear and calm at 9 a. m. and snow nearly gone.
	9 p. m.	24.644	S.	do	70	33	Calm.	
	7 a. m.	24.596	S.	do	63	31	Calm.	
Feb. 1	2 p. m.	24.563	E.	Clear	69	40	Calm.	Snowing again. Foggy.
	9 p. m.	24.692	E.	Clear	64	30	E.	
	7 a. m.	24.776	E.	Clear	70	26	Calm.	
2	2 p. m.	24.693	do	do	62	28	Calm.	Overcast. Do. Do. Do.
	9 p. m.	24.719	do	do	62	28	Calm.	
	7 a. m.	24.674	do	Cumulus.	58	36	Calm.	
3	2 p. m.	24.618	do	do	58	33	Calm.	Overcast. Do. Do.
	9 p. m.	24.736	do	do	59	33	Calm.	
	7 a. m.	24.697	do	do	66	22	Calm.	
4	2 p. m.	24.631	do	do	66	36	Calm.	Overcast. Do. Do.
	9 p. m.	24.658	do	do	64	33	Calm.	
	7 a. m.	24.642	do	do	71	33	Calm.	
5	2 p. m.	24.562	do	do	64	38	Calm.	Overcast. Do. Do.
	9 p. m.	24.695	do	do	71	38	Calm.	
	7 a. m.	24.725	do	do	64	30	Calm.	
6	2 p. m.	24.739	do	do	59	33	Calm.	Overcast. Do. Do.
	9 p. m.	24.785	do	do	63	29	Calm.	
	7 a. m.	24.742	do	do	54	27	Calm.	
7	2 p. m.	24.765	do	do	54	36	Calm.	Overcast. Do. Do.
	9 p. m.	24.766	do	do	58	35	Calm.	
	7 a. m.	24.579	do	do	48	30	Calm.	
8	2 p. m.	24.466	do	do	49	40	Calm.	Overcast. Do. Do.
	9 p. m.	24.590	do	do	54	36	Calm.	
	7 a. m.	24.866	do	do	69	34	Calm.	
9	2 p. m.	24.849	do	do	73	36	Calm.	Overcast. Do. Do.
	9 p. m.	24.889	do	do	70	32	Calm.	
	7 a. m.	24.779	do	do	69	34	Calm.	
10	2 p. m.	24.761	do	do	69	39	Calm.	Overcast. Do. Do.
	9 p. m.	24.030	do	do	58	36	Calm.	
	7 a. m.	24.687	do	do	58	36	Calm.	
11	2 p. m.	24.573	do	do	54	30	Calm.	Overcast. Do. Do.
	9 p. m.	24.620	do	do	54	34	Calm.	
	7 a. m.	24.614	do	do	41	36	Calm.	
12	2 p. m.	24.381	do	do	56	40	Calm.	Overcast. Do. Do.
	9 p. m.	24.351	do	do	48	44	Calm.	
	7 a. m.	24.127	do	do	53	44	Calm.	
13	2 p. m.	24.089	do	do	43	50	Calm.	Overcast. Do. Do.
	9 p. m.	24.034	do	do	37	37	Calm.	
	7 a. m.	24.291	do	do	68	30	Calm.	
14	2 p. m.	24.273	do	do	60	41	Calm.	Overcast. Do. Do.
	9 p. m.	24.354	do	do	64	30	Calm.	
	7 a. m.	24.630	do	do	46	32	Calm.	
15	2 p. m.	24.457	do	do	54	35	Calm.	Overcast. Do. Do.
	9 p. m.	24.457	do	do	68	33	Calm.	
	7 a. m.	24.438	do	do	51	41	Calm.	
16	2 p. m.	24.412	do	do	43	42	Calm.	Overcast. Do. Do.
	9 p. m.	24.412	do	do	93	42	Calm.	
	7 a. m.	24.412	do	do	93	42	Calm.	



8	7 a. m.	24.421	33	29	67	do	Calm.
	2 p. m.	24.077	58	41.5	37	do	Calm.
9	9 p. m.	24.266	48	32	38	do	N.
	7 a. m.	24.334	44	32	58	Stratus	W.
	9 p. m.	24.069	58.5	43	42	Cumulus.	E.
10	9 p. m.	24.515	37	32	64	do	N.
	7 a. m.	24.651	30	37.5	61	do	Calm.
	9 p. m.	24.516	36	32	70	do	Calm.
11	9 p. m.	24.601	28	24	79	Clear	Calm.
	7 a. m.	24.458	40	37	40	do	Calm.
	2 p. m.	24.220	56.5	42	44	Cumulus.	Calm.
12	9 p. m.	24.502	31	36	31	Clear	Calm.
	7 a. m.	24.300	43	44	44	do	do
	9 p. m.	24.290	52	52	52	do	do
13	9 p. m.	24.365	38	39	84	Clear	Calm.
	7 a. m.	24.273	36	34	84	do	Calm.
	9 p. m.	24.147	52	44	58	Clear	Calm.
14	9 p. m.	24.132	41	31	46	do	Calm.
	7 a. m.	24.244	42	36	63	Cumulus, cirrus	Calm.
	2 p. m.	24.033	52	42	50	do	Calm.
15	9 p. m.	24.268	32	26	26	do	Calm.
	7 a. m.	24.144	43	37	63	Cumulus.	Calm.
	9 p. m.	23.801	59	40	33	do	do
16	9 p. m.	23.924	41	32	50	do	Calm.
	7 a. m.	23.940	36	27	44	Cirrus	W.
	9 p. m.	23.722	44	34	46	Cirrus, cumulus	Calm.
17	9 p. m.	23.982	38	27	37	Clear	Calm.
	7 a. m.	24.039	34	31	76	do	W.
	2 p. m.	23.926	48	35	37	Cumulus, cirrus.	W.
18	9 p. m.	24.235	33	26	26	Clear	Calm.
	7 a. m.	24.224	32	26	26	Cloudy	Calm.
	9 p. m.	24.166	46	39	60	do	Calm.
19	9 p. m.	24.447	26	32	60	Clear	Calm.
	7 a. m.	24.531	24.5	32	32	do	Calm.
	9 p. m.	24.374	39	36	77	do	W.
20	9 p. m.	24.380	32	24	42	do	Calm.
	7 a. m.	24.274	40	29	42	do	Calm.
	2 p. m.	24.172	50	41	53	Cumulus.	Calm.
21	9 p. m.	24.331	31	23	31	Clear	Calm.
	7 a. m.	24.302	41	23	46	do	S. E.
	9 p. m.	24.958	52	41	47	do	S. E.
22	9 p. m.	24.310	43	34	50	do	Calm.
	7 a. m.	24.450	54	42	43	do	Calm.
	9 p. m.	24.125	59	45	44	do	Calm.
23	9 p. m.	24.470	42	33	49	do	Calm.
	7 a. m.	24.635	35	32	76	do	Calm.
	2 p. m.	24.531	43.5	45	76	do	S.
24	9 p. m.	24.754	31	28.5	67	do	Calm.
	7 a. m.	24.647	30	30	56	Clear	Calm.
25	9 p. m.	24.254	49	41	56	do	Calm.
	7 a. m.	24.305	44	39	68	do	Overcast.
	9 p. m.	24.232	47	39	56	do	Do.
	7 a. m.					do	Do.

Heavy wind.  
Overcast.

Do.  
Do.  
Do.

Overcast.

Overcast.

Overcast.  
Do.  
Do.





Table of mean monthly results of observations.

## SUMMIT OF MOUNT LINCOLN.

Date.	Barometer.			Wet bulb.			Dry bulb.			Mean of maxima.	Mean of minima.	Maximum.	Minimum.
	7. 00	2. 00	9. 00	7. 00	2. 00	9. 00	7. 00	2. 00	9. 00				
1873.													
July .....	18. 003	18. 028	18. 035	37. 3	41. 0	39. 0	47. 1	49. 0	39. 4	62. 6	33. 0	74	26
Aug. ....	18. 036	18. 015	18. 014	38. 3	39. 4	34. 5	46. 1	49. 2	34. 6	70. 8	34. 3	79. 5	28. 5
Sept. ....	17. 864	17. 884	17. 910	34. 1	35. 7	28. 3	34. 7	42. 8	29. 4	49. 3	24. 9	71	15. 5
Oct. ....	17. 748	17. 732	17. 792	21. 1	23. 1	14. 0	23. 6	30. 9	20. 4	41. 5	11. 1	67	19
Nov. ....	17. 722	17. 713	17. 781	10. 7	17. 6	12. 3	14. 1	24. 3	16. 1	29. 3	6. 5	51	11
Dec. ....	17. 532	17. 466	17. 494	6. 2	10. 8	9. 4	3. 2	10. 3	1. 7	10. 9	-7. 3	24	-38
1874.													
Jan. ....	17. 492	17. 464	17. 484	.....	.....	.....	3. 2	9. 4	6. 5	12. 8	-3. 7	26. 5	-15

## FAIRPLAY.

1873.													
July.....	21. 088	21. 057	21. 105	48. 6	44. 3	45. 9	58. 5	64. 4	49. 1	.....	.....	.....	.....
Aug.....	21. 040	21. 013	21. 029	47. 3	52. 1	42. 7	52. 1	61. 8	50. 0	.....	.....	.....	.....
Sept.....	20. 980	20. 919	20. 981	37. 6	44. 5	38. 0	43. 6	62. 2	44. 4	.....	.....	.....	.....

## CAÑON CITY.

1873.													
July.....	24. 881	24. 819	24. 868	.....	.....	.....	80. 4	84. 1	70. 8	.....	.....	.....	.....
Aug.....	24. 837	24. 767	24. 835	.....	.....	.....	79. 9	84. 6	71. 7	.....	.....	.....	.....
Sept.....	24. 807	24. 745	24. 774	.....	.....	.....	66. 8	75. 6	62. 4	.....	.....	.....	.....
Oct.....	24. 753	24. 707	24. 749	.....	.....	.....	54. 3	62. 8	51. 4	.....	.....	.....	.....
Nov.....	24. 779	24. 679	24. 701	37. 6	49. 2	39. 1	46. 8	59. 0	46. 8	.....	.....	.....	.....
Dec.....	24. 656	24. 623	24. 663	34. 0	35. 8	33. 8	40. 0	44. 7	40. 3	.....	.....	.....	.....
1874.													
Jan.....	24. 632	24. 545	24. 539	30. 2	36. 4	32. 4	37. 9	46. 1	49. 5	.....	.....	.....	.....
Feb.....	24. 592	24. 517	24. 591	30. 6	34. 5	32. 3	32. 9	43. 0	36. 6	.....	.....	.....	.....
Mar.....	24. 372	24. 303	24. 412	30. 8	36. 8	28. 5	38. 4	48. 4	34. 4	.....	.....	.....	.....

## BOZEMAN.

1873.													
April.....	.....	.....	.....	32. 8	39. 8	29. 9	37. 0	39. 2	33. 8	52. 8	28. 9	76. 8	76. 3
May.....	.....	.....	.....	42. 6	45. 1	39. 9	43. 8	54. 3	39. 2	58. 5	34. 7	78. 7	26. 5

Table deduced from Mount Lincoln records, showing the number of times in each month that the wind was observed to blow from each quarter, and also the total number of winds from each quarter.

	July.	August.	September.	October.	November.	December.	January.	Total.
N. ....	1	1	20	16	14	29	32	114
N. E. ....	1	2	4	15	20	19	20	81
E. ....	0	6	0	5	6	2	0	19
S. E. ....	2	14	5	8	0	1	0	30
S. ....	0	0	0	1	0	0	0	1
S. W. ....	4	16	13	10	1	1	1	46
W. ....	4	14	18	13	6	3	13	71
N. W. ....	7	13	26	24	29	22	31	152
Whole number of observations.	.....	.....	.....	.....	.....	.....	.....	514

TABLE I  
 SUMMARY OF THE RESULTS OF INVESTIGATIONS  
 INTO THE CAUSE OF THE

No.	Name	Age	Date of Birth		Date of Death		Cause of Death
			Year	Month	Year	Month	
1	John Doe	45	1915	5	1920	11	Heart Failure
2	Jane Smith	38	1912	3	1918	8	Stroke
3	Robert Johnson	52	1910	12	1919	3	Pneumonia
4	Mary White	40	1911	7	1917	6	Cholera
5	William Brown	35	1913	2	1916	9	Typhoid
6	Elizabeth Green	48	1914	4	1919	1	Scarlet Fever
7	Thomas Black	55	1916	1	1921	4	Smallpox
8	Anna Gray	30	1918	6	1920	2	Dysentery
9	George Hall	42	1917	9	1922	7	Scarlet Fever
10	Patricia King	33	1919	3	1923	5	Cholera

TABLE II

No.	Name	Age	Date of Birth		Date of Death		Cause of Death
			Year	Month	Year	Month	
11	Richard Lee	40	1915	8	1920	10	Heart Failure
12	Sarah Miller	35	1913	4	1918	7	Stroke
13	James Wilson	50	1911	11	1919	2	Pneumonia
14	Lillian Moore	45	1912	5	1917	4	Cholera
15	Charles Taylor	38	1914	1	1916	8	Typhoid
16	Frances Adams	48	1916	3	1919	1	Scarlet Fever
17	Frank Baker	53	1917	6	1921	3	Smallpox
18	Helen Clark	32	1919	2	1920	1	Dysentery
19	Edward Davis	43	1918	7	1922	6	Scarlet Fever
20	Margaret Evans	37	1920	4	1923	4	Cholera

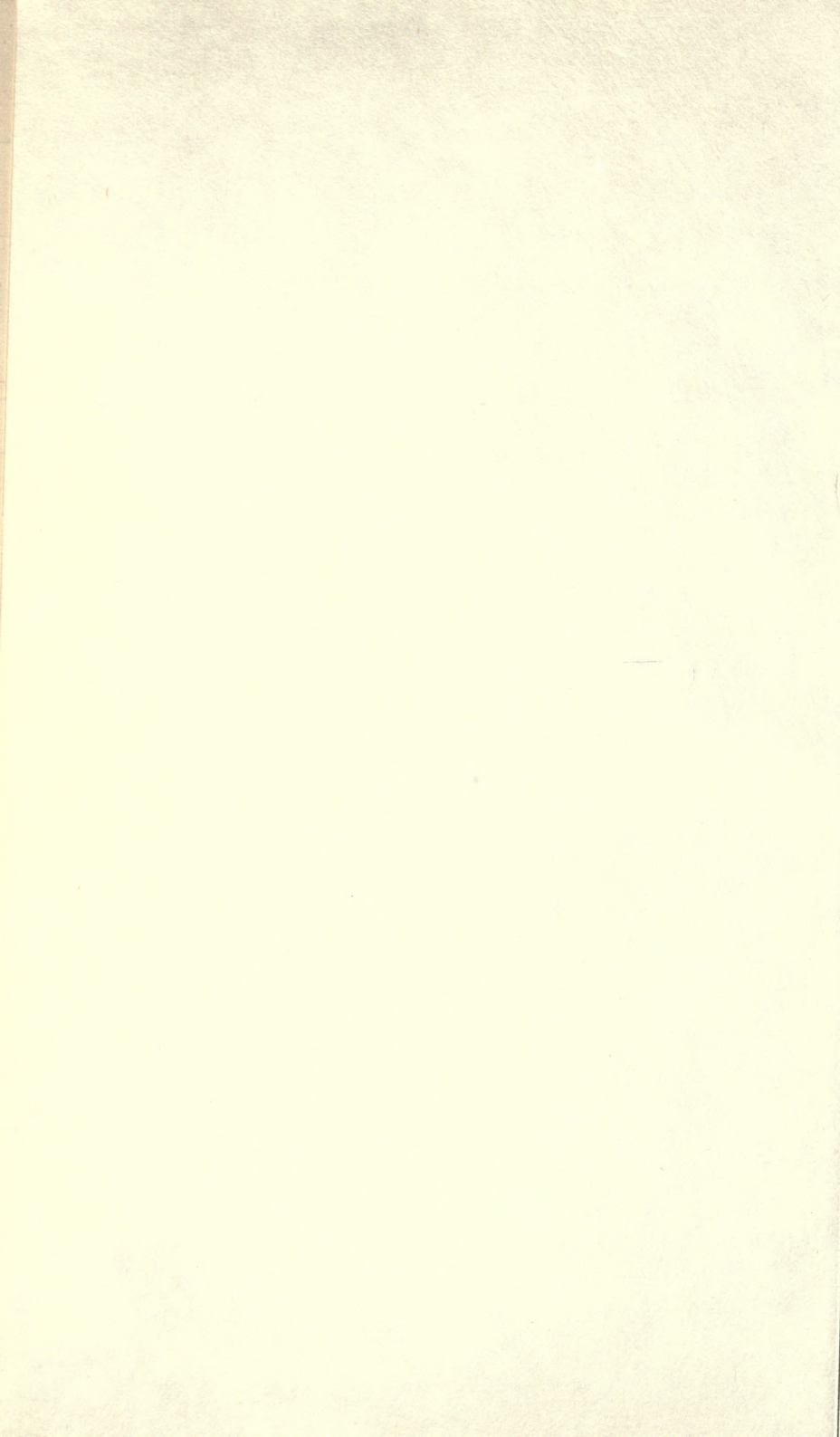
TABLE III

No.	Name	Age	Date of Birth		Date of Death		Cause of Death
			Year	Month	Year	Month	
21	Robert Foster	45	1915	9	1920	12	Heart Failure
22	Anna Martin	38	1913	6	1918	9	Stroke
23	William Harris	52	1911	10	1919	5	Pneumonia
24	Elizabeth Scott	40	1912	8	1917	3	Cholera
25	Thomas Young	35	1914	3	1916	11	Typhoid
26	Mary Hill	48	1916	5	1919	8	Scarlet Fever
27	George West	53	1917	7	1921	4	Smallpox
28	Lillian King	32	1919	1	1920	6	Dysentery
29	Edward Green	43	1918	4	1922	9	Scarlet Fever
30	Margaret White	37	1920	7	1923	5	Cholera

TABLE IV

No.	Name	Age	Date of Birth		Date of Death		Cause of Death
			Year	Month	Year	Month	
31	Richard Adams	40	1915	11	1920	8	Heart Failure
32	Sarah Baker	35	1913	7	1918	4	Stroke
33	James Clark	50	1911	9	1919	1	Pneumonia
34	Lillian Evans	45	1912	1	1917	10	Cholera
35	Charles Foster	38	1914	4	1916	7	Typhoid
36	Frances Green	48	1916	6	1919	3	Scarlet Fever
37	Frank Hall	53	1917	8	1921	5	Smallpox
38	Helen King	32	1919	3	1920	11	Dysentery
39	Edward Lee	43	1918	5	1922	8	Scarlet Fever
40	Margaret Miller	37	1920	8	1923	6	Cholera







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