

A Technical Study of the Genus Eriogonum
of Arizona
of the Family Polygonaceae

by
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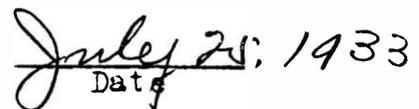
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E. A. M.

INTRODUCTION

The Polygonaceae, or Buckwheat family, is represented by about 40 genera and 800 species, and has a wide geographic distribution. In the temperate regions of North America this family consists of perennial and annual herbs, shrubs, and half-shrubs.

The following is a brief technical description of the Family Polygonaceae: Annual or perennial herbs or low shrubs, with simple leaves, alternate, or sometimes opposite or verticillate, the stipules forming a sheath or wanting; inflorescence cymose, capitate, racemose, spicate, or paniced; flowers regular, mostly perfect, without corolla, and rarely solitary; perianth or calyx 4- to 6-cleft or -parted, sometimes petaloid; stamens 4 to 9, more or less attached to the calyx; ovary superior, 2- to 4-carpellary, 1-celled, 1-ovuled, and bearing 2 or 3 styles or stigmas; fruit an achene, mostly triangular, sometimes lenticular.

Some of the more important genera of this family are Eriogonum, Rumex, Polygonum, Chorizanthe, and Oxytheca. Those of secondary importance are Oxyria, Fagopyron, and Tracaulon. Polygonum is of wide geographic distribution, occurring in both hemispheres, and including about 241 species. The genus Rumex is also of wide geographic distribution; it is found in both hemispheres, and consists of about 140 species. Of the larger genera is the genus

Eriogonum which grows only in North America, with nearly all of the species occurring west of the Mississippi river, and particularly concentrated in the West and Southwestern part of the United States including the States of Arizona, California, Colorado, New Mexico, Nevada, Texas, Utah, Wyoming, and northern Mexico. The two remaining genera of importance are Chorizanthe and Oxytheca, these being found only in the western United States, and chiefly in the state of California.

The genera of lesser importance of the family are Oxyria, Tracaulon, and Fagopyron, of these Fagopyron esculentum Moench, is the only one of great economic importance. It is from this plant that buckwheat flour, used in making buckwheat pancakes and waffles, is manufactured.

Other species of the Polygonaceae which may be considered of economic value, or used for ornamental purposes, are (1) Rumex hymenosepalus Torr. commonly known as Canaigre; from the roots of this plant tannin is extracted which is used in the process of tanning leather. (2) Rumex Rhaponticum L., garden rhubarb (sometimes called Pie-Plant and Wine-Plant) is grown for the thick edible petioles which are cooked and eaten in the spring. (3) The following are considered ornamentals: (a) Polygonum orientale L., Princes'-Feather, (b) Polygonum Sieboldi De Vriese, (c) Polygonum sachalinense F. Schmidt., Sacaline,

(d) Antigonon leptopus Hook & Arn., Coral-vine or Corallita, (e) Muehlenbeckia complexa Meissn., Wire-plant, (f) Muehlenbeckia chilense Meissn., (g) Muehlenbeckia platyclados Meissn., Tapeworm Plant. Altogether the family contributes a rather limited number of economic and ornamental plants to mankind.

The Genus Eriogonum

The following is a brief technical description of the Genus Eriogonum: Eriogonum Michx. Fl. Bor. Am. i.246. t.24 (1803). Low annuals, or herbaceous or somewhat woody perennials, with leaves entire, basal, alternate, or whorled, without stipules, and those of the inflorescence commonly reduced to bracts. Inflorescence various; involucre 4 to 8-toothed or -lobed, several to many-flowered, turbinate or campanulate, borne in heads, umbels, or solitary along the flowering branches, sessile or on peduncles or terminal on scape-like stems. Flowers small, perfect, more or less exserted on pedicels, and commonly reflexed or recurved in age, sometimes internixed with narrow scarious bractlets. Perianth or calyx 6-cleft or -parted, usually colored, equal or unequal, persistent about the achene. Petals wanting. Stamens 9, inserted on the base of the calyx. Styles 3, with stigmas minute, capitate. Achene 3-angled, sometimes winged.

In this taxonomic study of the genus Eriogonum detailed descriptions have been made for each species collected

in Arizona and found in the herbarium of the University of Arizona, or from specimens sent in by rangers of the United States Forest Service, or from specimens collected by the author. After a detailed description had been written of each specie studied, the proper specific name was determined from the literature available. All the names and synonyms of the North American Species were included in the alphabetical list at the close of this paper.

The key to the species of the genus was made at the close of this study. A systematic study of the species of the genus *Eriogonum* as found in Arizona constitutes the body of this paper.

KEY TO THE SPECIES

Annuals with fibrous roots.

Plants with leaves or leaf-like bracts on the stems,
and also with leaves in a basal rosette.

Involucres densely hairy or silky pubescent,
peduncled.

Involucres densely hairy or silky hir-
sute, not glandular.

Leaves linear or linear-oblong;
involucres on sparsely pilose hairy
peduncles.----- 1. *E. pharnaceoides*

Leaves triangular-ovate to narrow-
ovate; involucres on densely silky-
hirsute peduncles. 2. *E. Abertianum*

Involucres glandular pubescent to
glandular puberulent.

Basal leaves broadly-oblong or
lanceolate, uppermost ones linear-
lanceolate; involucres glandular
puberulent, borne on glabrous
peduncles (calyx whitish-pink).
----- 3. *E. angulosum*

Basal leaves rounded; involucres
glandular pubescent, borne on
hirsute peduncles (calyx cream-
yellow).----- 4. *E. divaricatum*

Involucres glabrous, neither glandular nor
pubescent, sessile. (Erect growing plants
with rose-pink flowers).---- 5. *E. polycladon*

Plants with leaves all basal, whorled, or in a
rosette; stems leafless above.

Involucres pubescent.

Leaves few, soon withering,
roundish-ovate to orbicular, dense-
ly white woolly on both faces; in-
volucres pilose-hairy, sessile, nar-
rowly funnelform.----- 6. *E. nidularium*

Leaves numerous, persistent, ovate,
to broadly oblong, lower face tomentose;
involucres on short peduncles, hemispherical
in outline.-----
----- 7. *E. Thurberi*

Involucres glabrous, or glabrous and glandular,
not pubescent.

Involucres glandular, the three outer
calyx segments with margins on each side
of the cordate bases.-- 8. *E. Thomasii*

Involucres not glandular, the calyx
segments without margins.

Involucres closely appressed to the
stem, grooved, cylindric-turbinate,
sessile.----- 9. *E. vimineum*

Involucres not closely appressed
to the stem, not grooved, either
turbinate, or campanulate, or
funneliform, peduncled.

Involucres 4-toothed; calyx
yellow, the sepals equal in
size, outer surface densely
white hispidulous.-----
-----10. *E. trichopodum*

Involucres 5-toothed; calyx
white, rose, or cream colored,
sepals unequal, nor hispidulous.

Involucres on deflexed or
nodding peduncles.

Involucres deflexed
1/32" to 1/8" long;
calyx lobes whitish
to rose colored, with
prominent red mid-
vein.11. *E. deflexum*

Involucres on nodding
peduncles, 1/8" to
3/8" long; calyx lobes
rose colored, midvein
not prominent.-----
---- 12. *E. cernuum*

Involucres erect or erect-ascending; peduncles 1/4" to 3/4" long; calyx lobes unequal, cream colored.----13. *E. reniforme*

Perennials with stout or woody roots.

Plants with leaves all basal, whorled, or in a rosette; stems leafless above.

Plants tomentose; inflorescence dense, racemose; involucres sessile, tomentose. (Leaf blades narrow cordate).14. *E. racemosum*

Plants glabrous and glaucous, at least above the base; inflorescence forming a diffuse panicle; involucres glabrous, peduncled.

Stems more or less inflated above; base of stem glabrous; calyx segments with prominent midvein, densely hirsute.----- 15. *E. inflatum*

Stems not inflated above; base of stems tomentose; calyx segments glabrous.----- 16. *E. sp.*
(Known from only one specimen)

Plants with leaves or leaf-like bracts on stems above as well as with leaves in a basal rosette.

Fruits winged; erect coarse perennial herbs.

Involucres hirsute; calyx segments glabrous; fruit winged entire length.----- 17. *E. alatum*

Fruits not winged; herbs, or shrubs, or half-shrubs; involucres pubescent, funnelform, or campanulate in outline.

Plants woody at the base, suffrutescent; inflorescence with flowers mostly large, 3/16" to 3/8" long.

Perianth segments glabrous on both surfaces, 3/16" to 1/4" long, bright yellow.--- 18. *E. stellatum*

Perianth segments pilose hairy along prominent midvein on outer surface, whitish, yellowish suffused with pink, or yellowish suffused with violet-red, 1/4" to 3/8" long.

Perianth segments whitish or yellowish suffused with pink; style branches hairy only at the base.----- 19. E. Jamesii

Perianth segments yellowish suffused with violet-red; style branches hairy 1/2 their length.----- 20. E. Bakeri

Plants shrubs or half-shrubs; inflorescence with flowers mostly small, 1/8" to 3/16" long.

Stems glabrous, finely tuberculate roughened and ending in spinescent branchlets.----- 21. E. Heermanni

Stems pubescent or tomentose, not finely tuberculate roughened, and not ending in spinescent branchlets.

Leaves ovate to ovate-elliptical. (Inflorescence divaricate-spreading).-----
----- 22. E. Jonesii

Leaves linear to oblanceolate, or oblanceolate-obovate.

Leaves thick, fascicled, margins revolute; persisting throughout the year.

Flower clusters in dense heads or umbels; calyx segments hairy on both faces at base along prominent midvein, whitish suffused

with pink.-- 23. *E. polifolium*

Flower clusters in
loosely paniculate
cymes; calyx seg-
ments glabrous on
both faces, pink-
ish in color.----

----- 24. *E. Simpsonii*

Leaves thin, not fas-
cicled, margins not
revolute, usually not
persisting throughout
the year. (Whole plant
densely white woolly).

----- 25. *E. Wrightii*

1. Eriogonum pharnaceoides Torr. in Sitgreaves, Rep. Zuni & Colo. 167. pl. 11.

Plant summer annual growing from June until late September at altitudes from 4500 feet and higher, erect-ascending, branches 1" to 4" above the base, divaricately branched, forming a vase-shaped head, 8" to 14" high, very slender, yellow-green in color, pubescent, with inflorescence composed of many small heads. Roots consist of a taproot with large and small laterals. Stems $1/32$ " to $1/16$ " diameter, terete, sometimes finely striate, yellow-green in color, suffused with violet-red, pilose-hairy. Leaves 4 to 8 at each joint, whorled, alternate or opposite near base of stem, and with exception of basal ones they are located around the axils of the branches, $3/8$ " to $1\ 1/4$ " long, sessile or sometimes short petioled, revolute, linear to linear-oblongate in outline, upper face pubescent, lower face white-tomentose. Leaf-like bracts linear in outline, whorled, with revolute margins. Inflorescence loosely paniculate, composed of many small heads $1/8$ " to $1/4$ " in diameter, borne lateral or terminal, and usually on very slender peduncles, $3/4$ " to $1\ 3/4$ " long. Involucres $1/8$ " to $3/32$ " long, many-flowered, funnelform, densely silky-hairy, 5-toothed with teeth lanceolate to triangular-lanceolate. Flowers 15 to 25, borne on pedicels which are glabrous, exserted, and jointed at the apex. Perianth consists of 3 outer sepals as broad as long and cordate at the base,

with glabrous nerves; the 3 inner ones narrowly-oblong, to linear-oblong, with glabrous nerves. Ovary glabrous, acuminate, 3-angled, with three very short styles and 3 stigmas. Fruit light brown, glabrous, $3/64$ " long.

Specimens studied, Arizona: Santa Catalina Mts., Bear Canyon; August 1908; No. 2734. J. J. Thornber. Prescott, dry rocky slopes; No. 8676; J. J. Thornber. Chiricahua Mts., Tompkins Canyon; September 5, 1907; J. C. Blumer. Santa Catalina Mts., Bear Canyon; August 1908; No. 2734; J. J. Thornber. Flagstaff, Coconino Forest; August 16, 1911; No. 181; R. R. Hill. Flagstaff, Long Valley; August 15, 1912; No. 181; Coconino Grazing Recon.

Range: Arizona and New Mexico. Dry mesas, Upper Sonoran Zone.

2. Eriogonum Abertianum Torr. in Enory, Mill. Recon. 151.
1848.

Plants annual growing from early spring to late fall, flowering from April to late November; late in the season the flower clusters become reddish-pink in color. Plant branched from the base and throughout forming a vase-shaped head, 6" to 15" tall, robust, yellow-green in color, hirsute, with inflorescence composed of many small heads. Roots consist of a rather stout, taproot, with small laterals. The stems are $1/16$ " to $1/8$ " in diameter, terete or nearly so,

yellow-green in color, and more or less suffused with violet-red, often appressed hirsute. The lower leaves are alternate or opposite, 1" to 2" long. Petioles are $\frac{3}{8}$ " to 1" long, distinctly channelled on the upper face, and yellow-green in color, often suffused with violet-red. The blade is $\frac{1}{2}$ " to $1\frac{1}{8}$ " long, $\frac{3}{8}$ " to $\frac{3}{4}$ " wide, in outline triangular-ovate to narrow-ovate, apex acute, base abruptly cuneate, tapering to the petiole, margins entire to crisped-undulate. Upper stem leaves lanceolate or ovate-lanceolate, opposite, the uppermost ones often in whorls. Leaf-like flower bracts linear or linear-lanceolate and whorled, with revolute margins. Inflorescence loosely paniculate, composed of many small heads, $\frac{1}{4}$ " to $\frac{1}{2}$ " diameter, borne lateral or terminal, often unilateral. Involucre $\frac{1}{8}$ " to $\frac{1}{4}$ " long, broadly funnelform and densely silky-hirsute, 6-toothed with teeth linear-lanceolate in outline. Flowers 18 to 26, borne on pedicels which are glabrous and jointed at the apex. Sepals 6, 3 outer ones as broad as long and cordate at the base with nerves hirsute on the inner face, 3 inner ones narrowly-oblong to linear-oblong with nerves glabrous. Stamens 9. Ovary 3-angled. Styles 3. Stigmas 3. Fruit brown, glabrous, $\frac{3}{64}$ " long.

Specimens studied, Arizona: Santa Rita Mts., Stone Cabin Canyon; September 19; No. 76; Thornber and Griffiths. Thatcher, mesas; April 14, 1909; No. 4703; J. J. Thornber.

Tucson, University of Arizona Grounds; November 8, 1912; J. J. Thornber. Tucson, mesas; August 1901; J. J. Thornber. Douglas, mesas near international line; September 10, 1913; No. 7127; J. J. Thornber. Oracle; September 13, 1905; J. J. Thornber. Reddington, San Pedro Valley; September 1912; Bertha F. Kilgour. Tucson; May 1911; Loy Purcell. Wilmot, mesas; November 16, 1901; No. 4432; J. J. Thornber. Tucson, University Grounds; October 5, 1913; No. 5350; J. J. Thornber. Huachuca Mts., Montezuma Canyon; August 10, 1909; L. M. Goodding. Apache Indian Reservation, Matanes Plateau; July 29, 1905; J. J. Thornber. Bisbee; October 1907; L. F. Goodding. Chiricahua Mts., August 18, 1906; No. 1334; J. C. Blumer. Benson; August 19, 1905; J. J. Thornber. Wilmot, Small Range Reserve; August 15, 1901; J. J. Thornber. Santa Rita Mts., Madera Canyon; August 7, 1902; No. 4457; J. J. Thornber. Bowie; September 19, 1884; M. E. Jones.

Range: Arizona, New Mexico, Western Texas, Chihuahua, Mexico. Dry mesas, foothills Lower Sonoran Zone.

3. Eriogonum angulosum Benth. Linn. Trans. XVII. 406. t.18, t.1; DC. Prodr. XIV. 22; Torr. & Gray, l. c. 187.

Plant in Arizona, a winter and spring annual, growing from February until June at altitudes from sea level to 2800 feet, erect-ascending or ascending, branches dichoto-

mously or trichotomously branched at or near the base and rather densely branched throughout, 3" to 15" high, yellow-green in color, sometimes suffused with violet-red, with inflorescence composed of very small heads. Roots consist of a main short taproot, with a few small laterals. Stems $1/32$ " to $3/32$ " in diameter, distinctly 6-angled, pilose to sparsely tomentose-hairy. 4 to 8 basal leaves in a whorl, rounded to broadly oblong to lanceolate, petioled, commonly undulate, $3/4$ " to $1\ 1/8$ " long, $3/16$ " to $1/2$ " wide, petioles $1/4$ " to $1/2$ " long; stem leaves opposite or whorled, oblong to lanceolate in outline, sessile or sometimes short petioled with revolute margins, $3/8$ " to $3/4$ " long, $1/8$ " to $3/8$ " wide, entire, somewhat undulate; upper face pilose, lower face and petioles if present tomentose. Leaves become gradually reduced in size upwards, those above linear-lanceolate in outline, and $3/16$ " to $3/8$ " long. Surrounding base of leaves are bracts united at their bases, $1/16$ " to $3/32$ " long, in outline oblong-lanceolate with tips acute, glabrous, margins somewhat revolute. Inflorescence dense, composed of very many small heads $1/8$ " to $1/4$ " diameter, borne lateral at internodes of stems or terminal, very slender, glabrous peduncles $1/8$ " to $3/4$ " long. Involucre $3/32$ " to $1/8$ " long, campanulate, with 5 rounded teeth $1/32$ " long with apex acute, many-flowered, outer surface glandular, inner surface tomentose or woolly. Flowers 15 to 20, borne on short pedicels slightly exserted

or shorter than the involucre, jointed at the apex. Perianth consists of 6 sepals, 3 outer as broad as long, ovate to ovate-elliptical in outline, apex acute, base cordate, minutely glandular on outer surface; 3 inner ones linear-oblong and longer than the outer ones. Stamens 9. Ovary glabrous, 3-angled, with 3 very short styles and 3 stigmas. Fruit an achene, brown, glabrous, base swollen, and apex tapered.

Specimens studied, Arizona: Tucson Mts.; April 14, 1906; J. J. Thornber. Tucson Mts.; April 14, 1906; No. 5824; J. J. Thornber. Tucson Mts., foothills; May 9, 1903; No. 5736; J. J. Thornber. Tucson Mts., Tumamoc Hill; May 17, 1905; No. 2282; J. J. Thornber. Tucson Mts.; April 3, 1906; Spaulding and Thornber. Tucson Mts., foothills; May 9, 1906; No. 5736; J. J. Thornber. Tucson Mts., north of Cat Mt.; April 14, 1906; Thornber. Tucson Mts., foothills; May 9, 1903; No. 4214; J. J. Thornber. Yucca; May 14, 1884; Marcus E. Jones. University of Arizona Campus; May 1914; C. Z. Lesher. Santa Catalina Mts., Pima Canyon; March 1906; J. J. Thornber. Fort Lowell, foothills; May 1, 1903; No. 2505; J. J. Thornber.

Range: Arizona, California, Lower California, Idaho. Foothills and mountains of the Lower Sonoran Zone.

4. Eriogonum divaricatum Hook. Journ Bot. Kew. Misc. 5:265. 1853.

Plant a summer annual growing from June until September, 3" to 10" high, with 1 to 5 branches loosely divaricately spreading from the base and dichotomously branched above, bracts of the inflorescence leaf-like with inflorescence loosely paniculate, composed of few small heads, borne axillary or terminally on short, rather stout peduncles. Roots consist of a slender taproot with few small laterals. Stems $3/48$ " to $1/8$ " diameter, terete, minutely pubescent, yellow-green in color, often suffused with violet-red. Leaf blades broadly-oblong to orbicular in outline, sparsely pilose-hairy on both faces, margins entire, yellow-green in color, and abruptly tapering into rather long petioles; secondary leaves or leaf-like bracts on stems at the nodes usually 2 in number, broadly-spatulate to orbicular in outline, $1/4$ to $1/3$ size of basal leaves. Petioles $1/32$ " to $1/16$ " diameter, terete, minutely pubescent, yellow-green strongly suffused with violet-red. Bracts of inflorescence 3 in number surrounding the stems at the nodes, $1/16$ " to $1/8$ " long, linear to linear-lanceolate in outline, and pilose-hairy. Peduncles rather stout, $1/16$ " to $1/2$ " long, finely pubescent. Involucres borne axillary or terminally on ends of stout peduncles, turbinate in outline, pubescent on outer surface, glabrous on inner surface, $1/16$ " long, 5-cleft with teeth short and blunt. Flowers exserted, 5 to 10 in number, borne on pedicels which are glabrous and jointed at their apices, $3/32$ " long. Perianth consists of

6 sepals, nearly equal in length, yellow in color, minutely pubescent on outer surface, and united at their bases into short broadly funnel-form tube. 3 outer sepals 1/16" long, linear-oblongate in outline, with prominent greenish-yellow mid-vein, apex acuminate. 3 inner sepals slightly narrower than 3 outer ones. Stamens 9 in number, not exerted. Ovary bluntly 3-angled, 1/16" long, base rounded, body broadly oval, with short neck, light brown in color. Styles 3, less than 1/32" long, with 3 stigmas. Fruit an achene.

Specimens studied, Arizona: Moencoppa; June 1890; Marcus E. Jones. Globe, Petrified Forest; June 19, 1933; U. S. Forest Service, Box 443.

Range: Arizona, New Mexico, Utah, and Wyoming. Dry hills in the Upper Sonoran Zone.

5. Ericgonum polycladon Benth. in DC. Prodr. 14:16. 1856.

Plant a long season annual growing from early spring to fall, March until October, with flower cluster reddish-pink or rose-pink; usually a single stem or sparingly branched from the base, dichotomously and trichotomously mostly dichotomously and much branched above, slender, densely grayish-white-tomentose, erect or erect-ascending, with strict inflorescence composed of very small heads usually sessile or nearly so. Roots consist of rather stout

taproot with a few small laterals. Stems $1/16''$ to $5/32''$ in diameter below, $1/32''$ to $1/8''$ diameter above, terete, and densely grayish white-tomentose. Leaves absent above, basal ones often forming a rosette and lower stemmed ones alternate, opposite, or whorled, $1''$ to $1\ 3/4''$ long. Petioles $1/4''$ to $5/8''$ long. The blade is $1/2''$ to $1\ 3/4''$ long, $1/4''$ to $5/8''$ wide, in outline spatulate to oblanceolate, apex acute, base abruptly cuneate tapering to the petiole, margins entire and crisped, and very densely white-tomentose on lower face. Inflorescence paniculate composed of many small heads $1/16''$ in diameter, borne sessile on slender stems sometimes appearing unilateral and at uniform intervals on stems. Bracts 3 at base of involucre, united at their bases below and ternate above, $1/16''$ long with lanate hairs on outer surface, inner surface tomentose on upper half, triangular-lanceolate in outline. Involucre $3/32''$ long, glabrous on outer surface, tomentose on inner surface, narrowly funnelform in outline, deeply 5-cleft with apex of teeth acuminate. Flowers 15 to 20, inserted; borne on pedicels which are jointed at point of attachment to flower, glabrous, and $1/8''$ long. Perianth consists of 6 sepals which are glabrous and rose-pink in color, 3 outer ones broader than long, broadly rounded at the apex, tapered to cuneate bases and $1/16''$ long; 3 inner ones smaller and shorter than outer ones, rounded obovate in outline, and tapered to cuneate bases. Ovary $1/16''$ long, glabrous,

acuminate, and 3-angled. Styles 3, and short. Stigmas 3. Fruit and achene, 1/32" long.

Specimens studied, Arizona: Santa Rita Mts., Stone Cabin Canyon; September; No. 63; Thornber & Griffiths. Tucson, University Campus; September 20, 1901; J. J. Thornber. Tucson, Santa Cruz Valley; October 1, 1901; No. 4869; J. J. Thornber. Prescott; August 26-31, 1916; No. 8034; J. J. Thornber. Oracle; September 9, 1905; Thornber. Fort Lowell; September 7, 1903; No. 20; Thornber. Santa Rita Mts.; August 1908; No. 5; L. N. Goodding. Dragoon; August 21, 1905; Thornber. Santa Rita Mts., Stone Cabin Canyon; September 14, 1903; No. 80; Thornber. Chiricahua Mts.; No. U. 76; J. C. Blumer. Flagstaff, Coconino Forest; October 4, 1923; No. 11-23; John A. Adams.

Range: Arizona, New Mexico, Western Texas. Dry hills and canyons Upper Sonoran Zone.

6. Eriogonum nidularium Coville. Contr. U. S. Nat. Herb. 4:186. 1893.

Plant summer annual growing from May until October, flowering from late May until September, with 1 to 5 stems growing from the base, 3 1/2" to 12" high, regularly dichotomously branched from the base and throughout the whole plant, the forks short forming a vase-shaped head, and in older plants the stems making a dense mass of intricate branches curving inward near apex and giving plant the ap-

pearance of bird's nest. Whole plant densely cobwebby-tomentose often reddish-brown in appearance. Roots in most plants consist of a single rather slender taproot with no laterals, in others main taproot branches 2 or 3 times with few rather large laterals. Stems $1/32$ " to $1/8$ " diameter, terete, green in color, and covered with dense white woolly tomentum; internodes rather short from $1\ 1/4$ " long below, to $1/4$ " long above. Leaves few, all basal, rather early deciduous, with blades $1/4$ " to $3/8$ " long, rounded at the apex, subcordate at base, roundish ovate to orbicular in outline, both surfaces densely white-woolly, whitish-green in color, margins entire somewhat undulate; leaves petiolated. Petioles $1/2$ " to 1" long, $1/32$ " to nearly $1/16$ " wide, slightly compressed, tomentose, whitish-green in color often suffused with violet-red, and broadening out at base becoming flattish or slightly channelled on upper surface. Bracts 3 in number surrounding the stem at each node by a narrow membrane, $1/16$ " to $1/8$ " long, triangular-acuminate to linear-lanceolate in outline, yellow-pinkish to reddish-brown in color, and tips somewhat recurved in longer ones, pubescent on both surfaces. Involucres sessile in all the forks throughout the flowering branches, also in the axils of the bracts on the flowering branches above, and each flowering stem is also terminated by an involucre. Involucres $1/16$ " to $5/64$ " long, pilose-hairy on outer surface, glabrous on inner surface, narrowly funnelform in outline, green

strongly suffused with violet-red in color, 5-cleft with teeth $1/64$ " long and triangular in outline. Inflorescence consists of many small heads with 5 to 10 flowers in each involucre. Flowers borne on pedicels which are $3/32$ " to $1/8$ " long, hair-like, glabrous and jointed at their apices, base of pedicels surrounded by a mass of pilose-silky hairs. Calyx consists of 6 sepals nearly equal in size and shape, and varying in color from reddish, to whitish to yellowish. 3 outer ones somewhat quadrate, obovate in outline, somewhat dilated at apex and margins incurved, with prominent midvein which is yellow-green in young flowers to yellow-green suffused with violet-red to reddish-brown in older flowers, glabrous on both surfaces, $3/48$ " long. 3 inner sepals slightly shorter and narrower than 3 outer ones. Stamens 9 in number, exserted; filaments $3/24$ " long, glabrous, very minute in diameter, glistening white in color; anther 2-lobed, violet-red to pinkish in color, very minute in size. Pistil linear-lanceolate in outline, $1/16$ " long, base acute, ovary $1/32$ " long, 3-angled, brownish to blackish in color covered with minute glandular pubescence, 3 short styles $1/64$ " long, and 3 stigmas. Fruit 3-angled.

Specimens studied, Arizona: Oracle, Foothills; September 9-13, 1905; No. 2016; J. J. Thornber. San Simon Plains; August 22, 1905; No. 5612; J. J. Thornber. Oracle; June 21, 1905; J. J. Thornber. Oracle, September 13, 1905; J. J. Thornber. Peach Springs, May 17, 1884; Marcus E. Jones.

Tucson, Desert Botanical Laboratory Hill; August 1905; No. 5999; J. J. Thornber. Oracle; May 28, 1905; J. J. Thornber. Solomonville, San Simon Valley; August 22, 1905; J. J. Thornber. Tucson, Rillito Valley; June 8, 1913; J. J. Thornber. Tucson, Tucson Mts.; August 30, 1906; No. 4854; J. J. Thornber. Mescal; August 18, 1905; J. J. Thornber. Yucca, May 17, 1884; Marcus E. Jones. Ashfork; August 23, 1916; No. 8585; J. J. Thornber. Wilmet, Small Range Reserve; August 27, 1901; J. J. Thornber. Tucson, Road North Desert Laboratory; May 16, 1933; W. A. Maier.

Range: Arizona, California, Idaho, Sandy or stony hills, Sonoran Zone.

7. Eriogonum Thurberi Torr. Bot. Mex. Bound. 176; Torr. & Gray, l. c. 183.

Plant annual growing from early spring until fall, flowering from late March to June, and flower cluster pinkish white to rose colored. Plant has 1 to several stems from the base, slender, erect, or erect-ascending, 2" to 12" tall, brownish-green to yellowish-brown in color, tomentulose below, to nearly glabrous above, with inflorescence composed of many small single heads borne terminally on very slender peduncles. Roots consist of a single slender tap-root branching into several long laterals. Stems a scape, 1/32" to 1/16" diameter, diffusely trichotonously branched, terete, leafless above, with ovate, ternate bracts at the

nodes. Bracts united at their bases, surrounding the stem, glabrous or minutely glandular on outer surface, tomentose on inner surface, apex sometimes acute. Leaves in a rosulate cluster at base of stems. Blades ovate to broadly-oblong in outline, undulate-rugose, upper surface pubescent to tomentose, whitish-green in color, lower surface densely white-tomentose, midvein prominent, $5/8$ " to $3/4$ " long, $1/4$ " to $5/8$ " wide, and petioled. Petioles $1/4$ " to 1" long, $1/32$ " wide, slightly compressed, tomentose. Involucres borne in the forks of branches or terminal on very slender hirtellous to nearly glabrous, terete, peduncles with are $1/4$ " to 1" long; involucres $1/16$ " to $3/34$ " long, nearly hemispherical in outline, glandular-hirtellous on outer surface, tomentose hairy on inner surface, green suffused with reddish-brown in color, 5-cleft with teeth obtuse in outline, margins revolute. Flowers 10 to 15, borne on pedicels which are glabrous jointed at their apices, very slender, $3/32$ " long. Calyx rose-red or white, composed of 6 segments (sepals). 3 outer sepals $1/16$ " long or less, united at their bases, roundish or transversely elliptical, abruptly narrowed to a broad claw which is hastate at base, glandular-hirtellous on outer surface, midvein is green in color, woolly pubescent at its tip on inner surface; 3 inner sepals slightly shorter than outer ones, linear-oblong to lanceolate in outline, somewhat hastate near base, outer surface glandular short hairy, inner surface glabrous, midvein prominent and green.

Ovary 3-angled, glossy, glabrous, $1/32$ " long, base rounded, apex acute, short with 3 styles and three stigmas. Fruit a 3-angled achene.

Specimens studied, Arizona: Bowie, Mesas; April 15, 1905; No. 4812; J. J. Thornber. Santa Catalina Mts., Sabino Canyon; May 2, 1903; No. 4140; J. J. Thornber. Fort Lowell, on dry sandy mesas; April 25, 1903; No. 5802; J. J. Thornber. Santa Catalina Mts., Sabino Canyon, May 2, 1903; No. 5625; J. J. Thornber. Santa Catalina Mts., foothills between Rillito Crossing and Sabino Canyon; April 19, 1913; J. J. Thornber. Santa Catalina Mts., Sabino Canyon; May 2, 1903; No. 5625; J. J. Thornber, Santa Catalina Mts., foothills; May 2, 1903; No. 5735; J. J. Thornber. Between Rillito Crossing and Sabino Canyon, mesa-like slopes; April 19, 1913; J. J. Thornber. Allen Valley; March 21, 1906; V. M. Spalding. Between Rillito Crossing and Sabino Canyon, mesa-like slopes; April 19, 1913; J. J. Thornber; Santa Catalina Mts., Foothills; May 2, 1903; No. 8096; J. J. Thornber. Fort Lowell, on dry sandy mesas; April 25, 1903; No. 5802; J. J. Thornber. Catalina Mts., Mesas near; April 1915; No. 8096; J. J. Thornber. Fort Lowell, on dry sandy mesas; April 25, 1903; No. 4218; J. J. Thornber. U. of A. Farm; March 25, 1916; L. C. Whitehead; Santa Catalina Mt., Sabino Canyon; May 2, 1903; No. 382; Thornber. Tucson, southeast, mesas near base Rincon Mts.; April 17, 1933; E. A. Maier.

Range: Arizona, California. Dry places, Lower Sonoran Zone.

8. Eriogonum Thomasii Torr. Pacif. R. Rep. IV 364; Torr. & Gray, l. c. 184.

Plant summer annual growing from early spring until late fall, flowering from April to October. Plant 4" to 8" tall with 1 to several erect stems from the base and at and above the first node. Stems diffusely and repeatedly 2 to 8-forked, whorled, and forming a vase-shaped head. Stems very slender, $1/32$ " to $1/16$ " diameter below the first node, $1/32$ " and smaller above, slightly glaucous, minutely hispidulous $1/2$ their length and yellow-green in color. Roots composed of a single rather slender taproot with few laterals 2" or more below the surface of the ground. Leaves all in a basal rosette and petioled. Blades $3/8$ " to $1/2$ " long, $5/16$ " to $1/2$ " wide, oval to orbicular in outline, sometimes subcordate at the base, dull green in color, somewhat crinkled, lower face tomentose or glabrate, midvein and laterals prominent, upper face less tomentose than lower, margins entire and somewhat undulate. Petioles $1/2$ " to $7/8$ " long, tomentose to glabrate, compressed, shallowly broadly channelled on upper surface and broadening out at point of attachment. Bracts 3, $1/16$ " or less long, triangular in outline, surrounding the stem at the nodes and united at their bases by a line. Inflorescence composed of

Many small heads borne singly, laterally or terminally on slender rather long peduncles. Peduncles $1/4$ " to $3/4$ " long, hair-like, terete, yellow-green suffused with violet-red in color, and always terminated by a single involucre. Involucres very finely glandular but not hairy on the outer surface, $1/32$ " long or less, turbinate-campanulate, deeply 5-cleft or -lobed, with teeth rounded at the apex, and their margins incurved, inner surface densely long silky-hairy. Flowers 2 to 10 in each involucre, exserted, borne on short slender petioled $1/32$ " to $1/16$ " long, glabrous, yellow to yellow-green or yellow tinged with red in color, and jointed at their apices. Calyx $5/32$ " to $5/64$ " long, composed of 6 sepals, whitish to yellowish and often tinged with pink, united at their bases into very short tube, hispidulous at base and along prominent midvein on outer surface, inner surface glabrous, ovate in outline, margins of lower half saccated, dilated on each side of cordate base. 3 inner sepals linear spatulate in outline, $5/64$ " long, united at their bases, hispidulous on outer surface near base, inner surface glabrous. Stamens 9. Ovary 3-angled, glabrous, purplish suffused with green in young ovaries, with 3 styles and 3 stigmas.

Specimens studied, Arizona: Sacaton, Mountains; April 7, 1916; No. 9102; Hastings and Thornber. Needles, May 3, 1884; Marcus E. Jones. Tucson, Wilmot Road 1 mile East Broadway Boulevard; April 23, 1933; E. A. Maier.

Range: Arizona, California, Utah. Desert regions,
Lower Sonoran Zone.

9. Eriogonum vimineum Dougl. ex Benth. in Trans. Linn. Soc.
xvii. (1837) 4.16.

Plant summer annual, growing from May until September, flowering from late June until early August, with 1 to several erect stems growing from the base, 4" to 18" high, much branched from near the base, the branches virgate and elongated, with lower branches often in whorls of 3 to 5, leaves nearly all basal and forming a rosette cluster, sometimes few leaves at nodes on lower stems, with inflorescence composed of rather few flower heads scattered throughout flowering branches and these terminal or axillary. Roots consist of small rather short slender taproot with few branching laterals. Stems $1/32$ " to $1/16$ " diameter, glabrous at least above the lower internodes, terete, yellow-green to yellow-green suffused with violet-red in color. Leaf blades $1/4$ " to $7/8$ " long, $1/4$ " to $3/4$ " wide, orbicular to ovate in outline, margins undulate, greenish, yellowish, or reddish in color, upper face floccose, lower face white-tomentose. Petioles 1 to nearly 3 times as long as the blades, tomentose, compressed, shallowly channelled on the upper surface and broadening out at the base where margins somewhat encircle the stem, $1/32$ " to $3/64$ " wide, whitish-green to whitish-green suffused with

violet-red in color. Bracts 3 in number surrounding the stem at the nodes by a rather broad membrane, $3/64$ " to $1/16$ " long, triangular in outline with tips sometimes acutish to obtusish, glabrous on outer surface, pubescent on inner surface, greenish to reddish-brown in color. Involucres sessile, closely hugging the stem, narrow, glabrous and glaucous on outer surface, pilose-hairy on upper half of inner surface, prominently and bluntly angled, narrow funnelform in outline, $3/32$ " to $1/8$ " long, $1/32$ " to $3/64$ " wide, 5-cleft with teeth very short, triangular and apex obtuse. Flowers 15 to 20, rose-color, or yellowish, borne on pedicels which are exserted $3/32$ " to $1/8$ " long, slender, terete, glabrous, jointed at the apices and surrounded at their bases by long silky hairs. Calyx consists of 6 sepals $5/64$ " long, nearly equal in size and shape, glabrous on both faces, united at their bases in very short tube, campanulate in outline. 3 outer segments obovate in outline with apex broadly rounded, and with prominent midvein extending $4/5$ length of segment from the base. 3 inner segments oblong-obovate in outline with prominent midrib and apex broadly rounded. Stamens 9 in number, not exserted. Ovary 3-angled, minutely tuberculate roughened, glabrous, $5/64$ " long with apex long tapered and angles of neck distinct, base rather abruptly acute, reddish-brown in color, with 3 very short styles and 3 stigmas.

Specimens studied, Arizona: Big Bug, July 29, 1891; J. W. Toumey. Prescott, U. S. Forest Service; June 19, 1914; No. 35; Edward P. Ancona.

Range: Arizona, California, Idaho, Washington. Hills, Sonoran Zone.

10. Eriogonum trichopodum Torr. in Emory Mil. Recon. 151. 1848.

Plant annual or perennial during favorable winter seasons, growing from April to November. Plant 6" to 18" tall, with 1 to several stems (11 stems) from the base, erect, whorled above the first node and rather loosely divaricately much branched, glabrous and glaucous, 1/16" to 1/8" in diameter, green suffused with violet-red, becoming reddish-brown in age; first internode often slightly inflated upward; leaves in a basal rosette or cluster, with the inflorescence composed of many minutely small single heads borne on very slender filiform peduncles and these profusely distributed throughout the flowering stems. Roots consist of a rather slender taproot, with few small laterals. The leaves are rounded-ovate, cordate, to oval, slightly cordate at the base, crinkly, 1/2" to 1 1/4" long, 1/2" to 1 1/4" wide, yellow-green to light green in color with prominent midveins and branching lateral veins on both faces, these violet-red in color, upper face densely short hirsute, lower face hirsute on veins, densely hirsute on sur-

face; margins strongly crisped or undulate and hirsute, and petioled. Petioles $1/2$ " to $2\ 1/2$ " long, $1/32$ " to $3/32$ " in diameter, compressed, broader, flattened below, terete, or slightly compressed above, light green strongly suffused with violet-red in color, shallowly broadly channelled on upper surface, and short hirsute. Bracts surrounding the nodes of the stems and slightly united at their bases, $3/32$ " to $3/16$ " long, $1/32$ " to nearly $1/16$ " wide, hirsute on outer surface and along the margins, and lanceolate in outline. Involucres minute, $1/32$ " to nearly $1/16$ " long, funnelform in outline, glabrous, 4-lobed with teeth ovate in outline, short mucronate, erect, and on divaricately spreading hair-like or capillary pedicels $3/16$ " to $5/8$ " long, terete, glabrous, and violet-red to reddish-brown in color. Flowers few, 2 to 6 in number, borne on slender short, glabrous pedicels, $1/16$ " long yellow-green $1/2$ their length, upper $1/2$ violet-red, and jointed at their apices. Calyx consists of 6 sepals equal in size and shape, segments lanceolate-ovate in outline, united at their bases, light yellow in color with wide yellow-green midvein, outer surface densely white hispidulous, in your flowers sepals radial. Stamens 9 in number, exserted, filaments glabrous, yellowish green in color, anthers bright yellow. Ovary 3-angled glabrous, $1/64$ " long. Styles 3. Stigmas 3.

Specimens studied, Arizona: Yuma; April 30, 1905; Herbert Brown. Tucson, University of Arizona Campus; May 1914;

C. Zaner Leshar. Tucson, Mesas; April 25, 1903; No. 5803;
J. J. Thornber. Reddington, San Pedro River; June 21-23,
1905; Thornber. Sulphur Spring Valley, Col. Hooker's Ranch;
August 28, 1905; No. 2660; Thornber. Benson, August 19,
1905; Thornber. Wilmot, Small Range Reserve; August 19,
1901; Thornber. Needles; May 5, 1884; No. 3820; Marcus F.
Jones. Tucson, Tucson Boulevard between Speedway and 2nd
Street; April 17, 1933; E. A. Maier. Tucson, Wilmot Road,
South Broadway Boulevard; May 10, 1933; E. A. Maier. Tuc-
son, Road North Desert Laboratory Hill; May 11, 1933; E. A.
Maier. Tucson, Wilmot Road South of Broadway Boulevard;
April 23, 1933; E. A. Maier.

Range: Arizona, California, New Mexico, Utah, and
Mexico. Arid and sandy places, Lower Sonoran Zone.

11. Eriogonum deflexum Torr. Ives' Rep. 24; Torr. & Gray, l.c.
181.

Plant long season annual growing from March until Dec-
ember at altitudes from 500' to 3000', with 1 to 8 stems
growing from the base, 5" to 24" high, dichotomously or tri-
chotomously branched above forming a vase-shaped head, lower
internodes rather long, late season plants densely branched
above, erect to erect-ascending, glabrous, and glaucescent
giving plant grayish-green appearance, stems above the base
without leaves and flower cluster deflexed, borne singly
laterally or unilaterally along the naked flower branches.

Roots consist of a single rather long taproot with few small laterals. Stems $1/32''$ to $1/8''$ in diameter, terete, gray-green in color. Leaves above reduced bracts which are 3 in number united at their base and surrounding each node, broadly triangular in outline, $1/32''$ to $3/32''$ long; bracts make nodes appear noticeably prominent. Leaves all basal, forming a rosette at the base of plant, $3/4''$ to $2\ 1/2''$ long, $1/2''$ to $1\ 1/2''$ wide; blade is orbicular in outline which cordate base, margins entire, lower surface prominently palmately veined, densely tomentose giving it a white woolly appearance, upper face pilose to tomentose, rather long petioled. Petioles slightly compressed, densely tomentose, $3/8''$ to $1\ 1/2''$ long, $1/32''$ to $1/16''$ wide. Inflorescence consists of many small heads $1/4''$ in diameter and scattered throughout the plant. Involucre broadly turbinate to campanulate, glabrous, $1/16''$ to $3/32''$ long, with five broadly triangular teeth, and borne on rather short peduncle which is deflexed and $1/32''$ to $1/4''$ long. Flowers 15 to 20 borne on pedicels which are glabrous, jointed at the apex, $1/16''$ to $3/32''$ long, exserted. Perianth consists of 6 sepals, light yellow to white or cream colored to rose colored, 3 outer ones elliptic or elliptic-ovate, cordate at the base, $3/32''$ long, $1/16''$ wide, with prominent pinkish-red midrib, and glabrous, 3 inner ones much reduced, linear-lanceolate in outline, $1/32''$ long, glabrous. Stamens 9, shorter than the calyx lobes. Ovary glabrous, 3-angled, $1/16''$ long,

with 3 styles $1/32$ " long and 3 stigmas.

Specimens studied, Arizona: Benson; August 19, 1905; Thornber. Ashfork; August 23, 1916; No. 8584; Thornber. Ashfork; August 23, 1916; No. 8586; Thornber. Sacaton; July 1914; M. F. Gilman. Wilnot, small range reserve; August 27, 1901; Thornber. Tucson, University of Arizona Campus; May 13, 1903; No. 4214; Thornber. Tucson Mts., foothills west of town; April 22, 1906; Thornber. Tucson, University of Arizona Campus; May 13, 1903; No. 5734; Thornber. Tucson, University of Arizona Campus; May 25, 1915; S. Isaac. Mammoth, San Pedro River; June 21-23; 1905; Thornber. Yuma, in depressions on arid mesa near Orange Grove; September 26, 1912; Thornber. Tucson, Campus, University of Arizona; May 13, 1903; No. 5734; Thornber. Tucson; July 7, 1891; J. W. Toumey. Yuma; April 30, 1905; Herbert Brown. Tucson Mts., near base of Cat Mt.; April 22, 1906; J. J. Thornber. Yuma; April 30, 1905; Herbert Brown. Grand Canyon, Bright Angel Trail; August 13, 1916; No. 8545; J. J. Thornber. Yuma, arid mesas; September 15-20, 1912; No. 2408; J. J. Thornber. Tucson mesas; August 1901; J. J. Thornber. Tucson, University of Arizona Campus; Louise Foucar.

Range: Arizona, California, Nevada, Utah. Desert washes and flats, Lower Sonoran Zone.

12. Eriogonum cernuum Nutt. Journ. Acad. Phila. II.1:162. 1848.

Plant summer annual growing from June until October, flowering from July until September, 6" to 14" high, with 1 main stem, erect, dichotomously or trichotomously branched above forming a paniculate head, with leaves all basal, flowering clusters racemose, the branches short, paniculate, and flowers or perianth whitish or pinkish. Roots consist of a single slender taproot somewhat twisted (like a corkscrew) with few small branching laterals. Stems $1/32$ " to $1/16$ " diameter, glaucous, glabrous, dull whitish-green in color, with older stems suffused with violet-red, scapiform, leafless above, with 3 bracts, not foliaceous, united at their bases and surrounding the nodes on stems above, $1/32$ " to $3/32$ " long, triangular to lanceolate, glabrous on outer surface, tomentulose on inner surface. Leaves confined to short unbranched stem below, whorled and petioled. Leaf blades round to oval with apex obtuse or slightly apiculate, $5/16$ " to $3/4$ " long, $6/16$ " to $3/4$ " wide, upper face floccose-tomentose tending to become glabrate, lower face white-woolly or densely tomentose, with margins entire. Petioles $3/8$ " to $5/8$ " long, somewhat compressed, densely white-woolly, and slightly channelled on the upper surface. Inflorescence paniculate with flower clusters borne on slightly deflexed peduncles. Peduncles $1/8$ " to $3/8$ " long, short, slender, terete, glabrous, $1/64$ " diameter, deflexed and tending to be somewhat racemose on flowering branches or stems, and terminated by a single involucre. Involucre $1/16$ " to

5/64" long, narrowly turbinate to campanulate in outline, glabrous, on outer surface, silky pilose-hairy on inner surface, 5-cleft to the middle and ovate-lanceolate in outline, green suffused with reddish-brown in color. Flowers 10 to 15 in number, borne on short slender, glabrous, terete pedicels, 3/64" to 1/16" long, slightly exserted and jointed at their apices. Perianth whitish or pinkish with 6 sepals, 1/16" long, campanulate in outline and narrowed to a short clavate base. 3 outer sepals united at their bases, glabrous, 1/16" long, obovate and somewhat panduriform, with margins undulate and retuse with prominent midvein which extends 3/4" the length of blade from the base and this yellow-green in color suffused with pink; 3 inner sepals nearly as long as outer ones, half as broad, and elliptic-cuneate in outline. Stamens 9 in number, not exserted. Pistil 5/64" long, with ovary somewhat 3-angled, 1/16" long, lower half globose, upper half abruptly tapered into slender 3-angled neck. Fruit a 3-angled achene, same as in ovary, glabrous, shiny, light brown to dark brown in color.

Specimens studied, Arizona: Grand Canyon of the Colorado, near El Tovar, September 26, 27, 28, 1913; No. 3688; Alice Eastwood. Williams, Tusayan Forest; September 27, 1922; No. 36; M. W. Talbot. Navajo Indian Reservation; July 1916; C. T. Vorhies.

Range: Arizona, California, Idaho, Nebraska, New Mex-

ico, Alberta and Saskatchewan, Canada. "Bad lands", hills, and canyons; Plain and Montane zones.

13. Eriogonum reniforme Torr. Fremont's Rep. 317; Benth in DC. Prodr. XIV 21; Torr. & Gray, l. c. 184.

Plant annual, growing from early spring until fall, flowering from late March until latter part of July, with 1 to several stems from the base, these 2 to 6-forked, erect, or erect-ascending, 4" to 8" tall, leaves all basal, with inflorescence scattered throughout flowering branching stems. Roots consist of a slender main taproot with few laterals. Stems $1/32$ " to $1/16$ " diameter, enlarging somewhat at the nodes, terete, glaucous and glabrous, branching diffusely above the first node giving the plant a vase-shaped appearance, leafless above, with 3 bracts surrounding each node. Bracts united at their bases, $1/16$ " long, glaucous on outer surface, tips acutish, margins loosely hairy, inner surface hairy. Leaves in a cluster surrounding base of stem, blade round-reniform or roundish, $3/8$ " to $3/4$ " long, $3/8$ " to $3/4$ " wide, upper face short woolly-hairy, yellow-green margins revolute, lower face densely white-tomentose, with petioles densely long woolly-hairy, slightly compressed, $1/2$ " to 2" long. Involucres borne on slender peducles in the axils of the flowering stems or terminal, glaucous and glabrous; involucres turbinate-campanu-

late in outline, $1/16$ " long, pilose-hairy on inner surface near base, 5-cleft with teeth very short and obtuse at the apex. Flowers 8 to 12 borne on pedicels which are glabrous, jointed at their apices, very slender, $5/64$ " long. Calyx yellowish or whitish, $3/64$ " to $1/16$ " long, and composed of 6 sepals. 3 outer sepals ovate or broadly elliptical in outline, glandular-puberulent on outer surface near base and on prominent midvein, $1/32$ " to $3/64$ " long, united at their bases in short funnelform tube; 3 inner ones, broadly linear in outline, glandular-puberulent on outer surface on outer surface with prominent midvein, shorter than outer sepals. Stamens 9, not exerted, whitish or yellowish in color. Pistil $1/32$ " long, ovary $1/64$ " long, 3-angled, light brown in color, with 3 styles and 3 stigmas, the latter $1/64$ " long. Fruit a 3-angled achene.

Specimens studied, Arizona: Yuma, Edge of Mesa; March 28, 1916; No. s. 209; Leonard Swingle. Tucson, Mesas between Limestone Hills and Tucson Mts.; April 22, 1908; J. J. Thornber. Tucson, Tucson Mts. Near Cat Mountain; April 22, 1906; J. J. Thornber.

Range: Arizona, California. Desert regions, Lower Sonoran Zone.

14. Eriogonum racemosum Nutt. Journ. Acad. Phila. II. 1: 161. 1848.

Synonym: E. orthocladon Torr. in Sitgreaves, Rep. Zuni & Colo. 107. pl. 9. 1854.

Plant a perennial 6" to 24" tall, growing from May until December, beginning flowering in June and continuing to flower until early November, at altitudes of 6000' to 8000', woody at the base, with 1 to 4 erect stems often once sometimes twice dichotomously branched above, first internode 3" to 9" long, light dull whitish yellow-green in color, with inflorescence one-sided racemose-like, composed of many heads 1/4" to 5/8" diameter, these scattered along the single flowering branches on the upper one-third of the plant. Roots consist of a single large, woody, twisted or straight taproot with 1 to 4 stems. Stems 1/16" to 1/8" diameter, terete, sometimes dichotomously branched above, densely tomentose, nodes prominent and few, leafless above, sometimes clothed with old leaf bases below. Bracts on stems above, and enclosing each involucre, united for one-half their length from the base, 3/16" to 1/4" long, linear-lanceolate to triangular in outline with tips acuminate tomentose on both surfaces. Leaves large, somewhat crowded, all basal, whorled, 4 to 10 leaves encircling each stem and rather long petioled. Leaf blades ovate-cordate to oblong-elliptical in outline, upper face yellow-green in color, sometimes suffused with violet-red, sparsely tomentulose tending to become glabrate, lower surface densely white-woolly, petioles broadening out in their bases and somewhat encircling the stems. Involucre sessile, 3/16" to 1/4" long, 3/32" to 1/8" wide at apex, tomentose on outer

surface, funnelform to broadly campanulate in outline, margins entire or with 6 short blunt teeth, not noticeably prominent, apex of these obtuse, veined with each vein terminating into a short tooth. Flowers exserted 15 to 25 in number, borne on pedicels, these glabrous; slender, terete, jointed at their apices, and surrounded at their bases by a tuft of long silky hairs. Perianth consists of 6 sepals, nearly equal in size and shape, turbinate in outline, $3/32$ " long, becoming accrescent in age and $1/4$ " long; sepals whitish or pinkish in color, obovate in outline, 3 outer sepals united at their bases in short tube and with prominent midvein which is yellow-green in color in young flowers, in older flowers yellow-green suffused with pink. Stamens 9 in number, not exserted, filaments white, slender, glabrous; anthers 2-celled, $1/32$ " long. Pistil $1/8$ " to $1/4$ " long with ovary $1/16$ " to $3/16$ " long glabrous, reddish-brown to brown in color, 3 styles $1/16$ " long, and 3 stigmas. Fruit a 3-angled achene.

Specimens studied, Arizona: Flagstaff, Coconino Forest; September-October, 1911; No. 213R; John A. Adams. Flagstaff, Coconino Forest; September 25, 1911; No. 332; R. R. Hill. Flagstaff, November 3, 1925; Chester F. Deaver. Flagstaff, N.A.N.S. campus; July 20, 1915; No. 25; Lydia Hu. Flagstaff, Mill Town; September 27, 1914; No. 11; Ethyl Croy. Flagstaff, flats; September 16, 1914; No. 8; Nelle Dunn. Flagstaff, Normal Campus; August 21, 1914; No. 1594; Leslie

N. Goodding. Flagstaff, Normal Campus; August 28, 1914; No. 1628; Leslie N. Goodding. Flagstaff, Campus; October 5, 1914; No. 8; W. C. Smith. Flagstaff, fields and hillsides; November 3, 1925; Chester F. Deaver. Flagstaff; July 8, 1898; Dr. D. T. MacDougal. Flagstaff; June 1915; Agnes Conrad. Showlow; September 13, 1913; E. O. Wooton. Flagstaff; August 2, 1884; No. 3950; Marcus E. Jones. Williams, Tusayan Grazing Recon.; A. D. Read.

Range: Arizona, Colorado, New Mexico, Utah, and Texas. Open slopes in the Upper Sonoran and Transition zones.

15. Eriogonum inflatum Torr. in Frem. Rep. Exped. Rocky Mount. 317. 1845.

Plant perennial occasionally a half-shrub, growing from latter part of March until November, flowering from March to October, 8" to 3' tall, with one to several (16) stems from the base, these repeatedly di- or trichotomously branched above the first node forming a diffuse panicle. Roots consist of single, large, long, woody, twisted, tap-root with few laterals. Stems 1/16" to 3/32" diameter; stem below first node in larger plants often as long as 14"; lower internodes especially the lowest one, but not always, strongly inflated upwards and outwards becoming as wide as 1/2" diameter at widest part, then becoming constricted gradually near the node, inflated part hollow; stems glabrous, glaucous, longitudinally striate, dull yellow.

lowish-green in color, in age becoming reddish-brown in color. Leaves in a cluster surrounding stem at the base, broadly elliptical, round-ovate, to reniform, or orbicular; $3/8$ " to $1/2$ " long, $3/8$ " to $7/8$ " wide, margins undulate, sparsely hirtellous; medium yellow-green in color on both surfaces, both surfaces sparsely hirtellous, and petioled. Petioles $5/8$ " to 3" long, $1/32$ " wide, broadening out at their bases to as wide as $1/8$ " and partly encircling the stem, lower surface convex, upper surface flattish or shallowly channelled, sparsely hirsute, yellow-green in color suffused with reddish-brown. Bracts 3 in number, united at their bases and surrounding the stem at the nodes by a small narrow membrane, $1/16$ " to $1/8$ " long, linear-lanceolate in outline with apex acute. Peduncles racemose, in the forks of the flowering branches, lateral or terminal, glabrous, glaucous, $1/64$ " wide, $1/4$ " to $3/4$ " long. Involucres $1/16$ " to $3/32$ " long, glabrous on outer and inner surface, turbinate in outline, 5-cleft with teeth lanceolate in outline and tips obtuse. Flowers few, 3 to 10 in number, bright yellow in color, borne on slender pedicels, $3/32$ " to $1/8$ " long, glabrous, minutely glandular, and jointed at their apices. Calyx consists of 6 sepals, nearly equal in length, densely whitish-hispid along prominent midvein on outer surface, and glabrous on inner surface; 3 outer segments united at their bases for very short distance, lanceolate, with margins revolute, thus making them linear-

lanceolate in outline; 3 inner segments triangular-lanceolate in outline with thin membranous (scarious) margins. Stamens 9 in number, not exserted; filaments nearly as long as sepals, very slender, yellow in color; anthers small, yellow in color. Ovary $1/8$ " long, glabrous, 3-angled, reddish-brown in color, $3/64$ " wide at the base tapering into short neck at apex. with 3 styles and 3 stigmas. Fruit a 3-angled achene.

Specimens studied: Arizona: Ajo. April 1916; Mrs. George Mairs. Grand Canyon of the Colorado River; Bright Angel Trail; September 26, 27, 28, 1913; No. 3728; Alice Eastwood. Reddington-Mammoth, San Pedro River; June 21, 23, 1905; Thornber. Reddington-Mammoth; June 1-23, 1915; J. J. Thornber; Reddington-Mammoth, San Pedro River; June 21-23, 1905; Thornber. Quartzite, October 19, 1905; Herbert Brown. Mammoth-Oracle, June 23, 1905; Thornber. Mammoth-Oracle, June 23, 1905; No. 4498; J. J. Thornber. Mammoth-Oracle, June 23, 1905; Thornber. Mountains near Sacaton; April 8, 1916; J. J. Thornber. Sacaton, Dry Rocky Mts.; April 8, 1916; No. 8995; Hastings and Thornber. Grand Canyon, Grand View Trail; August 23, 1907; No. 2951; Thornber and Hockdoeffer. Yuma, Harcuvar Mts., Vicinity of Cottonwood Canyon, Tank Pass and Cobrita Mine; May 3-6, 1917; No. 5711; J. C. Blumer. Prescott, June 29, 1927; Chester F. Deaver. Prescott, July 15, 1927; Chester F. Deaver.

Range: Arizona, California, Colorado, New Mexico.

Arid places, Sonoran Zone.

16. Eriogonum sp.

Plant perennial by short woody stems at the base, leaves all basal and alternate along woody stems, whorled at apex of these, 18" to 24" high, first internodes above woody stems long, erect, singly, glaucous and glabrous, branching above this from 2 to 5 times into a open paniculate vase-shaped head, uppermost stems mostly dichotomously branched, inflorescence composed of many small heads borne terminally, axillary in the forks of the branching stems or laterally, on slender peduncles, never sessile, roots absent in specimens studied. Stems below short, one or more, erect, or somewhat divaricate, $3/32$ " to $3/16$ " diameter, terete, clothed with old leaf bases, distinctly white-tomentose with the bark shreddy and peeling off easily, stems below bark reddish-brown to brown in color; stems above first internode $1/16$ " diameter, terete, glaucous and glabrous, yellow-green in color, with first node above woody stems $4\ 1/2$ " to 7" long, finely striate. Leaves all on woody stem below, distinctly short white-tomentose on both surfaces, and with petioles as long or twice as long as blades; blades rounded-ovate to orbicular and subreniforme in outline, $5/16$ " to $11/16$ " wide, $3/8$ " to $5/8$ " long, with margins distinctly

undulate. Petioles $\frac{5}{8}$ " to $1\frac{1}{2}$ " long, terete, tomentose, with broad clasping base. Bracts 3 in number, lowermost ones appressed pilose-hairy, uppermost ones glabrous, linear-lanceolate to lanceolate in outline, yellow-green on stems above, light brown to brown below, $\frac{1}{16}$ " long or less, to $\frac{1}{8}$ " long. Peduncles $\frac{1}{4}$ " to $\frac{7}{8}$ " long, terete, glabrous, needle-like and terminated by a single involucre. Involucres $\frac{1}{16}$ " long, narrowly campanulate in outline, glabrous, on both surfaces, yellow-green to light green in color, 5-cleft with teeth short $\frac{1}{32}$ " long, triangular-lanceolate in outline. Flowers 10 to 15 in number, on short pedicels which are $\frac{3}{32}$ " long, slender, terete, glabrous, jointed at their apices and each pedicel has at its base two leaf-like bracts, these linear-lanceolate in outline, $\frac{1}{16}$ " long, glabrous on outer surface, green in color with margins white, inner surface pilose-hairy. Perianth consists of 6 sepals, campanulate in outline, $\frac{1}{16}$ " to $\frac{5}{64}$ " long, whitish suffused with green to light yellow-green in color, united at their bases into very short tube, and nearly equal in length; 3 outer ones oblong-obovate in outline, glabrous on both faces, with very prominent midvein which is yellow-green in color, margins somewhat incurved and constricted near the middle of each blade making them appear somewhat panduriform; 3 inner ones narrower than the outer ones, oblong-oblongeolate, glabrous on both faces and with prominent yellow-green midvein. Stamens 9

in number, not exserted, with anthers 2-lobed and white, Ovary $1/16$ " long, bottle-shaped in outline with narrow 3-angled neck $1/2$ length of ovary, body broadly rounded, base abruptly obtuse, greenish-brown in color with 3 very short styles and 3 stigmas. Fruit a short broadly rounded 3-angled achene.

Specimens studied, Arizona: Sierra Ancha Mountains, near Salt River Bridge; C. J. Whitefield.

Range: Sierra Ancha Mountains.

17. Eriogonum alatum Torr. in Sitgreaves, Rep. Zuni & Colo. 168. pl. 8. 1854.

Plant perennial, starting growth in March and continuing until October at altitudes of 5500' and above, erect, 1' to 3' high, 1 to 6 rather stout stems growing from a short thick caudex, paniculately branched above, and leafy to the peduncles. Roots consist of a very large, stout, woody, taproot 12" long or longer, with few small laterals. Stems $1/16$ " to $3/16$ " diameter, terete to somewhat compressed and angled, yellow-green in color suffused with light reddish-brown, and hirsute. Leaves mostly basal in a dense whorl forming a rather thickened mass, $1\ 1/2$ " to $4\ 1/2$ " long, $3/16$ " to $1/2$ " wide, petioled, margins revolute, yellow-green in color, upper face sparsely hirsute, lower face glabrous with exception of strong prominent midrib which is hirsute, margins of leaves entire, hirsute; stem

leaves much smaller, and gradually diminishing in size upwards, erect. Petioles of basal leaves more or less wing-margined. Branches solitary and distant, subdivided in a trichotomous manner, each division bearing a single involucre. Inflorescence loosely paniculate composed of many small heads, $\frac{3}{8}$ " to $\frac{1}{4}$ " in diameter with the involucre at the ends of the branches, borne lateral or terminal, on slender peduncles $\frac{1}{4}$ " to $1\frac{1}{4}$ " long, $\frac{1}{32}$ " diameter. Involucre funnelform to narrow funnelform, 5-toothed, $\frac{1}{8}$ " long, $\frac{1}{16}$ " wide, segments obtuse, hirsute on outer surface, glabrous on inner surface. Flowers borne on pedicels which are glabrous jointed at the apex, and exerted, $\frac{1}{16}$ " to $\frac{3}{16}$ " long. Perianth campanulate, consisting of 6 sepals of equal length, light yellow to greenish-yellow in color, $\frac{3}{32}$ " long, linear-oblong or lanceolate in outline, and glabrous. Ovary 3-angled, glabrous, $\frac{3}{32}$ " long, with 3 styles $\frac{1}{32}$ " long, and 3 stigmas. Upon maturing ovary develops into a closely invested 3-winged achene, $\frac{5}{32}$ " long; wings membranous, glabrous, $\frac{1}{16}$ " wide, and extending full length of achene; borne upon a pedicel $\frac{1}{4}$ " long with shriveled sepals attached to base. Seed 3-angled, $\frac{3}{16}$ " long, $\frac{3}{32}$ " wide, apex abruptly pointed, base swollen, glabrous, dark brown to black in color.

Specimens studied: Arizona: Chiricahua Mts., No. 19; J. C. Blumer. Fort Apache, Open flats; July 26, 1910; No. 683; L. N. Goodding. Chiricahua Mts., Big Juniper, Tompkins

Canyon; September 5, 1907; J. C. Blumer. Flagstaff; June 1915; Agnes Conrad. Flagstaff; No. 6; M. J. Riordan. Grand Canyon, Grand View; August 6-12, 1916; No. 8335; J. J. Thornber. White Mts., open grassy flats; July 23, 1910; No. 675; L. N. Goodding. 1914; No. 401; M. F. Gilman. Flagstaff; August 13, 1907; No. 2835; J. J. Thornber. Flagstaff; August 4, 1884; Marcus E. Jones. Grand Canyon, Grand View Trail; August 11, 1916; No. 8595b; J. J. Thornber. Grand Canyon, Grand View Trail; August 6-12, 1916; No. 8335; J. J. Thornber. Showlow; September 12, 1913; E. O. Wooton. Flagstaff; August 13, 1907; No. 2835; J. J. Thornber. Flagstaff Long Valley; August 15, 1912; No. 482; Coconino Grazing Recon.

Range: Arizona, Colorado, Montana, Nebraska, New Mexico, Texas. Dry slopes, in the Upper Sonoran and Transition zones.

18. Eriogonum stellatum Benth. in Trans. Linn. Soc. xvii. (1837) 409.

Plant perennial, growing from May until October, flowering from summer until late fall, the base woody with 1 to 8 stems with basal leaves and also clothed with old leaf-bases, 4" to 10" high, leafless above, erect, singly below, rather openly dichotomously or trichotomously branched above, with lower internodes 2 1/2" to 5" long, tomentulose to sparsely spreading pilose-hairy, tending to become

glabrate, and with the flowers in single large heads $3/8$ " to $5/8$ " diameter, umbellate, borne terminally on the naked flower branches, and bright yellow in color. Roots consist of a coarse woody root, 4" to 8" long, with many small laterals. Stems $3/64$ " to $1/16$ " diameter, terete, yellow-green in color and suffused with violet-red, and scapiform. Leaves whorled, forming a rosette at base of stems, blade ovate, broadly elliptical to spatulate in outline, upper surface nearly glabrous to sparsely appressed pilose-hairy, light green in color, lower face white-tomentose with rather prominent midvein, margins entire, and with rather long petioles. Petioles $1/4$ " to $1\ 1/4$ " long, $1/32$ " wide broadening at the base and sometimes clasping or partially encircling the stem, channelled on upper surface, slightly compressed, and tomentose. Leaf-like bracts noticeably prominent at the nodes on stems above, whorled and united at their bases into a short funnelform tube, 3 bracts to a whorl. Inside of outer bracts another set of 3 bracts arise. Outer bracts $3/8$ " to $1/2$ " long, $3/32$ " to $1/8$ " wide, lanceolate to spatulate in outline, margins entire, revolute, upper face nearly glabrous to pilose-hairy, lower face tomentose, sessile or short-petioled; inner bracts $3/16$ " to $5/16$ " long, $1/32$ " to $1/16$ " wide, linear-lanceolate to lanceolate in outline, margins entire, revolute; faces same as in outer bracts, and sessile or short petioled. Involucres $3/16$ " to $1/4$ " long, $1/8$ " to $5/32$ " wide, campanulate

to broadly campanulate in outline, white-tomentulose to appressed pilose-hairy on outer surface, glabrous on inner surface, borne sessile on peduncles $3/4$ " to 2" long, 6- to 8-cleft with teeth $1/16$ " to $3/32$ " long, ovate to triangular ovate in outline. Flowers exserted 25 to 35 borne on slender, terete, pedicels which are glabrous, jointed at their apices, $3/32$ " to $1/4$ " long. Perianth consists of 6 sepals bright yellow in color; 3 outer ones united into a short tube at their bases, oval in outline with bases abruptly acute and apices rounded, glabrous on both faces, with rather prominent midvein, and $1/4$ " long, $1/8$ " wide; 3 inner ones obovate to spatulate in outline, with apices rounded and bases abruptly acute and short petioled, longer than the outer ones, $5/16$ " long, $1/8$ " wide, midvein prominent and with 3 stamens attached to inner surface near base of each sepal. Stamens 9, filaments $3/16$ " long, orange-yellow in color, short silky-hairy $1/4$ " their length from their bases and glabrous above, anthers $3/64$ " long, bright orange and glabrous. Pistil $1/4$ " long, $3/64$ " wide, 3-angled, base acute, apex tapering into a long neck with 3 styles $3/32$ " long, and 3 stigmas. Ovary develops into a 1-seeded achene which is 3-angled, $5/32$ " long, $3/64$ " wide, glabrous, and reddish-brown to dark brown in color, widest near base with apex pointed.

Specimens studied: Arizona: Northern Arizona, Sagie Canyon; June-August, 1916; L. C. Whitehead. Flagstaff; Aug-

ust 12, 1907; J. J. Thornber. Flagstaff; August 12, 1907;
No. 784; J. J. Thornber. Flagstaff; August 12, 1907.
Flagstaff, Lowell Hill; August 9, 1907; No. 4052; J. J.
Thornber. Flagstaff, Lowell Hill; August 9, 1907; No. 4052;
J. J. Thornber. Flagstaff; August 12, 1907; J. J. Thornber.
Flagstaff; July 24, 1911; No. 122; R. E. Bodley.

Range: Arizona, California, Colorado, Washington, Wy-
oming. Mountains and dry valleys, Submontane and Subalpine
zones.

19. Eriogonum Jamesii Benth. DC. Prodr. 14:7. 1856.

Plant perennial growing from May until October, flow-
ering from summer until fall, the base woody with branching
caudex 3" to 15" tall, 1 to 12 stems clothed with old leaf-
bases, leaves mostly basal, leafless or reduced to bract-
like leaves above, decumbent below, openly divaricately
branched above with lower internodes 2" to 6" long, lanate
to pilose-hairy, flowers in single large heads 7/16" to
5/8" across, borne terminally on the naked flower stems, or
in the axils of the divaricately branching stems, pinkish-
white suffused with green to light orange or cream-orange
in color, Roots consist of a large woody, crooked, and
sometimes twisted taproot, with few small long branching
laterals. Stems 1/32" to 3/32" diameter, terete, light
whitish-green suffused with reddish-brown in color, scapi-

form. Leaves whorled forming a rosette at base of stems with leaves or leaf-like bracts in whorls at the nodes on stems above, and petioled. Blade $1/2$ " to $1\ 1/2$ " long, $3/16$ " to $1/2$ " wide, broadly elliptical to spatulate or oblanceolate in outline, upper surface pilose-hairy and bright green in color, lower surface with rather prominent midvein, tomentose, dull white to greenish-white in color, margins entire, somewhat revolute, and pilose-hairy. Petioles $1/4$ " to $1\ 5/8$ " long, $1/32$ " to $1/16$ " wide, hispidulous to pilose-hairy, shallowly channelled on upper surface, and with bases broadened, strongly nerved and somewhat encircling the stem, greenish-white above, below pinkish to reddish-yellow in color. Leaf-like bracts noticeably prominent at nodes on stems above, whorled, united at their bases into broad, short, funnelform tube surrounding the node, 4 to 5 in a whorl, short petioled or nearly sessile, $1/4$ " to $7/8$ " long, $1/16$ " to $5/8$ " wide, oblong-lanceolate to oblanceolate in outline, blade same as in leaves. Involucres borne sessile inside of whorl of leaf-like bracts, funnelform-campanulate in outline, $3/16$ " long, silky-hairy on outer surface, glabrous on inner surface, with 3 teeth $1/8$ " long, these obtuse to rounded at the apex. Flowers 15 to 25, exserted, borne on pedicels which are glabrous, compressed, and jointed at the apex. Perianth consists of 6 sepals, $7/32$ " long. 3 outer sepals united at their bases into short funnelform tube $1/16$ " long, fine silky-hairy on

outer surface and along midvein, glabrous on inner surface, obovate in outline, whitish in color with midvein yellowish sometimes suffused with pink. 3 inner sepals united at their bases $3/16$ " long, slightly longer than outer sepals, obovate to obovate-spatulate in outline, silky-hairy on outer surface glabrous on inner surface, white with broad midvein which is cream-yellow suffused with pink. Stamens 9, exserted, filament $7/32$ " long, fine silky-hairy $1/2$ their length from the base, anthers $1/32$ " long, ovate in outline, violet-red in color. Pistil $3/16$ " long, glabrous, and acute at the base, broadening out at apex into 3 stigmas $1/8$ " long, silky-hairy at their point of attachment to ovary. Ovary 3-angled, silky-hairy at the apex. Fruit an achene, and 3-angled.

Specimens studied: Arizona: M. French Gilman; 1904; No. 402. Sycamore Creek, Subalpine slopes; July 29, 1910; No. 712; L. N. Goodding. Huachuca Mts., Miller's Peak, Crest of Mts.; August 18, 1909; No. 429; L. N. Goodding. Sycamore Creek, Subalpine slopes; July 29, 1910; No. 712; L. N. Goodding. Santa Rita Mts., top of Mt. Baldy; L. Peck.

Range: Arizona, Colorado, Kansas, Texas. Plains and hills, Plain and Montane zones.

20. Eriogonum Bakeri Greene, Pl. Baker. 3:15. 1901.

Synonym: E. Jamesii flavescens. S. Wats. Proc. Amer. Acad. 12:225. 1877.

E. vegetius A. Nels. Bull. Torrey Club 31: 239.
1904.

Plant a perennial growing from May until November, flowering from summer until late fall, the branched, woody base with 1 to 5 stems and these with basal leaves and also clothed with old leaf-bases, 6" to 10" high, leafless above, erect, single below, rather openly dichotomously and sometimes trichotomously branched in the upper $1/2$ to $1/3$ of the plant, first internodes from $2\ 1/2$ " to 6" long, tomentulose to pilose-hairy, flowers in single large umbellate heads, $1/2$ " to 1" diameter, borne terminally on the naked flower branches and bright yellow, sometimes orange-yellow in color. Roots consist of a single, coarse, woody, crooked, twisted taproot, near the apex developing 2 to 5 stems. Stems $1/16$ " to $3/32$ " diameter, terete, yellow-green in color, often suffused with red-brown or violet-red and scapiform. Leaves all basal, whorled forming a rosette at base of stems; blade oblong-ob lanceolate to spatulate in outline, $3/16$ " to $7/16$ " wide, $1/2$ " to $1\ 1/4$ " long, upper face short pilose-hairy sometimes tending to become glabrate, lower face tomentulose with rather prominent midvein, margins entire and with rather long petioles. Petioles $1/4$ " to $1\ 1/4$ " long, $1/32$ " wide, broadening at the base and sometimes clasping or partially encircling the stem, channelled on upper surface, slightly compressed, tomentulose to densely pilose-hairy. Leaf-like bracts noticeably prominent at the nodes on stems above, whorled and united at their

bases into a short funnelform tube, 3 bracts to a whorl. Inside of outer bracts arise another set of 3 bracts, outer bracts $1/2''$ to $3/4''$ long, $3/32''$ to $1/4''$ wide, oblong-ob lanceolate to linear-ob lanceolate in outline, margins entire, sometimes revolute, upper face nearly glabrate to pilose-hairy, lower face tomentose, bracts short petioled $1/16''$ to $1/8''$ long; inner bracts $1/4''$ to $1/2''$ long, $1/16''$ to $1/8''$ wide, linear-lanceolate to lanceolate in outline, margins entire, revolute, with faces same as in outer bracts, sessile or short petioled. Inflorescence a single, large, sessile involucre at apex of the peduncle, varying in length, and from the base of this pair of rays $1/2''$ to $2\ 1/2''$ long, at the apex of these is another involucre and another pair of proliferating rays or pedicels, such proliferations occurring two to three times with rays becoming shorter each time. Involucre campanulate to broadly campanulate in outline, $3/32''$ to $1/4''$ long, $1/8''$ to $3/16''$ wide near apex, tomentulose to appressed pilose-hairy on outer surface, glabrous on inner surface, 6-cleft with teeth $1/16''$ long, ovate to triangular-ovate in outline. Flowers exserted, 25 to 35 in number, borne on slender, terete pedicels, $1/4''$ to $3/8''$ long, jointed at their apices, yellow in color suffused with violet-red, at their bases is a tuft of pilose-silky hairs. Perianth consists of 6 sepals, bright yellow to orange-yellow in color; 3 outer sepals united at their bases into narrow funnelform tube $1/16''$ to $3/32''$ long and

silky-hairy, $1/4$ " to $5/16$ " long; $1/8$ " wide, oval in outline, apices rounded, bases abruptly tapered with prominent midvein which is silky pilose-hairy on outer surface, glabrous on inner surface; 3 inner ones $5/16$ " to $3/8$ " long, obovate to spatulate in outline with apices rounded and bases abruptly acute and short petioled, longer than the outer ones, short pilose-hairy on outer surface along prominent midvein, glabrous on inner surface, and with 3 stamens attached to the base of each sepal. Stamens 9 in number, not exserted, filaments $5/32$ " long, slightly compressed, silky-hairy $1/2$ " their length from the base, orange-yellow below, yellow above. Pistil $1/4$ " long with ovary 3-angled, $7/32$ " long, $1/16$ " wide, yellow suffused with brown to reddish-brown in color, apex long tapered, base abruptly acute, glabrous, with 3 styles $1/16$ " to $3/32$ " long, sparsely silky-hairy $1/2$ " their length and 3 stigmas. Seed 3-angled achene, glaucous, glabrous, $3/16$ " long, reddish-brown to brown in color, apex long tapered, base abrupt and obtuse.

Specimens studied, Arizona: Grand Canyon, Grand View Trail; August 16, 1916; No. 8443; J. J. Thornber. Grand Canyon of the Colorado River; September 26, 27, 28, 1913; No. 3659; Alice Eastwood. Grand Canyon, near El Tovar; September 26-28, 1913; No. 3659; Alice Eastwood. Flagstaff, Coconino Grazing Reconnaissance; August 31, 1911; No. 253; W. R. Chapline.

Range: Arizona, New Mexico, Utah, Wyoming. Open valleys, Montane and Submontane zones.

21. Eriogonum Heermanni Du. & Hilg. in Pacif. Rail. Rep. v. 14. t. 17.

Plant perennial shrub 12" to 24" tall, growing from May until November, flowering in August and continuing until October. Plant woody at the base, leafy below, and soon branching into a diffuse panicle, peduncles of the panicles short, repeatedly 2 to 3-forked and ending into somewhat spinescent branchlets, with inflorescence composed of few-flowered heads borne axillary, laterally, and sometimes terminally on the branches of the panicle. Roots consist of a coarse, woody, tortuous, twisted, rather large tap-root, with few branching laterals. Stems below 1/8" to 1/4" diameter, woody up to the much branched panicle; old leaf bases prominent, densely flocculent, especially in axils of leaf bases on woody stems above, glabrate below; bark grayish-white to dull grayish in color, shreddy and peeling off readily, wood below light reddish-brown; forks of the panicle rather short, 1/4" to 5/8" long, straightish, rigid with branchlets somewhat divaricate, appearing fistulous, compressed, minutely tuberculate-roughened, glabrate, and slightly constricted at the nodes, dull yellow-green in color. Leaves alternate, on stems below the panicle, but wanting in older stems near the bases, petioled. Leaf

blades, oblong-lanceolate to oblong-obovate in outline, $\frac{3}{8}$ " to $\frac{1}{2}$ " long, $\frac{3}{32}$ " to $\frac{7}{32}$ " wide, appressed hairy on upper surface, margins entire, slightly revolute, somewhat undulate, lower face tomentose. Petioles short, $\frac{1}{8}$ " to $\frac{3}{16}$ " long, strongly compressed especially near basal end which is flattened and closely clasps the stems, floccose-tomentose on both surface, channelled above. Bracts 3 in number, lanceolate to triangular in outline, glabrous on outer surface, appressed pilose-hairy on inner surface, minute on branchlets above to $\frac{1}{16}$ " long on branchlets below. Involucres hemispherical or broadly turbinate, $\frac{1}{16}$ " to $\frac{3}{32}$ " long, base yellow-green, glabrous, 5-cleft with teeth short broad rounded with scarious margins somewhat overlapping, these reddish-brown in color, outer surface very finely tuberculate roughened, inner surface pilose-hairy. Flowers few, 5 to 10, exserted, borne on pedicels which are glabrous, $\frac{3}{32}$ " long, terete, jointed at their apices, and each flower accompanied by 2 bracts growing from the base of each pedicel and these $\frac{1}{16}$ " long, linear-lanceolate or subulate in outline, reddish-brown in color, pilose-hairy on inner surface. Perianth consists of 6 sepals $\frac{3}{32}$ " to nearly $\frac{1}{8}$ " long, and cream-yellow to light orange-yellow in color, 3 outer sepals orbicular in outline, united at their bases into short tube, glabrous on both surfaces; 3 inner segments much narrower than outer ones, oblong in outline, glabrous on both faces. Stamens 9 in number, not

exserted, filaments nearly as long as sepals, cream-yellow to orange-yellow in color, finely pilose-hairy $1/2$ their length from the base, anthers 2-lobed, bright orange in color. Ovary 3-angled, $1/16$ " long, very finely tuberculate roughened, glabrous with long narrow neck, base short acute, with 3 styles which are exserted, $1/16$ " to nearly $3/32$ " long, and 3 stigmas. Fruit a 3-angled achene.

Specimens studied: Arizona: Grand Canyon, International Phytogeographers Excursion; September 26, 1913; Dr. Schroeter. Grand Canyon, Grand View Trail; August 14, 1916; No. 8520; J. J. Thornber. Grand Canyon of the Colorado River, near foot of Bright Angle Trail; September 26, 27, 28, 1913; No. 3760; Alice Eastwood. Williams, Tusayan Forest Reserve; Form 430; A. D. Read.

Range: Arizona, California, Nevada. Plains and Submontane.

22. Eriogonum Jonesii S. Wats. Proc. Amer. Acad. 21:454. 1886.

Plant perennial, shrubby, 12" or more high, flowering from August to October, with stems tomentose throughout, erect or erect-ascending, with leaves scattered and petioled, inflorescence with dichotomously or trichotomously ascending branches, lowermost bracts sometimes foliaceous, few-flowered, borne in heads scattered throughout the branch in inflorescence. Stems woody near the base, terete, $3/32$ "

to 1/8" diameter, bark not readily peeled off from lower stems, wood reddish-brown in color. Leaves scattered on stems to the peduncles, alternate or whorled at the base of the stems and petioled. Leaf blades 1/4" to 11/16" wide, 3/8" to 1" long, ovate to ovate-elliptical in outline, upper face floccose and tending to become glabrate in age, margins somewhat slightly undulate crisped, lower face tomentose with prominent midvein and branching laterals. Petioles as long as or nearly twice as long as the blades, 5/8" to 1 1/2" long, compressed, tomentose, channelled on upper surface, broadening at the base and partially encircling the stem. Bracts sometimes leaf-like and these linear-oblong in outline, smaller bracts 3 in number, triangular-lanceolate to triangular in outline, united at their bases by a thin membrane and surrounding the stems at the nodes, tomentose on both faces. Involucres all sessile and borne axillary in forks of the flowering peduncles or laterally, or terminally, 3/32" long, broadly turbinate in outline, tomentose on outer surface, pilose-hairy on inner surface, 5-cleft with teeth short, obtuse to triangular in outline. Flowers 10 to 12 in number, borne on pedicels which are 1/8" long, terete, glabrous, jointed at their apices. Perianth campanulate in outline, nearly 1/8" long, consists of 6 sepals equal in length, united at their bases into short funnelform tube, and each sepal with a prominent midvein, cream-yellow in color; 3 outer sepals

obovate in outline; 3 inner ones narrower, oblong-obovate in outline. Stamens 9 in number, not exserted, and nearly as long as the sepals. Ovary 3-angled, 1/8" long, with broad rounded base and short 3-angled neck, minutely tuberculate roughened, yellow-brown in color, with short styles and 3 stigmas. Fruit a 3-angled, glabrous achene.

Specimens studied: Arizona: Grand Canyon, Bass Canyon; September 13, 1916; No. 2821G; J. J. Thornber. Flagstaff, Walnut canyon; September 20, 1919; No. 9; Marie Collins. Cosnino; August 11, 1884; No. 4050; Marcus E. Jones.

Range: Arizona, Colorado, Utah. Arid districts, Upper Sonoran Zone.

23. Eriogonum polifolium Benth. in DC. Prod. xiv. 12.

Plant a leafy low shrub, 6" to 20" tall, suffruticose or frutescent, growing from February until November, beginning flowering in March and continuing until November.

Plant with stems much branched and woody, with the very leafy branches ending in a simple or compound umbel or with the umbel reduced to a single head, with the inflorescence composed of many small flowers. Roots composed of a large stout, woody, twisted crooked, taproot, with medium sized laterals. Stems woody their full length not including flowering peduncle, 1/16" to 1/8" diameter, bark shreddy, dull gray in color, beneath shreds reddish-brown in color,

inclined to be geniculate at the base, erect or erect-ascending, terete or slightly compressed, glabrous or nearly so, and very leafy. Leaves fascicled, $3/16''$ to $1/2''$, sometimes $7/8''$ long, $1/32''$ to $3/32''$ wide, oblong, linear, or oblong-oblongate in outline, drawn down to a narrow base, margins sharply revolute, upper face medium green in color, sparsely silky-hairy or glabrate, lower face medium green in color, moderately tomentose with midvein rather prominent, sessile or nearly so. Flower clusters in heads sessile when single in axils of rays, or on ends of flowering peduncles, or on short unequal rays when borne in umbels. Flowering peduncles $2''$ to $8''$ long, without leaves, $1/32''$ to nearly $1/16''$ diameter, terete, finely striate, sparingly to moderately pilose, medium green in color. Bracts 3 to 5 in number, borne on ends of flowering peduncles and at apex of rays surrounding flowering cluster at base, linear or oblongate in outline, $1/8''$ to $3/16''$ long, those next to involucre united at their bases by a thin membrane which is translucent. Rays $3/16''$ to $3/8''$ long, $1/64''$ to $1/32''$ diameter, terete, pilose-hairy. Involucre $1/8''$ long, campanulate, yellow-green on outer surface, deeply 5-cleft with teeth linear-lanceolate, and connected between teeth with white translucent membrane, this with undulate irregular margins; involucre glabrous on inner surface. Flowers exserted, 7 to 10 in number, borne on pedicels which are glabrous, $1/32''$ to $3/32''$ long and jointed at their

apices. Growing from base of pedicels and surrounding them is a ring of densely long silky hairs nearly as long as pedicels. Perianth consists of 6 sepals nearly equal in length; 3 outer ones united at their bases into very short tube, $3/32$ " long, pilose-hairy at base and along prominent midvein on inner and outer surface, midvein pinkish or rose colored, margins white, somewhat incurved or revolute, oval to oblanceolate in outline; 3 inner segments same as outer ones but slightly shorter. Stamens 9 in number; filaments $1/16$ " long, pilose-hairy at their bases, glabrous above, white in color; anthers $1/48$ " long, violet-red to rose-pink in color. Ovary 3-angled with 3 styles and 3 stigmas. Fruit a 3-angled achene.

Specimens studied: Arizona: Yuma, Harcuvar Mountains; May 3-6, 1917; No. 5702; J. C. Blumer. Ajo; March 10, 1915; Mrs. George Mairs. Needles, May 8, 1884; No. 3652; Marcus E. Jones. Yucca; May 17, 1884; Marcus E. Jones Rice, San Carlos Indian Reservation; May 19, 1916; No. 2658G; no name. Sacaton; May-June 1912; No. 357; M. French; Gilman. Superior, Boyce-Thompson Southwestern Arboretum; April 8, 1933; E. A. Maier.

Range: Arizona, California, Nevada. Desert slopes and in the mountains, Lower Sonoran Zone.

24. Eriogonum Simpsonii Benth. in DC. Prodr. 14:18. 1856.

Plant woody, low leafy shrub, 8" to 2' high, subcaespitose, growing from May until October, and flowering from July until September. Plant with branches erect-ascending or ascending, tomentose, leafy throughout up to the peduncles, dichotomously branching into broadly paniculate cyme. Roots absent on plants studied. Stems $\frac{3}{32}$ " to $\frac{1}{8}$ " diameter, somewhat compressed below, tomentose, with bark somewhat shreddy in older plants near the base, stems reddish-brown in color where exposed. Leaves fascicled below, alternate on stems above, attenuate into a short petiole; blades $\frac{3}{8}$ " to $\frac{5}{8}$ " long, margins revolute, appressed pilose-hairy tending to become glabrate above, densely white-woolly below, broadly linear in outline. Petioles $\frac{1}{16}$ " to $\frac{3}{32}$ " long, compressed, tomentose, broadening at base and clasping the stems when leaves are alternate. Bracts 3 in number, narrowly linear-lanceolate in outline with apices acute, $\frac{3}{32}$ " to $\frac{7}{32}$ " long, united at their bases and encircling stem by a narrow band and tomentose on both surfaces. Flower cluster in broadly paniculate cymes terminating the flowering peduncles. Peduncles $\frac{3}{4}$ " to 2" long dichotomously branched, with involucre borne in the axils of the branching peduncles or laterally, or terminally on the peduncles. Involucre of the lower forks shorter peduncled, turbinate, $\frac{1}{16}$ " to $\frac{3}{32}$ " long, somewhat floccose on outer surface to glabrous, 5-cleft with teeth short, apex obtuse, and tomentose on inner sur-

face. Flowers exserted, 5 to 10 in number, borne on pedicels which are glabrous, terete, jointed at their apices, 1/8" long, pinkish in color. Perianth consists of 6 sepals turbinate in outline, whitish to pinkish in color and united 1/2 their length into funnel-shaped tube; 3 outer lobes 1/8" long glabrous on both faces, obovate in outline with apex broadly rounded, and with prominent pinkish midvein; 3 inner ones same length as outer ones, oblanceolate in outline, glabrous on both faces, apex rounded and with prominent midvein. Stamens 9 in number and not exserted. Ovary 1/16" long, 3-angled, glabrous, terminated with 3 slender styles 1/16" long. Fruit a 3-angled achene.

Specimens studied: Arizona: Grand Canyon, Grand View Trail; August 20, 1907; No. 2938; Thornber & Hockdoerffer. Peach Springs; June 26, 1884; Marcus E. Jones. Grand Canyon, Grand View; August 6-12; 1916; No. 8340; J. J. Thornber. Grand Canyon of the Colorado River, Grand View Trail; September 26, 27, 28, 1912; No. 3579; Alice Eastwood. Grand Canyon, Grand View Trail; August 20, 1907; No. 2938; Thornber & Hockdoerffer. Navaho Reservation, Canyon sides; July 1916; C. T. Vorhies. Grand Canyon, Grand View; August 6-12; 1916; No. 8340; J. J. Thornber. Grand Canyon, El Tovar; September 3, 1916; No. 2800G; no name.

Range: Arizona, Colorado, Texas, Utah. Dry plains, Sonoran Zone.

25. Eriogonum Wrightii Torr. *E. helianthemifolium* Benth. Torr & Gray, l. c. 176. *E. Wrightii* & *trachygonum*. Torr.; Benth. in DC. Prodr. XIV. 14.

Plant a perennial 6" to 15" tall, leafy half-shrub, suffruticose or frutescent, growing from March until late November, beginning flowering in July at altitudes of 2800' to 6500', much branched and woody at the base, light green in color overlaid with white tomentose, with inflorescence composed of many small heads $3/16$ " to $1/4$ " in diameter which are near the apices of the branchlets and often crowded. Roots composed of a large, stout, woody twisted, crooked taproot, with many medium sized laterals. Stems woody at the base, crooked, terete, $1/16$ " to $3/32$ " diameter, dichotomously or trichotomously branched above with no leaves on upper half of stems, tomentose, internodes short, nodes rather prominent. Tomentum often peeling off in layers leaving the stems glabrous and reddish-brown in color. Leaf-like bracts on stems above 3 in number at the nodes, broadest at their bases and tapered above, ovate-lanceolate to triangular in outline, tomentose; bracts of lower stems usually one and broadly tricangular. Leaves $3/8$ " to $3/4$ " long, $1/8$ " to $1/4$ " wide, obovate-oblongate to oblanceolate in outline, often whorled in the axils of the stems, white-tomentose on both faces, margins entire, revolute, tip acute, midrib prominent on lower surface, on upper surface strongly impressed, rather short petioled. Petioles $1/8$ " to $3/8$ " long, broader at point of attachment

to stem and somewhat encircling it, shallowly channelled on upper surface, and tomentose. Inflorescence composed of many small heads $1/4''$ to $3/8''$ in diameter, scattered along the upper branches or conjected towards the ends and borne lateral or terminal. Involucres $1/8''$ long, moderately campanulate to narrowly campanulate in outline $1/16''$ wide, 6-cleft with teeth linear-lanceolate in outline and $1/32''$ long, prominently veined each vein terminating in a tooth, tomentose on outer surface, glabrous on inner surface except the teeth which are tomentose on the inner surface. Flowers exserted, 10 to 20, borne on pedicels which are glabrous and jointed at their apex, $1/8''$ to $3/16''$ long. Perianth consists of 6 sepals nearly alike in outline, obovate to rounded obovate, 3 inner ones slightly longer than the outer, $5/32''$ to $1/8''$ long, apex rounded, base abruptly tapered, united at their bases into a short tube, and with pronounced midveins. Ovary $1/8''$ long, linear-lanceolate in outline with base abruptly tapered, distinctly 3-angled, glandular, with 3 styles $1/32''$ long and 3 stigmas.

Specimens studied: Arizona: Oracle, September 13, 1905; J. J. Thornber. Santa Rita Mts., Stone Cabin Canyon; October 14, 1903; No. 113; Thornber. Farview; August 28, 1884; No. 4094; Marcus E. Jones. Santa Rita Mts., Stone Cabin Canyon; September 13, 1905; Thornber. Santa Rita Mts., Stone Cabin Canyon; October 14, 1903; No. 113; Thornber.

Santa Rita Mts.; August 1908; No. 6; L. N. Goodding.
Mule Mts., Walnut Springs; October 9, 1909; No. 478; L.
N. Goodding. Chiricahua Mts., Gosseneck, Paradise; Octo-
ber 4, 1907; No. 1861; J. C. Blumer. Huachuca Mts., Carr
Peak; August 25, 1910; No. 852; L. N. Goodding. Sulphur
Spring Valley, Col. Hooker's Ranch; August 28, 1905; No.
2659; J. J. Thornber. Chiricahua Mts.; No. 76; J. C.
Bruner. San Simon Plains; August 22, 1905; No. 5630; J. J.
Thornber. Santa Rita Mts., Stone Cabin Canyon; October 14,
1903; No. 113; Thornber. Chiricahua Mts.; October 4, 1907;
No. U. A. 44; J. C. Blumer. Flagstaff, Coconino Forest;
November 19, 1921; No. 12LV. W. J. Brown. Flagstaff, Coco-
nino Forest; September 19, 1911; No. 236; R. R. Hill.
Huachuca Mts., Carr Peak, No. 852; L. N. Goodding.

Range: Arizona, California, Colorado, and Mexico. Dry
plains and mountains, Sonoran Zone.

ALPHABETICAL LIST OF SPECIES
OF THE GENUS ERIOGONUM AND SYNONYMS.

1. *Eriogonum Abertianum* Torr. N. M., Tex., Ariz., Mex.
2. *Eriogonum acaule* Nutt. Colo., Wyo., Ida., Nev.
3. *Eriogonum acetoselloides* Torr. Calif.
4. *Eriogonum Ainsliei* Standl. N. M.
5. *Eriogonum alatum* Torr. Mont., Texas., Ariz., Neb., Wyo.,
N. M., Colo.
6. *Eriogonum Alleni* Wats. Vir., W. Vir.
7. *Eriogonum andinum* Nutt. Wyo., Nev., Mont., Ida.
8. *Eriogonum androsaceum* Benth. Alta., Mont., B. C.
9. *Eriogonum anemophilum* Greene, Pittonia 3:199. 1899. Nev.
10. *Eriogonum angulosum* Benth. (var. *viridesens* Jep., *Maculatum* Jep. variable Parish) Ariz.,
Calif., Ida.
11. *Eriogonum annuum* Nutt. (*E. Hitchcockii* Gand., *E. Lindheimerianum* Scheele) Mont., Tex., S.
Dak., Neb., Mex.
12. *Eriogonum arcuatum* Greene (*E. Jamesii flavescens* Benth)
Colo., Utah, Wyo., N. M., Ariz.
13. *Eriogonum aridum* Greene (*E. reclingtum* Greene) (*E. alatum* Small) Mont., Colo., Nev., Wash.
14. *Eriogonum atrorubens* Engelm. N. M., Mex.
15. *Eriogonum aureum* Nutt. (Greene) Colo.
16. *Eriogonum azaleastrum* Greene, Pittonia 5:67. 1902. Nev.
17. *Eriogonum Baileyi* S. Wats. (var. *tomentosum* S. Wats.)
Ariz., Calif., L. Calif., Nev., N. M.,
Ida., Wash.
18. *Eriogonum Bakeri* Greene (*E. arcuatum* Greene; *E. Vegetius* A. Nels.) Ariz., Wyo., N.m., Utah.
19. *Eriogonum batemani* Jones, Contr. West. Bot. 11:11. 1903.
Utah. (*spathuliforme* Rydb. Bull.
Torrey Club 39:307. 1912)

20. *Eriogonum bicolor* M. E. Jones (*E. Batenani*, *E. griscanum* M. E. Jones) Utah.
21. *Eriogonum biumbellatum* Rydb. Utah.
22. *Eriogonum brachypodum* Torr. & Gray. Calif.
23. *Eriogonum Brandegi* Rydb. Colo.
24. *Eriogonum brevicaule* Nutt. (*E. chrysosepalum* x *brevicaule*) Utah, Mont., Colo.
25. *Eriogonum caespitosum* Nutt. Colo., Ida., Nev., Mont., Wash., Wyo.
26. *Eriogonum campanulatum* Nutt. (*E. sabulosum* M. E. Jones; *E. Brevicaule*, *E. micranthum* Nutt.) Colo., Kans., Neb., N. M., Ore., Utah, Wyo.
27. *Eriogonum cernuum* Nutt. (var. *E. cernuum tenne.* Torr. & Gray. Proc. Amer. Acad. 8:182. 1870. Utah, Nev.,) Ariz., Alta., Calif., Colo., Ida., Kan., Mont., Nev., N. M., Sask.
28. *Eriogonum chloranthum* (*E. aureum* Nutt.; *E. flavum* A. Nels.) Colo., Wyo.
29. *Eriogonum chrysocephalum* Gray. (*E. laxifolium* A. Nels.; *E. Kingii laxifolium* T. & G. E. medium Rydb.) Colo., Neb., Ida., Utah, Wyo.
30. *Eriogonum chrysops* Rydb. Ida., Ore.
31. *Eriogonum ciliatum* Torr. Mex.
32. *Eriogonum cinereum* Benth. Calif.
33. *Eriogonum clavellatum* Small. Utah.
34. *Eriogonum coloradense* Small. Colo.
35. *Eriogonum commixtum* Greene; Tidestrom Proc. Biol. Soc. Washington 36:181. 1923. Nev.
36. *Eriogonum compositum* Dougl. (var. *leianthum* Benth.) Calif., Ida., Wash.
37. *Eriogonum contortum* Small. Colo.

38. *Eriogonum cordatum* Torr. Calif.
39. *Eriogonum coriaceum* Coult. & Fisher. (*E. Texanum* Coult. & Fisher) Tex.
40. *Eriogonum corymbosum* Benth. (? var. *Fendlerianum* Benth.; *E. microthecum* Benth.) Calif., Colo., N. M. Utah.
41. *Eriogonum crassifolium* Benth. (var. *tectum* A. Gray.) Wyo.
42. *Eriogonum croceum* Small. Colo., Ida., Wash.
43. *Eriogonum dasyanthemum* T. & G. (var. *Jepsonii* Greene) Calif.
44. *Eriogonum deflexum* Torr. (*E. incigne* S. Wats. Proc. Amer. Acad. 14:295. 1879.) Ariz., Calif., Nev., Utah.
45. *Eriogonum densum* Greene. Ariz., Nev., N. M. Utah.
46. *Eriogonum depauperatum* Small. S. Dak.
47. *Eriogonum depressum* (Blarckinship) Rydb. (*E. ovalifolium depressum* Blandinship; *E. rubidum frigidum* Gand.) Mont., Ore.
48. *Eriogonum dichotomum* Dougl. (*E. Album* Nutt.; *E. Greenei* Gray; *E. niveum* T & G.) Calif., Ida., Ore., Calif.
49. *Eriogonum divaricatum* Hook. Ariz., Colo., N. M., Wyo.
50. *Eriogonum divergens* Small (*E. corymbosum divaricatum* Torr.) Ariz., Colo., Nev., N. M., Utah.
51. *Eriogonum Douglasii* Benth. Calif., Ore.
52. *Eriogonum effusum* Nutt. (*E. microthecum effusum* T. & G.; *E. microthecum* Nutt.; *E. tristichum* Small.; *E. salicum* Greene.) Neb., N. M., Mont., S. Dak., Utah, Wyo., Colo.
53. *Eriogonum elatum* Dougl. Calif., Ida., Nev., Wash.
54. *Eriogonum elongatum* Benth. Calif.
55. *Eriogonum eximium* Tidestrom, Proc. Biol. Soc. Wash. 36-181. 1923. Nev., Calif.

56. *Eriogonum esmeraldense*. S. Wats. Proc. Amer. Acad.
24:95. 1889. Nev.
57. *Eriogonum fasciculifolium* A. Nels. Ida.
58. *Eriogonum Fendlerianum* (Benth.) Small. (*E. microthecum* Fendlerianum Benth.) Colo.,
N. M.
59. *Eriogonum Flavum* Nutt. (*E. Chloranthum* Greene; *E. polyphyllum* Small; *E. sericeum* Pursh.; *E. crassifolius* Benth.) Man., Alta.,
Sask., Ariz., Colo., Kan., Neb.
60. *Eriogonum floridanum* Small. Florida.
61. *Eriogonum friscanum* Jones, Contr. West. Bot. 11:14.
1903. Utah.
62. *Eriogonum fusiforme* Small. Ariz., Colo., Utah.
63. *Eriogonum glandulosum* Nutt. (*E. flexum* M. E. Jones. *E. flexum ferronis* Jones, Contr.
West. Bot. 11:15. 1903.) Colo.,
Utah.
64. *Eriogonum Gordoni* Benth. (*E. Visherii* A. Nels.) Colo.,
Neb., S. Dak., Utah, Wyo.
65. *Eriogonum gracile* Benth. (var. *effusum* T. & G.; *leuclidon* T. & G., Benth.; *acetoselloides* T. & G., Torr.) Calif.
66. *Eriogonum grangerense* M. E. Jones (*E. confertifolium*
Stansburgii Benth.) Utah, Wyo.
67. *Eriogonum gypsophilium* Woot. & Standl. N. M.
68. *Eriogonum harvardii* S. Wats. N. M., Tex.
69. *Eriogonum Heermanni* Dur. & Hilg. Calif., Nev.
70. *Eriogonum heracleoides* Nutt. B. C., Colo., Mont., Nev.,
Cre., Utah, Wyo., Wash.
71. *Eriogonum hieracifolium* Benth. N. M., Tex.
72. *Eriogonum hirtifolium* Gray. (*E. pharnaceoides* Torr.; *E. Abertianum* Torr. Ariz., N. M.; *E. villiflorum* Gray. Utah.) Calif.
73. *Eriogonum Hookeri* S. Wats. Ariz., Nev., Utah., Wyo.

74. *Eriogonum idahoense* Rydb. Ida.
75. *Eriogonum incanum* T. & G. Calif.
76. *Eriogonum inflatum* Torr. (*E. fusiforme* Small) Ariz., Calif., Colo., N. M. Nev.
77. *Eriogonum insigne* S. Wats. Nev., Utah.
78. *Eriogonum Jamesii* Benth. (*E. flavum* var. *vegetius* Wats.; *E. sericeum* Torr.; var. *flavescens* Wats.) Ariz., Colo., Kan., Mex., N.M.
79. *Eriogonum Jonesii* Wats. Ariz., Colo., Utah.
80. *Eriogonum Kellogii* Gray. Calif.
81. *Eriogonum Kennedyi* Porter. Calif.
82. *Eriogonum Kingii* Gray. Calif.
83. *Eriogonum lachnogonum* Torr. (*E. tetraeuris* Small.) Utah, Ariz., Colo., Kan., N. M., Tex.
84. *Eriogonum lagopus* Rydb. Wyo.
85. *Eriogonum latifolium* Smith. Calif.
86. *Eriogonum latum* Small Colc., Mont., Utah, Wash., Wyo.
87. *Eriogonum Lemmoni* Wats. Nev.
88. *Eriogonum leptocladon* T & G. (*E. ramosissimum* Eastw.; *E. Eastwoodae* M. E. Jones) N. M., Utah.
89. *Eriogonum leptophyllum* (Torr) Woot. & Standl. N. M.
90. *Eriogonum leucophyllum* Woot. & Standl. N. M.
91. *Eriogonum Lobbi* T. & G. Calif., Nev.
92. *Eriogonum lonchophyllum* T & G. (*E. wasatchense* M. E. Jones) Colo., N. M., Utah.
93. *Eriogonum longilobum* Jones. Utah, Nev.
94. *Eriogonum loganum* A. Nels. Utah.
95. *Eriogonum longifolium* Nutt. (*E. texanum* Scheele) Ark., Fla., Mo., N. M., Okla., Tex., Utah.

96. *Eriogonum mancum* Rydb. Mont.
97. *Eriogonum marifolium* T. & G. Calif., Nev.
98. *Eriogonum Mearnsii* Parry. Ariz., Utah.
99. *Eriogonum medium* Rydb. Utah.
100. *Eriogonum micranthum* Nutt. (*E. medium* x *micranthum*, *E. chrysocephalum* x *micranthum* Rydb.)
Ida., Utah.
101. *Eriogonum microthecum* Nutt. (*E. myrianthum*, *E. intricatum*, *E. saronthriforme* Gand.) Ariz.,
Calif., Colo., Mont., Nev., Nebr.,
N. M., Ore., Wash.
102. *Eriogonum mohavense* Wats. Calif.
103. *Eriogonum multiceps* Nees. (*E. gnaphaloides* Benth.) Colo.,
Ida., Mont., Nebr., N. Dak., Sask.
104. *Eriogonum multifolium* T. & G. Calif., Nev.
105. *Eriogonum Neallyi* Coult. Tex.
106. *Eriogonum nebraskense* Rydb. Neb.
107. *Eriogonum neglectum* Greene. (*E. umbelliferum* Small.; *E. glaberrimum aureum* Gand.) Colo., Nev.,
Wyo.
108. *Eriogonum nidularium* Coville. (?*E. nummulare* M. T. Jones.
var. *E. nidulgrium lyciense* Jones)
Ariz., Calif., Ida., Nev., Ore.
109. *Eriogonum niveum* Dougl. B. C., Ida., Ore., Wash.
110. *Eriogonum nudicaule* (Torr.) Small. (*E. effusum nudicaule*
Torr.) Kan., N. M., Tex., Utah.
111. *Eriogonum nudum* Dougl. (var. *pauciflorum*, *oblongifolium*
Wats.) (var. *E. deductum* Greene. Pitton-
ia 5:71. 1902.) Nev., Calif., Wash.
112. *Eriogonum nummulare* Jones. Utah.
113. *Eriogonum nutans* T. & G. (*E. fubiflorum* Rydb.) Calif.,
Nev., Utah.

114. *Eriogonum ochroleucum* Small (*E. ovalifolium* Small.)
Colo., Mont., Ida., Nev., Wyo.
115. *Eriogonum Ordii* S. Wats. Ariz., Utah.
116. *Eriogonum orendense* A. Nels. Utah, Wyo.
117. *Eriogonum orthocaulon* Small Alta., Colo., Ida., Nev.,
Utah.
118. *Eriogonum Ostlundi* M. E. Jones Utah.
119. *Eriogonum ovalifolium* Nutt. (*E. orthocaulon* Small; *E.*
dichroanthum Gand.; *E. ovali-*
folium nevadense Gandog.; *E.*
ovalifolium utahense Gandog.;
var. *purpureum* Nutt., *prolifer-*
um Wats.) Alta., Calif., Colo.,
Mont., N. M., Ida., Wash., Ariz.
120. *Eriogonum Palmeri* Wats. Calif., Utah.
121. *Eriogonum pannosum* Woot. & Standl. N. M.
122. *Eriogonum Parryi* A. Gray. Calif., Utah.
123. *Eriogonum pauciflorum* (Pursh) Nutt. (*E. parviflorum*
Nutt.) Colo., Nebr., S. Dak.,
Wyo.
124. *Eriogonum pharnaceoides* Torr. Ariz., N. M., Mex., Utah.
125. *Eriogonum pinetorum* Greene (*E. abertianum neomexica-*
num Gandog.) Ariz., Tex.
126. *Eriogonum Piperi* Greene. Mont., Wash., Wyo.
127. *Eriogonum Plumatella* Dur. & Hilg. Calif., Nev., Utah.
128. *Eriogonum polifolium* Benth. (*E. revolutum* Godding)
Ariz., Calif., Utah.
129. *Eriogonum polycladon* Benth. Ariz., Mex., Tex.
130. *Eriogonum polyphyllum* Small Alta., Mont., Ore.
131. *Eriogonum Porteri* Small Utah.
132. *Eriogonum proliferum* T. & G. (?*E. anserinum* Greene; *E.*
Cusickii Californicum Gandog.)
Ida., Wash., Calif.

133. *Eriogonum puberulum* S. Wats. Utah.
134. *Eriogonum pulvinatum* Small Ariz., Utah.
135. *Eriogonum pusillum* T. & G. Ariz., Calif., Nev., Utah.
136. *Eriogonum pyrolaefolium* Hook. Calif., Ida., Wash.
137. *Eriogonum racemosum* Nutt. (*E. orthocladon* Torr.)
Ariz., Colo., N. M., Tex., Utah.
138. *Eriogonum reniforme* Torr. (*E. prachens* Gandog. Bull.
Soc. Bot. Belg. 42:196. 1906; ?
E. collinum Stokes; Jones, Contr.
West. Bot. 11:15. 1903. var. *E.*
reniforme asarifolium. Gandog.
Bull. Soc. Bot. Belg. 42:196.
1906.) Ariz., Calif., Nev., Utah.
139. *Eriogonum rhodanthum* Nels. & Kenn. Nev.
140. *Eriogonum robustum* Greene Nev.
141. *Eriogonum Rosense* Nels. & Kenn. Nev., Calif.
142. *Eriogonum rotundifolium* Benth. Colo., Mex., N. M., Tex.
143. *Eriogonum rubicaule* Tidestrom, Nev.
144. *Eriogonum Rydbergi* Greene. (var. *umbellatum*, *clado-*
phorum, Gan., *rhomboidium* A. Nels.)
Wyo.
145. *Eriogonum salicum* Greene Colo.
146. *Eriogonum salinum* A. Nels. Colo., Wyo.
147. *Eriogonum salsuginosum* Hook. (*E. stenogonium salsugino-*
sum Nutt.) Colo., N. M., Utah,
Wyo.
148. *Eriogonum saxatile* Wats. Calif.
149. *Eriogonum scoparium* Small Colo., N. M.
150. *Eriogonum sericoleucum* Greene. Nev.
151. *Eriogonum Shockleyi* S. Wats. Nev., Utah.
152. *Eriogonum Simpsoni* Benth. (*E. effusum faliosum* Torr.,
(?) *effusum leptophyllum* Torr., *E.*

longchophyllum T. & G., E. nudicaule Small Torr., E. scoparium Small.) Ariz., Colo., Nebr., N. M.

153. *Eriogonum sphaerocephalum* Dougl. (*E. cupreum* Gand.)
Calif., Ida., Wash., Nev.
154. *Eriogonum spathulatum* A. Gray. (*E. Kearneyi* Tidest)
Utah.
155. *Eriogonum spergulinum* Gray. Calif., Nev.
156. *Eriogonum stellatum* Benth. Ariz., Calif., Colo., Ida.,
Ore., Utah, Wash., Nev.
157. *Eriogonum strictum* Benth. (*E. fruticosum* A. Nels.)
Utah.
158. *Eriogonum subalpinum* Greene (*E. umbellatum majus*
Benth.) Alta., B.C., Colo., Nev.
159. *Eriogonum subreniforme* S. Wats. Ariz., N. M., Utah,
Nev.
160. *Eriogonum suffruticosum* Wats. Tex.
161. *Eriogonum sulcatum* S. Wats. Ariz., N. M., Utah.
162. *Eriogonum tenellum* Torr. (var. *caulescens* T. & G.;
E. platyphyllum Torr.) Calif.,
Mex., Colo., N. M., Tex., Utah.
163. *Eriogonum tetraeuris* Small. Colo.
164. *Eriogonum Thomasii* Torr. Ariz., Calif., Colo., Mex.,
Utah.
165. *Eriogonum Thompsonae* S. Wats. Utah.
166. *Eriogonum Thurberi* Torr. Ariz., Calif.
167. *Eriogonum thymoides* Benth. Ida., Wash.
168. *Eriogonum tomentosum* Michx. Alabama, S. Car., Fla.
169. *Eriogonum Torreyanum* Gray. Calif.
170. *Eriogonum trichopodum* Torr. (*E. trichopes* Torr.) Calif.,
Mex., N. M., Tex., Utah.
171. *Eriogonum trinervatum* Small. Colo., Utah.

172. *Eriogonum triste* S. Wats. (*E. alatum glabriusculum* Torr.) Ariz., Colo., Neb., N. M., Tex., Utah.
173. *Eriogonum tristichum* Small Colo., Utah.
174. *Eriogonum truncatum* T. & G. Calif.
175. *Eriogonum turbinatum* Small. Ariz., Utah.
176. *Eriogonum umbellatum* Torr. (var. *intectum* A. Nels., *monocephalum* T. & G.; *E. marginale* Gand., *E. neglectum* Greene, Pitt.; *E. umbelliferum* Small., *E. Tolmieanum* Hook.) Calif., Colo., Ida., Ore., Tex., Utah, Wash., Wyo.
177. *Eriogonum umbelliferum* Small. Colo., Nev., Utah, Wyo.
178. *Eriogonum ursinum* Wats. Calif.
179. *Eriogonum villiflorum* A. Gray. Utah.
180. *Eriogonum vimineum* Dougl. (*E. coninum* Greene, *E. shoshonerse* A. Nels.; *E. leucocladon* Gandog.) Calif., Ida., Nev., Wash., Utah, Ariz.
181. *Eriogonum virgatum* Benth. (*E. roseum* Dur. & Hilg.) Calif.
182. *Eriogonum watsoni* Torr. & Gray. Nev., Calif.
183. *Eriogonum wetherilli* Eastw. Ariz., N. M., Utah.
184. *Eriogonum wrightii* Torr. (var. *subscaposum* Wats., *trachygonum* Torr.; *E. trachygonium* Torr.) Ariz., Calif., Colo., Mex., N. M., Tex., Utah.
185. *Eriogonum xanthum* Small Colo., Wyo.

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