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## A STUDY OF ALLOCARYA

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By CHARLES V. PIPER



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44

## PREFACE.

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The accompanying number of the Contributions, by Professor Charles V. Piper, of the Bureau of Plant Industry, United States Department of Agriculture, presents the results of a critical study of *Allocarya*, a genus of boraginaceous plants, natives chiefly of the western United States. From this territory 35 species have hitherto been described, two-thirds of these having been proposed by the late Edward L. Greene, who himself established the genus. The number is increased in the present paper to 79. The classification adopted is founded chiefly upon the diversity of sculpture and armature of the mature nutlets, these characters, though almost microscopic, being regarded as constant and diagnostic for the species, which in several of the groups are not distinguishable by evident superficial characters.

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# A STUDY OF ALLOCARYA.

BY CHARLES V. PIPER.

## INTRODUCTION.

The genus *Allocarya* of the family Boraginaceae was established by Dr. E. L. Greene in 1887<sup>1</sup> to embrace 18 species, nine of them newly proposed, most of the remainder having been included by Dr. Gray as a section (*Myosotideae*) first of *Eritrichium*<sup>2</sup> and later of *Krynitzkia*<sup>3</sup>. One species, *A. greenei*, was referred by Dr. Gray to a special section (*Echinoglochin*) under *Echinospermum*. The genus as delimited by Greene has been generally accepted as valid. It is best distinguished from allied genera by the ventrally keeled nutlets, which are attached basally or suprabasally to a low gynobase, and by having the lowermost leaves opposite. Dr. Greene indicated no type for the genus, but the first species in his treatment is *A. lithocarya* Greene.

Subsequent to the establishment of the genus 17 additional species have been proposed, 12 by Greene and one each by Howell, Jepson, Nelson, Brandege, and Piper. There have thus been described from North America 35 species, mostly from the Rocky Mountains and westward, but two occur eastward from the one hundredth meridian, one, apparently the same as *A. scopulorum* Greene at Devils Lake, North Dakota, and the other, *A. lonchocarpa*, in Aurora County, South Dakota. At least three of the North American species, besides one other, *A. mexicana* Macbride, very like the South American *A. linifolia* (Lehm.) Macbride, occur in Mexico. From Chile about ten species have been described, and from Australia one is recorded.

The species of *Allocarya* grow mostly in soil that is wet and muddy during the winter or spring, such as stream banks, lake shores, the bottoms of temporary pools, etc. Some species grow in strongly alkaline soil. Not uncommonly two or more species occur growing together, and as they are superficially very similar collectors have often confused two or more under a single collection number. Nothing is known of the fertilization of these plants, but Greene<sup>4</sup> writes, "My long continued field observations lead me to suspect them of

<sup>1</sup> Pittonia 1: 14. 1887.

<sup>3</sup> Proc. Amer. Acad. 20: 265. 1885.

<sup>2</sup> Proc. Amer. Acad. 10: 55. 1874.

<sup>4</sup> Pittonia 1: 11. 1887.



hybridizing freely in some localities, or, as most botanical writers would say, they are confluent or hard to define." The present studies have revealed no evidence of free intercrossing. The nutlet characters seem remarkably constant, and in mixed gatherings serve perfectly to segregate the species. Relying on the constancy of the nutlet characters in particular, it is necessary to recognize additional species.

A few species are widespread and abundantly represented in herbarium material, but many others are either very rare or very local, being known in a number of cases by only a single collection. It is apparent that much additional field work is necessary before the genus can be monographed satisfactorily.

The distinguishing characters of the species are not easily described, especially the various types of rugosity of the nutlets. When the nutlets are armed with slender bristles great care must be exercised in their examination, as the bristles are easily broken. The actual characters of such bristles can be seen only by use of a compound or a binocular microscope. The somewhat succulent species are as a rule readily distinguishable from those not at all succulent, albeit nearly all are very slender plants. There is rarely doubt in one's mind as to when the calyx is markedly accrescent, and in all known species this character is correlated with a somewhat succulent texture of the plant. In several of the groups the species are not distinguishable by any evident superficial characters. It is with reluctance that so many new species are recognized and proposed, but it seems the only logical treatment that will accord with the facts.

The annual species form a remarkably complete series of forms, the groups merging almost insensibly into one another. It is difficult to decide which characters are most important in tracing the phylogeny, but the structure of attachment of the nutlets appears of more profound significance than the form of the nutlet, the armature of its surface, or indeed any of the other characters. The groups with small ovoid nutlets and suprabasal scar are seemingly the most primitive, and it is not difficult to construct a diagram of the probable phylogeny. The evolution of the numerous forms is evidently very recent, and it is not improbable that the genus is in an active mutative state. The perennial *Molles* are not closely related to the annuals.

In the descriptions terms are used with the following significations: *rugulose*, for more or less continuous ridges which may be either even or dentate; *tuberculate*, for rounded prominences as high or nearly as high as the ridges; *papillate*, for projections like tubercles but taller and more slender; *granulate*, for the very fine, usually roundish elevations in the interspaces between the ridges. The epidermis of the nutlets may be perfectly smooth, or the epidermal cells may project



as conical, usually sharp muriculations (*muriculate*), conditions to be seen only with the microscope. *Glochidia* are trichomes with divergent cells or branches, usually only at the apex; when very small they can be seen clearly only with the microscope.

### SYSTEMATIC TREATMENT.

In the study of the genus the writer has had access to the materia in the U. S. National Herbarium (N); the Gray Herbarium (G); the Greene Herbarium (E); the herbarium of the California Academy of Sciences (C); the herbarium of the University of California (B); and the herbarium of Stanford University (S).

On account of the great confusion that has existed in the genus, a rather extensive list of specimens is cited. It should be borne in mind, however, that many collections are mixtures. Not infrequently the sheet of a particular number in one herbarium is entirely different from that in others.

### KEYS TO THE GROUPS AND SPECIES.

- Plants perennial; pubescence soft and dense.....I. *Molles*.
- Plants annual; pubescence stiff, strigillose, setulose, or hirsute.
  - Scar deeply excavate, half as long as the nutlet. (*A. scripta*, of the group *Humistratae*, may be sought here as the scar is large and excavate but only one-third as long as the nutlet.)
    - Nutlets armed with stout opaque bristles, these barbed their entire length, or the bristles obsolete on some nutlets in one species.....II. *Echinaceae*.
    - Nutlets unarmed, or the projections not barbed.....III. *Glyptocarpae*.
  - Scar not deeply excavate, sometimes large when basal.
    - Attachment and scar exactly basal; nutlets lanceoloid.
      - Nutlets armed with fine bristles.....IV. *Asperulae*.
      - Nutlets unarmed.....V. *Stipitatae*.
    - Attachment and scar not exactly basal, either oblique or clearly suprabasal.
      - Nutlets lanceoloid.....VI. *Lonchocarpae*.
      - Nutlets ovoid.
        - Nutlets armed with hyaline bristles or at least with short glochidia.
          - Calyx conspicuously accrescent.....VII. *Humistratae*.
          - Calyx not conspicuously accrescent.....VIII. *Penicillatae*.
        - Nutlets unarmed.
          - Bracts none.....IX. *Scoulerianae*.
          - Bracts present.
            - Ventral side of nutlets with a median sunken groove.....X. *Sulcatae*.
            - Ventral side of nutlets not with a median groove.
              - Corolla large, 4 to 5 mm. broad; pubescence spreading.
                - XI. *Cooperianae*.
              - Corolla small, 1 to 3 mm. broad; pubescence strigillose (except in *A. salsa* and *A. jucunda*).
                - Nutlets glossy, the epidermal cells not muriculate...XII. *Nitentes*.
                - Nutlets mostly dull, the epidermal cells muriculate.
                  - XIII. *Californicae*.



I. MOLLES. Perennials, sometimes rooting at the nodes in one or perhaps both species; pubescence dense, close, and soft; racemes bracteate; calyx but little accrescent; corolla large; nutlets broadly ovoid, unarmed, the epidermal cells smooth or minutely muriculate; scar suprabasal.

Nutlets shiny, the dorsal rugae thick and obtuse, the small interspaces scarcely or not at all granulate.....1. *A. mollis*.  
Nutlets dull, the dorsal rugae fine, the large interspaces conspicuously granulate.....2. *A. vestita*.

II. ECHINACEAE. Annuals; pubescence mostly strigillose and sparse; racemes bracteate; calyx somewhat spreading and moderately accrescent; corolla small; nutlets broadly ovoid, armed with stout opaque bristles, these divaricately barbed their entire length; scar deeply excavate, half as long as the nutlet.

Length of bristles about one-sixth the width of the nutlet.....3. *A. hystriola*.  
Length of bristles one-fourth or more of the width of the nutlet.

Dorsal surface of nutlet more or less rugulose-reticulate.

Reticulations few, large, irregular. Bristles mostly on the dorsal ridge and margins.....4. *A. acanthocarpa*.

Reticulations small and regular, each including 1 to 4 tubercles.

Bristles of the nutlet few, on some nutlets entirely lacking.

5. *A. oligochaeta*.

Bristles of the nutlet numerous.....6. *A. echinacea*.

Dorsal surface of the nutlet not at all rugulose.

Bristles only on the dorsal ridge and on the marginal angles of the nutlets.

Surface of nutlet coarsely granulate.....7. *A. austinae*.

Surface of nutlet smooth.....8. *A. cristata*.

Bristles covering the whole back of the nutlet.

Nutlets rugulose on the ventral surface.....9. *A. eastwoodae*.

Nutlets not rugulose on the ventral surface.....10. *A. greenii*.

III. GLYPTOCARPAE. Annuals; pubescence mostly strigillose and sparse; racemes bracteate; calyx somewhat spreading, moderately if at all accrescent; corolla various; nutlets broadly ovoid, unarmed, variously sculptured; scar deeply excavate, usually half as long as the nutlet.

Corolla 4 to 6 mm. broad. Calyx somewhat spreading, moderately accrescent; nutlet 2 mm. long, the back with very sharp prominent dentate ridges.

11. *A. glyptocarpa*.

Corolla very small.

Nutlets 2 mm. long, the back armed with about 20 slender erect smooth projections.....12. *A. spiculifera*.

Nutlets 1.5 mm. long, the back not armed as above.

Calyx strongly accrescent; dorsal ridges of the nutlets sharp and prominent, somewhat dentate.....13. *A. anaglyptica*.

Calyx scarcely accrescent; dorsal ridges of the nutlets low and obtuse.

Nutlets with many prominent papillae besides the finer granulations.

14. *A. papillata*.

Nutlets with few obscure granulations in the interspaces, not at all papillate.

Flowers widely distant; scar only one-third as long as nutlet; rugae coarse and transverse.....15. *A. distantiflora*.

Flowers not widely distant; scar half as long as nutlet; rugae not as above.

16. *A. microcarpa*.



IV. ASPERULAE. Annuals; pubescence strigillose; racemes bracteate; calyx various; corolla small; nutlets lanceoloid, armed with slender hyaline bristles, these mostly barbed or branched at tip; scar basal.

Plants conspicuously strigillose, slender-stemmed; calyx not conspicuously accrescent. Racemes rather dense.

Inflorescence with many bracts; bristles of nutlet mostly in tufts. 17. *A. nelsoni*.

Inflorescence with few bracts; bristles mostly solitary. 18. *A. oricola*.

Plants sparsely strigillose, rather fleshy; calyx conspicuously accrescent, thickened at base and holding the nutlets firmly.

Nutlets 4 times as long as broad; bristles mostly unbarbed on both surfaces of nutlet.

19. *A. leptoclada*.

Nutlets 2 to 3 times as long as broad; bristles barbed at tip.

Fruiting calyx 3 to 5 mm. long. Nutlets conspicuously bristly only on the back, the venter rugulose, granulate, and minutely bristly. 20. *A. divergens*.

Fruiting calyx 6 to 10 mm. long.

Nutlets bristly on both surfaces, rugulose beneath. 21. *A. asperula*.

Nutlets bristly only on dorsal surface, merely granulate beneath.

22. *A. wilcoxii*.

V. STIPITATAE. Annuals, rather succulent; pubescence strigillose or setulose; racemes bracteate (except in *A. leibergii*); calyx accrescent, thickened at base, holding the nutlets firmly; corolla various; nutlets lanceoloid, unarmed, variously sculptured; scar basal.

Pubescence of the leaves loose and spreading, that of the stem somewhat appressed; nutlets 2 mm. long. Scar large. 23. *A. setulosa*.

Pubescence all strigillose; nutlets 1.5 mm. long.

Corolla large, 5 to 7 mm. broad. 24. *A. stipitata*.

Corolla small, 2 to 4 mm. broad.

Plant very stout and fleshy. 25. *A. glabra*.

Plant not very fleshy.

Bracts none. Nutlets rugulose and granulate above, merely rugulose beneath.

26. *A. leibergii*.

Bracts present.

Nutlets tuberculate above, rugulose beneath. 27. *A. tuberculata*.

Nutlets rugulose above.

Scar very small. Nutlets merely rugulose beneath. 28. *A. orthocarpa*.

Scar large.

Nutlets rugulose and coarsely granulate beneath.

24a. *A. stipitata micrantha*.

Nutlets sparsely and faintly granulate beneath, not at all rugulose.

29. *A. charaxata*.

VI. LONCHOCARPAE. Annuals, inclined to be succulent; pubescence strigillose; racemes bracteate; calyx more or less accrescent; corolla small; nutlets lanceoloid, unarmed, variously sculptured; scar nearly basal but oblique.

Calyx slightly accrescent; flowers mostly bractless; nutlets faintly if at all rugulose beneath. 30. *A. ambigena*.

Calyx decidedly accrescent; flowers mostly bracteate; nutlets reticulate-rugulose beneath. 31. *A. lonchocarpa*.

VII. HUMISTRATAE. Annuals; pubescence strigillose, sparse; racemes bracteate; calyx conspicuously accrescent; corolla small; nutlets ovoid, armed with slender, hyaline, mostly tufted bristles, these barbed at the tip; scar suprabasal.

Interspaces of nutlet deep, smooth. 32. *A. scripta*.



Interspaces of nutlet not deep, granulate.

Nutlets not bearing hyaline bristles but densely covered with microscopic, nearly sessile glochidia.....33. *A. limicola*.

Nutlets covered with evident hyaline bristles, these mostly in tufts.

Bristle tufts few, mostly on the margins and dorsal keel; rugosities low, rather even.....34. *A. sigillata*.

Bristle tufts numerous on all the dorsal rugosities, the latter irregularly dentate.  
35. *A. humistrata*.

VIII. PENICILLATAE. Annuals, slender; pubescence strigillose; racemes bracteate; calyx not accrescent; corolla various, mostly small; nutlets ovoid, armed with hyaline bristles or nearly sessile glochidia; scar suprabasal, small.

Bristles short, not at all barbed or branched.....36. *A. cryocarpa*.

Bristles all or mostly barbed or branched at tip.

Corolla large, 4 to 5 mm. broad; racemes mostly bractless, rarely with one or two bracts.

Bristles of the nutlet very short, almost sessile; scar linear.....37. *A. gracilis*.

Bristles of the nutlet not very short; scar not linear.

Scar ovate; dorsum with about 20 papillae; bristles armed at tip...38. *A. laxa*.

Scar lanceolate; dorsum dentate-rugulose; bristles, except those on the ridges, unarmed.....39. *A. pratensis*.

Corolla small, 1 to 2 mm. broad; racemes with at least a few bracts.

Glochidia very short, sessile, the stalk scarcely evident.

Nutlets 1.5 mm. long, not conspicuously granulate; scar ovate.

40. *A. hispidula*.

Nutlets 1.2 mm. long, conspicuously granulate; scar linear to lanceolate.

41. *A. tenera*.

Glochidia longer, the hyaline stalk clearly evident.

Bristles merely barbed at tip, the most conspicuous ones in clusters on the prominent tubercles. Scar linear to lanceolate.....42. *A. penicillata*.

Bristles slender, all or most of them branched at tip like a deer horn.

Scar ovate-triangular, almost basal; inflorescence dense....43. *A. cervina*.

Scar narrowly pyriform, clearly suprabasal; inflorescence loose.

44. *A. ramosa*.

IX. SCOULERIANAE. Annuals, slender, mostly erect; pubescence strigillose or hirsute; racemes entirely bractless; corolla large; nutlets ovoid, unarmed, sculptured; scar suprabasal.

Pubescence spreading, at least on the calyx.

Racemes dense, the internodes about as long as the calyx; stems setose; epidermal cells of nutlet sharply muriculate, unicellular.....45. *A. hirta*.

Racemes loose, the internodes 2 to 4 times as long as the calyx; stems strigillose; epidermal cells of nutlets produced into short trichomes bearing minute apical cells.....46. *A. calycosa*.

Pubescence all appressed. Epidermal cells of nutlets all or some of them produced into short trichomes with minute apical cells.

Calyx spreading; epidermal muriculations of nutlet all multicellular.

47. *A. figurata*.

Calyx erect; epidermal muriculations of nutlet partly unicellular and partly multicellular.

Flowers 5 mm. broad; calyx scarcely ferruginous; scar and base of keel in a depression surrounded by a conspicuous ridge.....48. *A. vallata*.

Flowers 8 mm. broad; calyx ferruginous; scar and base of keel not in a depression.

49. *A. scouleri*.



X. SULCATAE. Annuals, slender; pubescence strigillose; racemes bracteate; calyx little or not at all accrescent; corolla small; nutlets ovoid, smooth or sculptured but not bristly, the keel or scar or both in a sunken median groove formed by the overarching sides of the nutlet, the keel sometimes completely concealed; scar suprabasal.

Groove completely closed, at most the edge of the keel exposed.

Nutlets smooth and shiny.....50. *A. lithocarya*.

Nutlets rugulose or granulate or both, dull.

Pedicels as long as the calyx or longer; corolla 5 to 6 mm. broad.

51. *A. chorisiana*.

Pedicels nearly all shorter than the calyx; corolla 2 to 3 mm. broad.

52. *A. hickmanii*

Groove open, very narrow to very broad, or incomplete, that is, evident only near the base.

Scar linear.

Corolla 5 to 6 mm. broad; pedicels mostly as long as the calyx, or longer.

51. *A. chorisiana*.

Corolla 1 to 3 mm. broad; pedicels all or mostly shorter than the calyx.

Groove narrow, deep, extending the whole length of the nutlet; nutlets sparsely rugulose but conspicuously granulate.....53. *A. myriantha*.

Groove very shallow, only the scar and base of keel sunken; nutlets closely rugulose with low obtuse ridges, not granulate.....54. *A. undulata*.

Scar ovate.

Corolla 3 mm. broad; pedicels all shorter than the calyx.

Nutlets minute, 0.6 to 0.7 mm. long.....55. *A. minuta*.

Nutlets larger.

Calyx lobes erect, barely exceeding the nutlets; nutlets 1.5 to 2 mm. long, rugulose and granulate.....56. *A. stricta*.

Calyx lobes spreading, twice as long as the nutlets; nutlets 1.5 mm. long, rugulose, not granulate.....57. *A. scalpta*.

Corolla 1 to 2 mm. broad; pedicels mostly short, a few of the lower ones elongate.

Nutlets shiny, the interspaces of the reticulations smooth...58. *A. reticulata*.

Nutlets dull, the interspaces conspicuously granulate.

Calyx setulose; racemes with few bracts.....59. *A. areolata*.

Calyx strigillose; racemes with many bracts, these mostly between the flowers.....60. *A. diffusa*.

XI. COOPERIANAE. Annuals; pubescence sparse, spreading; racemes bracteate; calyx not accrescent; corolla large, rotate; nutlets ovoid, shiny, sculptured but not bristly, the epidermal cells smooth; scar small, suprabasal.

One species.....61. *A. cooperi*.

XII. NITENTES. Annuals, slender; pubescence strigillose or setulose; racemes bracteate; calyx not accrescent; corolla small; nutlets ovoid, smooth or sculptured, not bristly, mostly glossy, the epidermis of the nutlets smooth or at most only a few of the epidermal cells muriculate; scar suprabasal, linear to ovate.

Nutlets not at all rugulose or granulate.....62. *A. nitens*.

Nutlets rugulose or granulate or both.

Pubescence all spreading.

Flowers densely crowded; dorsum coarsely granulate, obscurely rugulose; scar rather large.....63. *A. salsa*.

Flowers not densely crowded; dorsum coarsely granulate below and conspicuously rugulose above the middle; scar very small.....64. *A. jucunda*.



Pubescence all strigillose.

Scar linear to lanceolate.

Nutlets very glossy, 1.5 mm. long, the dorsal rugae low; scar linear to lanceolate.....65. *A. cusickii*.

Nutlets not very glossy, 1.2 mm. long, the dorsal rugae prominent; scar linear.....66. *A. inornata*.

Scar ovate.

Nutlets rugulose and tuberculate but not granulate; corolla 3 mm. broad.

67. *A. media*.

Nutlets rugulose and granulate; corolla 1 to 2 mm. broad.

Stems stout and stiffly spreading; nutlets moderately rugulose.

68. *A. divaricata*.

Stems not stout or stiffly divaricate; nutlets strongly rugulose.

69. *A. cognata*.

XIII. CALIFORNICAE. Annuals, mostly very slender; pubescence strigillose; racemes bracteate; calyx not accrescent (except in *A. plebeja*, *A. trachycarpa*, and *A. diffusa*); corolla small; nutlets ovoid, sculptured, not bristly, dull (except in *A. dispar* and *A. insculpta*), the epidermal cells of the nutlet all or mostly muriculate, none or at most a very few forming imperfect glochidia; scar suprabasal or in a few species nearly basal.

Scar ovate, somewhat excavate, one-fourth as long as the nutlet, the margins flange-like.

Ridges of the nutlet sharp and dentate.....70. *A. trachycarpa*.

Ridges of the nutlet not sharp or dentate.....71. *A. interrasisilis*.

Scar neither excavate nor with flangelike margins.

Interspaces between the ridges of the nutlet smooth or at most very obscurely granulate.

Calyx decidedly accrescent; nutlets dull.....72. *A. plebeja*.

Calyx not accrescent; nutlets somewhat glossy.

Nutlets constricted toward the tip, the dorsal ridges coarse and the interspaces small, rugulose beneath.....73. *A. insculpta*.

Nutlets not constricted toward the tip, the dorsal ridges fine and the interspaces large, not rugulose beneath.....74. *A. dispar*.

Interspaces granulate; calyx slightly if at all accrescent.

Scar almost basal, small, ovate.

Surface of the nutlets predominantly granulate, the ridges low and thin.

75. *A. granulata*.

Surface of the nutlets predominantly rugulose, the interspaces granulate.

76. *A. conjuncta*.

Scar clearly suprabasal.

Herbage almost glabrous; scar linear, minute.....77. *A. corrugata*.

Herbage decidedly strigillose; scar lanceolate or narrowly panduriform to ovate.

Corolla 3 mm. broad; nutlets tuberculate-rugulose.....78. *A. scalpocarpa*.

Corolla 1 to 2 mm. broad; nutlets rugulose, not at all tuberculate.

79. *A. californica*.

1. *Allocarya mollis* (A. Gray) Greene, Pittonia 1: 20. 1887.

*Krynitzkia mollis* A. Gray, Proc. Amer. Acad. 19: 89. 1883.

TYPE LOCALITY: "Sierra Valley, California, on alkaline wet flats and borders of ponds, Lemmon, 1874 to 1883."



## SPECIMENS EXAMINED:

CALIFORNIA: Sierra Valley, *Lemmon*, July, 1885 (N, E, C); *Lemmon*, in 1875 (N); *Lemmon* 53, in 1879 (G); *Lemmon* 498, in 1874 (G); *Lemmon*, in 1882 (G); *Leiberg* 5206, July 24, 1900 (N). Pitt River, *Austin* 1447 (N, G, E). Egg Lake, Modoc County, *M. S. Baker*, June 25, 1893 (E, B). Loyalton, *Eastwood* 7847, June 29, 1915 (C). Portola, *K. Brandegee*, July 30, 1911 (B.)

NEVADA: "Northwestern Nevada," *Lemmon* in 1875 (G).

OREGON: Near "P" Ranch, *Cusick* 2599, June 24, 1901 (N, E). Harney Valley, *Cusick* 2045, July 18, 1898 (N, E, G). Swan Lake Valley, *Applegate* 371, July 14, 1895 (N, G). Sprague River Valley near Yainax Bridge, *Coville & Leiberg* 320, August 10, 1896 (N). Keno, Klamath Valley, *Cusick* 2843, June 20, 1902 (N, G). Malheur Lake bottoms, *Griffiths & Morris* 733, August 1901 (N).

2. *Allocarya vestita* Greene, *Erythea* 3: 125. 1895.

*Allocarya mollis vestita* Jepson, Fl. West. Mid. Calif. 442. 1901.

TYPE LOCALITY: Petaluma, California. Type collected by J. W. Congdon in 1880.

## SPECIMENS EXAMINED:

CALIFORNIA: Petaluma, *Congdon*, July 2, 1880 (E, G, B). Visalia, *Congdon*, September, 1882 (G).

3. *Allocarya hystricula* Piper, sp. nov.

Annual; branches slender, decumbent, 30 to 45 cm. long, sparsely strigillose; leaves linear to linear-oblongate, acute, 1 to 2 cm. long, densely strigillose beneath, sparsely so above; flowers scattered, short-pedicel, many of the lower ones with bracts; calyx densely covered with somewhat appressed bristles, markedly accrescent, the lanceolate acute lobes becoming 5 to 6 mm. long, one-sixth to one-fourth as long as the internodes; corolla very small, not exceeding the calyx, less than 2 mm. broad; nutlets broadly ovoid, 2 mm. long, the dorsum obscurely ridged in the median line, densely covered with very short stout bristles, these armed their whole length with divaricate barbs and joined at their bases by mostly oblique ridges, the interspaces granulate, the venter keeled and obliquely rugulose but not bristly; scar large, ovate, sunken, half as long as the nutlet.

Type in the U. S. National Herbarium, no. 42063, collected on Montezuma Hills, Solano County, California, May 14, 1892, by W. L. Jepson.

## ADDITIONAL SPECIMEN EXAMINED:

CALIFORNIA: Elmira, *K. Brandegee*, May, 1883 (B).

Closely allied to *A. greenii* (A. Gray) Greene, but well distinguished by the very short, stout bristles of the nutlet, which are about one-sixth as long as the breadth of the nutlet.

4. *Allocarya acanthocarpa* Piper, sp. nov.

Annual, branched from the base, 10 to 15 cm. high; branches slender, simple, finely and sparsely strigillose; leaves narrowly oblanceolate, acutish, nearly glabrous above, strigillose beneath, 1 to 1.5 cm. long; racemes loose, the internodes 4 to 6 times as long as the calyces, many of the flowers leafy-bracteate; pedicels much shorter than the calyces; calyx spreading, the lance-linear lobes obtuse, 2.5 mm. long, densely strigillose, somewhat ferruginous at tip; corolla small, 1.5 mm. broad; nutlets pale, very angularly ovoid, as thick as broad, sharply acute, about 2 mm. long, the dorsal keel, margins, and dorsal ridges prominent and armed with stout opaque bristles, these retrorsely barbed on the upper half or for the whole length; dorsum with a keel two-thirds of the length, armed with 5 or 6 bristles, the prominent, almost continuous lateral margins with 3 or 4 bristles on each side, usually with 1 or 2 bristles on the most prominent intermediate dorsal ridge on each side, the interspaces



coarsely granular or tuberculate; venter coarsely reticulate-rugulose, not granulate, keeled from scar to apex; scar ovate, deeply excavate, half as long as the nutlet.

Type in the University of California Herbarium, no. 78207, collected at Caliente, California, by T. S. Brandegee.

**5. *Allocarya oligochaeta* Piper, sp. nov.**

Annual, branched from the base, the branches erect or ascending, 10 cm. long; stems slender, densely and loosely strigillose; leaves linear-oblongate, acutish, 1 to 2 cm. long, sparsely strigillose above, densely so beneath with rather long hairs; racemes loose, the internodes about 4 times as long as the fruiting calyces, the lower flowers leafy-bracted; pedicels shorter than the calyces; calyx lobes erect, lanceolate, densely strigillose on both sides, ferruginous when young, slightly accrescent, at length about twice as long as the nutlets; corolla small, about 2 mm. broad, barely exceeding the calyx; nutlets ovoid, 2 mm. long, sharply acute, the whole surface deeply reticulate with sharp ridges, these forming polygonal areoles each containing 1 to several tubercles, the dorsum sometimes bearing a few short bristles barbed for their whole length; venter keeled from the scar to the apex; scar ovate, somewhat excavate, half as long as the nutlet.

Type in the Gray Herbarium, collected in the San Joaquin Valley, California, April 23, 1884, by E. L. Greene.

ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Byron Springs, *Eastwood* 3808 (in part), March 14, 1892 (G, C).

Antioch, *Davy* 913, April 7, 1895 (B).

Closely allied to *A. echinacea* Piper, the sculpturing of the nutlet being very similar, but the bristles are very few, short, and irregular, or on some nutlets wanting. The pubescence of the plant also is much denser and longer.

**6. *Allocarya echinacea* Piper, sp. nov.**

Annual, erect or ascending, mostly few-branched from the base, 10 to 30 cm. high stems sparsely strigillose; leaves linear or linear-oblongate, mostly acute, glabrous or nearly so above, strigillose and somewhat pustulate beneath, 1 to 4 cm. long; racemes loose, some of the flowers leafy-bracted; pedicels mostly shorter than the calyx lobes; calyx lobes erect, lanceolate, acutish, densely strigillose beneath, slightly ferruginous when young, 5 to 6 mm. long; corolla barely exceeding the calyx, 2 to 3 mm. wide; nutlets 3.5 mm. long, ovoid, somewhat compressed above the middle, the dorsum densely granulate, prominently keeled, armed with numerous stout bristles about half as long as the width of the nutlet, these divaricately barbed their whole length and with their bases connected by ridges, the numerous areoles thus formed each containing 1 to 6 prominent tubercles; venter granulate and prominently keeled; scar deep, triangular, broadly flange-margined, lateral, over one-third as long as the nutlet.

Type in the U. S. National Herbarium, no. 440508, collected at University Heights, San Diego, California, April 12, 1902, by T. S. Brandegee (C. F. Baker, no. 825).

ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Duplicates of type (B, E, G). San Diego, *Brandegee*, in 1898 (N); *Parry & Jones*, March, 1882, in part (G); *Mary F. Spencer*, March 24, 1916 (B); *Brandegee*, April 22, 1894 (B). Alcalde, *Brandegee*, March 29, 1893 (B). San Marcos, *Cleveland*, April 21, 1882 (N). Livermore Valley, *Greene*, April 3, 1895 (N, E). Byron, *Greene*, March 24, 1889 (N, E). Byron Springs, *Eastwood* 3832 (N, G). Elmira, *Greene*, May 3, 1886 (G). Mariposa, *Congdon*, April 15, 1895, in part (S). Lewis, Mariposa County, *Congdon*, April 17, 1892 (B).

LOWER CALIFORNIA: Tijuana Valley, *Orcutt* 2261, March 31, 1886 (N).

Near *A. greenii* (A. Gray) Greene, but in that the bases of the bristles are entirely separate.



**7. *Allocarya austinae* Greene, Pittonia 1: 18. 1887.**

TYPE LOCALITY: Butte County, California. Type collected by Mrs. R. M. Austin in 1883.

## SPECIMENS EXAMINED:

CALIFORNIA: Butte County, *Austin*, in 1883 (B, G, C), in 1896 (B). Shasta, *Parry*, in 1887 (N). Adobe flats, Little Chico, *Austin* (N). Adobe land east of Chico, *Austin*, April, 1896 (E). Plains east of Chico, *Austin* 627, May, 1896; mixed with *A. stipitata* (N). Chico, *Parry*, April 14, 1887 (E). Stoney Creek, Amador County, *Hansen* 1610 (N). Marysville Buttes, *Heller* 11272 (E). Millville Road near Redding, *M. S. Baker*, in 1896 (E).

**8. *Allocarya cristata* Piper, sp. nov.**

Annual, erect or ascending, simple or branched from the base, 5 to 8 cm. high; stems very sparsely strigillose; leaves linear, acute, 0.5 to 2 cm. long, glabrous above, sparsely strigillose beneath, pustulate-strigillose on the margins; racemes few-flowered, bracteate, densely ferruginous-strigillose; pedicels shorter than the calyces; calyx lobes erect, lanceolate, acutish, about 4 mm. long, little exceeding the nutlets; corolla not seen; nutlets 3 mm. long, angularly ovoid, strongly compressed above the middle, the dorsum nearly smooth, somewhat shiny, keeled with a high narrow ridge bearing 4 to 6 stout bristles, these divaricately barbed their whole length, 1 or 2 similar bristles on each margin near the middle, sometimes a single similar bristle on each margin near the apex, the venter coarsely rugulose, prominently keeled; scar lateral, triangular, deep, nearly half as long as the nutlet.

Type in the herbarium of the California Academy of Sciences, collected at Mokelumne Hill, Calaveras County, California, by F. E. Blaisdell.

A remarkable species, allied to *A. austinae* Greene.

**9. *Allocarya eastwoodae* Piper, sp. nov.**

Annual, erect, simple or sparingly branched from near the base, 10 to 15 cm. high; stems very sparsely strigillose; leaves linear-ob lanceolate, acute, glabrous above, strigillose beneath, 1 to 2 cm. long; racemes loosely few-flowered, bracteate below; pedicels shorter than the calyces; calyx lobes lanceolate, strigillose, spreading in fruit, scarcely accrescent, at length 2 mm. long, one-sixth to one-fourth as long as the internodes; corolla minute, not longer than the calyx, 1 mm. broad; nutlets broadly ovoid, 1.5 mm. long, the dorsum convex, strongly keeled, sparsely granulate and bearing about 30 slender separate bristles, these divaricately barbed their entire length, the venter conspicuously rugulose but not bristly, keeled from the scar to the tip; scar broadly ovate, deep, flange-margined, one-half as long as the nutlet.

Type in the U. S. National Herbarium, no. 880534, collected at Guernsey, Tulare County, California, March 25, 1914, by Miss Alice Eastwood (no. 3896).

Very closely allied to *A. greenei*, but differing in having the smaller nutlets rugulose beneath. The type specimens are probably smaller than normal. Specimens of the same collection are in the herbarium of the California Academy of Sciences and in the Gray Herbarium.

**10. *Allocarya greenei* (A. Gray) Greene, Bot. San Fran. Bay 259. 1894.**

*Echinospermum greenei* A. Gray, Proc. Amer. Acad. 12: 163. 1877.

*Allocarya echinoglochin* Greene, Pittonia 1: 15. 1887.

TYPE LOCALITY: "About Yreka, Siskiyou Co., in the northern part of California. 1876, E. L. Greene."

## SPECIMENS EXAMINED:

CALIFORNIA: Yreka, *Greene*, May 2, 1872 (type); *Butler* 668, April 30, 1909 (B). Shasta, *Parry*, in 1887 (N). Amador County, *Hansen* (E). Stoney Creek, *Hansen* 1610 (N, S). Chico, (*Mrs. R. M. Austin?*) 627, May, 1896, mixed



with *A. stipitata* (N). Mokelumne Hill, Calaveras County, *Blaisdell* (C). Between Shingle Springs and El Dorado, *Heller* 12293, April 7, 1911 (G). San Diego, *O. W. Knight*, March, 1892 (G); *Jones*, March 15, 1882 (G). Eight miles south of Oroville, *Heller* 11266, April 6, 1914 (G, E, S). Marysville Buttes, *Heller* 11272, April 8, 1914 (G). Folsom, *K. Brandegee*, June, 1893 (B). Rose Springs, *M. H. Gates*, in 1879 (B). Ione, *Brandegee*, May, 1890 (B).

OREGON: Southern Oregon, *Howell* 220, in 1884 (G). Rogue River Valley, *Howell*, April 16, 1887 (E).

**11. *Allocarya glyptocarpa* Piper, sp. nov.**

Annual, erect, branched from the base, about 30 cm. high; stems slender, shiny, very sparsely strigillose; leaves linear to lance-linear, obtusish, glabrous above, sparsely strigillose beneath, 2 to 5 cm. long; racemes subsecund, very loose, the internodes 4 to 6 times as long as the fruiting calyces, some of the lower flowers leafy-bracted; calyx lobes somewhat spreading, lanceolate, strigillose on both sides, ferruginous when young, somewhat accrescent, at length twice as long as the nutlets; corolla about 4 mm. broad, well exceeding the calyx; nutlets pale, ovoid, 2 mm. long, the dorsum keeled toward the apex, sharply rugulose with about 7 exactly transverse, somewhat dentate ridges, obscurely granulate in the grooves, the venter merely rugulose, keeled from the scar to apex; scar ovate, deep, flange-margined, half as long as the nutlet.

Type in the Gray Herbarium, collected in moist cultivated ground, eight miles north of Oroville, California, March 16, 1914, by A. A. Heller (no. 11202). Also collected, without locality, by Mrs. R. M. Austin, in 1898 (B).

**12. *Allocarya spiculifera* Piper, sp. nov.**

Annual, branched from the base, the slender branches spreading or ascending, 10 to 20 cm. long; stems rather densely strigillose; leaves linear-ob lanceolate, acutish, nearly glabrous above, pustulate-strigillose beneath, 1 to 3 cm. long; racemes loose, the lower flowers leafy-bracted, the internodes 2 to 5 times as long as the calyces; pedicels shorter than the calyces; calyx lobes erect, narrowly lanceolate, acute, densely strigillose on both sides, somewhat accrescent, at length twice as long as the nutlets; corolla very small, not exceeding the calyx; nutlets 2 mm. long, ovoid, pungently acute, the dorsum keeled its whole length, densely granulate, studded with stiff slender papillae, these more or less joined by connecting ridges, the venter merely rugulose, keeled from the scar to the apex; scar triangular-ovate, deeply excavate, flange-margined, half as long as the nutlet.

Type in the U. S. National Herbarium, no. 880547, collected between Earlimart and Delano, Tulare County, California, March 26, 1914, by Miss Alice Eastwood (no. 3939).

Specimens of the same collection are in the Gray Herbarium and in the herbarium of the California Academy of Sciences.

ADDITIONAL SPECIMEN EXAMINED:

CALIFORNIA: Goshen, "*B*" (=Brandegee?), May, 1891, in part (B).

**13. *Allocarya anaglyptica* Piper, sp. nov.**

Annual, branched from the base, the branches 10 to 20 cm. long; stems strigillose; leaves oblong-linear or somewhat oblanceolate, acutish, nearly glabrous above, densely strigillose beneath, 1 to 3 cm. long; racemes loose, the internodes in fruit 4 to 6 times as long as the calyces, the lower flowers leafy-bracted; calyx strongly accrescent, spreading, strigillose, the lance-linear lobes acute, at length 4 to 6 mm. long; corolla very small, barely exceeding the calyx; nutlets strongly ovoid, 1.5 mm. long, very acute, the dorsum convex, keeled its whole length, transversely rugulose with low



sharp dentate ridges, densely granulate in the interspaces, the venter strongly rugulose, keeled from the scar to the apex; scar ovate, deep, half as long as the nutlet.

Type in the herbarium of the California Academy of Sciences, collected between Earlimart and Delano, Tulare County, California, March 26, 1914, by Miss Alice Eastwood (no. 3939, in part).

**14. *Allocarya papillata* Piper, sp. nov.**

Annual, branched from the base, the branches spreading or ascending 15 to 25 cm. long; stems slender, sparsely strigillose; leaves linear, acutish, nearly glabrous above, strigillose and more or less pustulate beneath, 2 to 4 cm. long; racemes loose, the internodes in fruit 4 to 6 times as long as the calyces, some of the flowers leafy-bracted; pedicels shorter than the calyces; calyx but little accrescent, strigillose, the lance-linear lobes attenuate and acutish; corolla very small, barely extruding; nutlets broadly ovoid, sharply acute, the dorsum keeled its whole length, transversely rugulose with low broken ridges, strongly papillate (especially on the margins and keel), the interspaces granulate, the venter merely rugulose, prominently keeled from scar to apex; scar ovate, excavate, half as long as the nutlet.

Type in the herbarium of the California Academy of Sciences, collected at Delano, Tulare County, California, March 26, 1914, by Miss Alice Eastwood (no. 3965).

ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Roseville, *K. Brandege*, May, 1884 (B). Goshen, "*B.*" May, 1891, in part (B).

**15. *Allocarya distantiflora* Piper, sp. nov.**

Annual, not succulent, branched from the base; branches mostly simple, erect, 15 to 20 cm. high, loosely and sparsely strigillose; leaves linear-lanceolate, 1 to 2 cm. long, loosely strigillose or setulose on both sides; stems flowering almost from the base, the internodes 5 to 15 times as long as the calyces; bracts several; pedicels shorter than the calyces; calyx densely setulose, not accrescent, the lanceolate, acutish, somewhat spreading lobes about 3 mm. long; corolla small, barely exceeding the calyx, 1 to 2 mm. broad; nutlets ovoid, dull, much constricted above the middle, acute, sharply and dentately angular, 1.5 mm. long, the dorsum dentately keeled its entire length, coarsely and closely transverse-rugulose, the venter similarly rugulose, the edges somewhat inflexed over the scar, keeled from the scar to the apex; scar oval, excavate, one-third as long as the nutlet.

Type in the University of California Herbarium, no. 78229, collected at Madera, California, April, 1888, by P. S. Buckminster.

**16. *Allocarya microcarpa* Piper, sp. nov.**

Annual, much branched from the base, the branches procumbent to ascending, 6 to 12 cm. long; stems strigillose; leaves linear, acutish to obtuse, glabrous or nearly so above, sparsely strigillose beneath, 1 to 3 cm. long; racemes loose, the lower flowers leafy-bracteate; pedicels shorter than the calyces; calyx lobes narrowly lanceolate, acutish, hispidulous, not accrescent, at length 3 mm. long; corolla minute, barely exceeding the calyx; nutlets angularly ovoid, dull, 1.2 mm. long, nearly as thick as broad, the dorsum faintly keeled its entire length, rugulose with low, thick, rather even ridges, faintly granulate in the interspaces, the venter rugulose, keeled from scar to apex; scar ovate, excavate, half as long as the nutlet.

Type in the Gray Herbarium, collected at Mariposa, California, May 10, 1897, by J. W. Congdon (no. 48).

ADDITIONAL SPECIMEN EXAMINED:

CALIFORNIA: Mariposa, *Congdon*, April 15, 1895, mixed with *A. echinacea* (S).

In general appearance this species much resembles *A. californica* (Fisch. & Mey.) Greene, but the nutlets ally it with a very different group.



**17. *Allocarya nelsonii* Greene, Erythea 3: 48. 1895.**

TYPE LOCALITY: Silver Creek, Wyoming. Type, in the Greene Herbarium, collected by A. Nelson (no. 1198), August 26, 1894.

## SPECIMENS EXAMINED:

WYOMING: Silver Creek, *Nelson* 1198 (E, G, N). Duck Creek, Albany County, *Nelson* 7462 (G, N).

ROCKY MOUNTAINS: *E. Hall*, raised from seed (G); *Hall & Harbour* 433, in part (G).

**18. *Allocarya oricola* Piper, sp. nov.**

Annual, branched from the base, the ascending branches 10 to 25 cm. long, strigillose; leaves linear-ob lanceolate, acutish, glabrous or nearly so above, strigillose beneath, 1 to 2 cm. long; racemes subsecund, a few of the flowers bracted; pedicels very short; calyx very sparsely setulose, markedly accrescent, becoming thickened at base, at length 5 to 7 mm. long, mostly one-third to one-half as long as the internodes; corolla minute; nutlets lanceoloid, 2 to 5 mm. long, the dorsum keeled only near the tip, tuberculate and obliquely rugose, bearing slender bristles, these barbed near the tip, the venter keeled its whole length, granulate and bristly; scar basal, roundish, flange-margined.

Type in the U. S. National Herbarium, no. 543877, collected at Shoshone, Lincoln County, Idaho, July 18, 1911, by A. Nelson and J. F. Macbride (no. 1170). Specimens of the same collection are in the Gray Herbarium and the herbaria of Stanford University and the University of California. No. 1167 of the same collectors, from the same locality, also is of this species.

Very near *A. leptoclada* Greene but the bristles of the nutlet are very different.

**19. *Allocarya leptoclada* Greene, Pittonia 3: 109. 1896.**

TYPE LOCALITY: Pine Creek, Nevada. Type, in the Greene Herbarium, collected by E. L. Greene, July 20, 1896.

Known only from the original collection.

**20. *Allocarya divergens* Piper, sp. nov.**

Annual, somewhat succulent, divergently branched from the base, the branches stiff and straight, very sparsely strigillose, 10 to 20 cm. long; leaves narrowly linear, glabrous above, very sparsely setulose beneath, 2 to 4 cm. long; racemes very loose, subsecund, some of the flowers bracteate; pedicels very short; calyx very sparsely strigillose, accrescent, at length firm, the lobes becoming 3 to 5 mm. long, mostly about one-fourth as long as the internodes; corolla exceeding the calyx, 1 mm. broad; nutlets ovoid, 1.5 mm. long, the venter sparsely rugulose, finely granulate, minutely bristly, keeled its whole length, the dorsum keeled distinctly near the apex and obscurely toward the base, densely granulate and rugulose, the ridges uneven with tubercle-like elevations bearing solitary or rarely grouped but separate bristles, these barbed near the tip; scar rotund, basal, somewhat stipitate.

Type in the U. S. National Herbarium, no. 880492, collected at Corcoran, Tulare County, California, March 24, 1914, by Miss Alice Eastwood (no. 2874). Specimens of the same collection are in the Gray Herbarium and the herbarium of the California Academy of Sciences.

## ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: San Diego, *Greene*, May, 1885 (G). Elsinore Lake, Riverside County, *Johnston* 1981, April 27, 1918 (G).

LOWER CALIFORNIA: Northern part, *Orcutt* 2260, April 21, 1886 (N, B).

The San Diego specimen might be considered the type of *A. humistrata* Greene, since it is labeled *A. humistrata* by Dr. Greene, but the original description of that species agrees much better with a specimen from Antioch, which also was included



**21. *Allocarya asperula* Piper, sp. nov.**

Annual, somewhat succulent, the stems erect or ascending, simple or sparingly branched, 10 to 30 cm. high, very sparsely strigillose; leaves linear, glabrous above, strigillose beneath, 1 to 2 cm. long; racemes at length very loose, subsecund, most of the flowers bracteate; pedicels very short; calyx sparsely setulose, markedly accrescent, becoming 5 mm. long, about one-sixth as long as the internodes; corolla minute; nutlets lanceoloid, 2.2 to 2.5 mm. long, 1 mm. broad, compressed and reduced above the middle, the dorsum keeled one-third to one-half its length, densely granulate and sharply rugose-reticulate, bristly on the ridges (especially toward the tip), the slender bristles scattered or in penicillate tufts of 2 to 4, all armed near the tip with short divaricate barbs, the venter keeled, granulate in faint lines or ridges as well as bristly; scar nearly basal, ovate, flange-margined.

Type in the U. S. National Herbarium, no. 219624, collected near Cypress Hills, Saskatchewan, July 26, 1880, by John Macoun.

## ADDITIONAL SPECIMENS EXAMINED:

SASKATCHEWAN: Cypress Lake, *Macoun* 5805, June 30, 1894 (G).

WYOMING: Fort Bridger, *Porter*, July 11, 1873 (G).

NEVADA: Clover Mountains, *Watson* 851, in part, September, 1868 (G).

Closely related to *A. leptoclada* Greene, but the nutlet bristles of that are not barbed. The last two specimens cited were included by Dr. Gray in his *Krynitzkia californica* var. *subglochidiata*.

**22. *Allocarya wilcoxii* Piper, sp. nov.**

Annual, succulent, much branched from the base, the ascending branches 8 to 15 cm. long, very sparsely strigillose; leaves linear-oblongate, glabrous above, pulvinate-setulose beneath, 1 to 2 cm. long; racemes moderately loose, subsecund, some of the flowers bracted; pedicels very short and stout; calyx firm, erect, markedly accrescent and becoming thickened, the lobes sparsely pulvinate-setulose, at length 5 to 6 mm. long, mostly more than half as long as the internodes; nutlets ovoid, trigonous, 2 mm. long, the dorsum keeled at tip, obliquely rugulose and tuberculate, bearing fine solitary bristles, these barbed at tip, the venter densely granulate, not bristly, keeled its entire length; scar basal, broad, flange-margined.

Type in the U. S. National Herbarium, no. 42062, collected in Idaho, in 1883, by T. E. Wilcox.

General Wilcox informs me that the specimen was collected near Fort Boise.

**23. *Allocarya setulosa* Piper, sp. nov.**

Annual, branched from the base, the branches spreading to nearly erect, 10 to 20 cm. long; stems sparsely setulose; leaves linear-oblongate, acutish or obtuse, pustulate-setulose on both sides, 1 to 4 cm. long; racemes dense, 5 to 10 cm. long, some of the flowers leafy-bracted, only the lower internodes becoming longer than the fruiting calyces; pedicels shorter than the calyces; calyx lobes lanceolate, acute, strongly setulose, little accrescent, at length 4 to 5 mm. long; corolla small, slightly exceeding the calyx; nutlets lanceoloid, acute, dull, 2 mm. long, the dorsum faintly keeled above the middle, transversely rugulose with low ridges except at base, coarsely granulate in the interspaces and especially toward the base, the venter obliquely and finely rugulose as well as granulate; scar exactly basal, the margins flangelike.

Type in the U. S. National Herbarium, no. 404831, collected near Fort Klamath, Oregon, August 7, 1894, by J. B. Leiberger (no. 659). Specimens of the same collection are in the Gray Herbarium and in the herbaria of the University of California and the California Academy of Sciences.

## ADDITIONAL SPECIMENS EXAMINED:

OREGON: *Howell* 45, in 1880 (N).

WASHINGTON: Klickitat, *Howell* 295, in 1880 (G).

There is a possibility that this is *A. bracteata* Howell, but Howell's description does not apply, and no authentic specimens of that species have been located.



**24. *Allocarya stipitata* Greene, Pittonia 1: 19. 1887.**

TYPE LOCALITY: "In the central part of California." Greene included in his description both the large-flowered plant here considered typical *A. stipitata* and the smaller-flowered plant now separated as *A. stipitata micrantha*. Three specimens are marked "type" in the herbarium of the University of California, according to Mrs. T. S. Brandege, as follows: Vallejo, *Greene*, April 20, 1874; Antioch, *Mrs. Brandege*, April, 1883; Elmira, *Greene*, May 3, 1886. The last specimen is small-flowered, the two others large-flowered.

## SPECIMENS EXAMINED:

CALIFORNIA: Elmira, *C. F. Baker* 2894, in part (E); *Greene*, May 5, 1890 (N); *Greene*, May 3, 1886 (G); *Curran*, April, 1884 (N); *K. Brandege*, May 3, 1909 (B). Byron, *C. F. Baker* 2799, April 27, 1903 (N, E, G); *Eastwood* 3822, March 14, 1914 (N, C, G); *Eastwood* 3777, March 14, 1914 (N, C, G); *Greene*, May 23, 1889 (E); *Greene*, March 24, 1889 (E); *Bioletti*, in 1892 (E). Antioch, *Greene*, April 7, 1895 (E); *K. Brandege*, May, 1889 (B); *Curran*, April, 1883 (E); *K. Brandege* (B), a strongly fasciated, very succulent plant. Chico, *Austin*, April, 1896 (E, B); *Austin* 1928, May, 1897 (N, S); *Bidwell*, in 1879 (G). Nine miles from Chico, *Heller* 11317, April 27, 1894 (E, G, S, B). Livermore, *Greene*, in 1895 (E). Vallejo, *Greene* 105, April 20, 1874 (B, G). Sacramento Valley, *Greene*, May, 1883 (N). Lower Sacramento, *Greene*, May, 1890 (E). Clear Creek, Butte County, *Brown* 162, 165, April 15, 1897 (N). Fairfield, *Heller & Brown* 5377, April 26, 1902 (N, G, S). Colusa County, *Curran*, May, 1885 (G). Suisun, *Greene*, in 1886, in part (G). Anderson, *W. W. Jones* 265, April 5, 1910 (G). Benicia, *W. W. Jones* 213a, April 7, 1914 (G). Midway, Alameda County, *Greene*, May 3, 1895 (E). Taylor Mountain, Sonoma County, *M. S. Baker*, in 1898 (E). Crescent Mills, Plumas County, *Austin*, April, 1896 (E). Pitt River, *L. E. Smith* 13, March 28, 1913 (C). Goose Valley, *Eastwood* 747, in 1912 (C). Without locality, *Kellogg & Harford* 355 (C), 722 (N). Butte Creek, *Austin* 626, April 7, 1896 (B). Brentwood, *K. Brandege*, May, 1892 (B). Elk Grove, *Drew*, April, 1882 (B). Colusa, *K. Brandege*, April, 1889, in part (B); *Mrs. Summers* (B). Butte County, *Mrs. E. Miles*, in 1887 (B). Hollister, *Setchell*, April 14, 1897 (B). College City, *Miss M. Alice King*, in 1905 (B). Sutter Plains, *Jepson*, April 10, 1891 (B). French Camp, *Sanford* 101 (B). Napa Junction, *Sonne*, April, 1887 (B). Eldorado to Placerville, *Heller* 12303, April 7, 1911 (S). Williams, *Ferris* 533, April 12, 1917 (S). Dunnigan, Yolo County, *Ferris* 701, April 20, 1917 (S).

**24a. *Allocarya stipitata micrantha* Piper, subsp. nov.**

Corolla small, 2 to 4 mm. broad; otherwise as in the species.

Type in the U. S. National Herbarium, no. 42061, collected at Stockton, California, April 28, 1889, by E. L. Greene.

## SPECIMENS EXAMINED:

CALIFORNIA: Tres Pinos, San Benito County, *Eastwood* 6917, May 14, 1918 (C). Blockman's Ranch, Mariposa County, *Eastwood* 4307, April 18, 1915 (C). Merced, *Eastwood* 4396, 4396a, April 23, 1915 (C). Zimmerman's, Contra Costa County, *Brewer* 1188, July 31, 1862, unusually fleshy and the branches fasciated (N, B). Bethany, *C. F. Baker* 2788, April 27, 1903 (N, G, E). Antioch, *Heller* 8885, April 16, 1908 (N, G, S); *Curran*, May 9, 1886 (G); *Davy* 946, April 7, 1895 (B). Angel Island, *W. F. Schmidt*, in 1913 (N). Six miles north of Chico, *Heller* 11470, May 30, 1914 (G, E, S). Madrone, *Jepson*, June 1, 1896 (G). Fairfield, *Heller & Brown* 5375, April 26, 1902 (G, N, S). Chapman Schoolhouse, Mariposa County, *Congdon* 53, very slender, with scarcely accrescent calyx (G). Sacramento Valley, *Greene*, May, 1883 (E).



Elmira, Curran, May, 1885 (G); Greene, May 3, 1886 (B); C. F. Baker 2894, in part (E); K. Brandegee, May 3, 1909 (B); K. Brandegee, April, 1883 (B). Mendota, Dudley, April 19, 1903 (S). Sacramento, Edna Hannibal, April 7, 1918 (S). Wallace, McMurphy, May 28, 1914 (S). Williams, Ferris 534, April 12, 1917 (S). Hollister, Setchell, April 14, 1897 (S). Byron, K. Brandegee, April, 1887 (B). Boca, K. Brandegee (B). Colusa, K. Brandegee, April, 1889, in part (B). Campo, San Diego County, Parish 10814, May 9, 1916 (B). Yosemite Valley, Hall 8875, June 7, 1911 (B). Stockton, H. P. Fitch, April 25, 1889 (B). Suisun, K. Brandegee, May 3, 1892 (B). Goshen, Setchell, June 23, 1897 (B).

LOWER CALIFORNIA: Northern Lower California, Orcutt 2259, April 6, 1886 (N).

Dr. Greene included this in his original description of *A. stipitata*, but it has seemed most consistent to consider the large-flowered plant as the type he had in mind. Intergrades are apparently rare between the two, but the nutlet characters are identical.

25. *Allocarya glabra* (A. Gray) Macbride, Proc. Amer. Acad. 51: 543. 1916.

*Lithospermum glabrum* A. Gray, Proc. Amer. Acad. 17: 227. 1882.

*Allocarya salina* Jepson, Fl. West. Mid. Calif. 442. 1901.

TYPE LOCALITY: "Arizona, Lemmon," but this is in all probability an error, according to Mrs. Brandegee (Zoe 5: 94). Type of *A. salina* (not examined) collected on "margin of salt marshes, Alvarado," California.

SPECIMENS EXAMINED:

ARIZONA: Apache Pass, Lemmon 485, in 1881 (G).

CALIFORNIA: Los Gatos, Evelina Cannon, June, 1894 (C). Mount Eden, K. Brandegee, June 16, 1893, and April 17, 1890 (B).

*Allocarya glabra* and the unusually succulent forms of *A. stipitata micrantha* may be distinguished by the nutlet characters, as follows:

*A. glabra*.—Nutlets finely and obscurely granulate beneath, their margins rather sharp and with a conspicuous entire narrow border.

*A. stipitata micrantha*.—Nutlets coarsely and conspicuously granulate beneath, their margins not acute but with an obscure, not entire border.

26. *Allocarya leibergii* Piper, sp. nov.

Annual, somewhat succulent, branched below, the ascending branches 15 to 30 cm. long, minutely strigillose; leaves linear, glabrous above, pulvinate-setulose beneath, about 2 cm. long; racemes bractless, subsecund, rather closely flowered, the fruiting calyces nearly as long as the internodes; calyx setulose, not pulvinate, somewhat accrescent, the lobes erect, at length 3 to 5 mm. long; nutlets broadly lanceoloid, abruptly compressed above the middle, 2 to 2.2 mm. long, the dorsum keeled near the tip, rugulose and granulate, the venter keeled its entire length and reticulately rugulose; scar basal, rounded, flange-margined.

Type in U. S. National Herbarium, no. 621087, collected at margins of summer pools, Medford, Oregon, June 18, 1899, by J. B. Leiberg (no. 4120).

27. *Allocarya tuberculata* Piper, sp. nov.

Annual, somewhat succulent, branched from the base, the ascending branches minutely and very sparsely strigillose, 10 to 30 cm. long; leaves oblanceolate, obtuse, sparsely strigillose on both sides, 1 to 2 cm. long; racemes subsecund, loosely flowered, bracteate below, the fruiting calyces mostly one-fourth as long as the internodes; pedicels very short and stout; calyx sparsely strigillose, decidedly accrescent, becoming thickened, the lobes erect or curved, at length 4 to 5 mm. long; nutlets lanceoloid, somewhat compressed above the middle, 2.3 mm. long, the dorsum keeled half its length and tuberculate, the venter obscurely rugulose; scar basal, round, somewhat stipitate.



Type in the U. S. National Herbarium, no. 404778, collected at Pine Creek, Gilliam County, Oregon, altitude 740 meters, June 7, 1894, by J. B. Leiberger (no. 166). Specimens of the same collection are in the Gray Herbarium and in the herbaria of Stanford University and the University of California.

**28. *Allocarya orthocarpa* Greene, Pittonia 4: 235. 1901.**

TYPE LOCALITY: "Cache Valley, Utah, *Miss Mulford*." Type in the Greene Herbarium.

SPECIMENS EXAMINED:

UTAH: Type specimen, as above. Great Salt Lake, *Coulter*, in 1872 (N).

COLORADO: Middle Park, *Parry* 4, in 1864 (G). Golden, *Greene*, June 4, 1870 (G).

MONTANA: Lower Sand Coulee, *Williams* 777 (N). Midvale, *Umbach* 298 (N).

WASHINGTON: Klickitat, *Howell* 336, June, 1879 (G). Tshimikaine, *Geyer* 548, in part (G).

**29. *Allocarya charaxata* Piper, sp. nov.**

Annual, branched from the base, somewhat succulent, the branches mostly simple, divergent or ascending, 10 to 25 cm. long; stems sparsely strigillose; leaves linear, slightly broader toward the tip, obtuse or acute, glabrous above, sparsely strigillose beneath, 2 to 5 cm. long; racemes loose, the internodes about 4 times as long as the calyces, the lower flowers leafy-bracteate; pedicels shorter than the calyces; calyx moderately accrescent, at length 5 mm. long, the lobes erect, lanceolate, obtuse, sparsely strigillose; corolla 1.5 mm. broad; nutlets lanceoloid, 1.7 mm. long, the dorsum keeled from about the middle, rugulose with prominent transverse broken ridges except at base, the interspaces sparsely granulate, the venter keeled, sparsely granulate, not at all rugulose; scar basal, triangular, variable in size in the same cluster, sometimes flange-margined.

Type in the U. S. National Herbarium, no. 880527, collected at Guernsey, Tulare County, California, March 25, 1914, by Alice Eastwood (no. 3881, in part). Specimens of the same collection are in the herbarium of the California Academy of Sciences and in the Gray Herbarium.

**30. *Allocarya ambigens* Piper, sp. nov.**

Annual, branched from the base, the rather stout, spreading to erect branches mostly simple, 15 to 20 cm. long; stems sparsely strigillose; leaves linear-oblong, obtusish, glabrous or nearly so above, strigillose and usually pustulate beneath, 1 to 4 cm. long; racemes strict, the internodes 2 to 4 times as long as the calyces, a few of the lower flowers leafy-bracteate; pedicels shorter than the calyces; calyx rather thick, slightly accrescent, at length 4 mm. long, the lobes erect, lanceolate, acute, strigillose; corolla small, slightly exceeding the calyx; nutlets lanceoloid, 2 mm. long, the dorsum rather flat, keeled from about the middle, transversely rugulose with low entire ridges, coarsely granulate or finely tuberculate in the interspaces, especially near the base, the venter keeled and obliquely rugulose with low oblique ridges; scar narrow, oblique but suprabasal.

Type in the Gray Herbarium, collected between Vinton and Beckwith, Plumas County, California, July 2, 1907, by A. A. Heller and P. B. Kennedy (no. 8682). Specimens of the same collection are in the U. S. National Herbarium and the herbarium of the University of California. Heller and Kennedy's no. 8681, from the same locality, is also of this species.

The following additional collections from California are referred here with some doubt: Howell Mountain, Napa Basin, *Jepson*, May 8, 1893 (B); San Luis Obispo County, *Mrs. Summers* (B).

This species is quite intermediate between the *Californicae* and the *Stipitatae*.



**31. *Allocarya lonchocarpa* Piper, sp. nov.**

Annual, branched from the base, the branches ascending, 10 to 20 cm. long; stems sparsely strigillose; leaves linear-oblongate, acutish, nearly glabrous above, strigillose beneath, 1 to 3 cm. long; racemes rather loose, the internodes 2 to 4 times as long as the calyces, most of the flowers leafy-bracted; pedicels shorter than the calyces; calyx slightly accrescent, strigillose, the lobes somewhat spreading, lanceolate, acute, at length 5 mm. long; corolla minute; nutlets narrowly lanceoloid, 2.2 mm. long, the dorsum rather flat, keeled near the apex, rugulose with 4 or 5 fine transverse ridges, coarsely granulate in the broad interspaces, the venter keeled and reticulately rugulose; scar oblique, lanceolate.

Type in the U. S. National Herbarium, no. 517636, collected in wallows filled with water, Aurora County, South Dakota, June, 1873, by E. N. Wilcox.

**32. *Allocarya scripta* Greene, Pittonia 1: 142. 1887.**

TYPE LOCALITY: "Somewhere on the plains of the Sacramento, Calif." Type in the Greene Herbarium; the only collection seen.

A unique species, the type specimens not quite mature. The scar is apparently deep and excavate and about one-third as long as the nutlet. The plant therefore shows relationship to the *Echinaceae* and *Glyptocarpaceae*.

**33. *Allocarya limicola* Piper, sp. nov.**

Annual, branched from the base, somewhat succulent; branches ascending, minutely and sparsely strigillose, 10 to 15 cm. long; leaves oblongate, obtuse, glabrous above, strigillose beneath, 1 to 3 cm. long; racemes loose, the internodes 3 to 5 times as long as the fruiting calyces, the lower flowers leafy-bracteate; calyx strongly accrescent, the lanceolate acute lobes at length thick, spreading or twisted, 6 to 7 mm. long; corolla about 2 mm. broad; nutlets broadly ovoid, 2 mm. long, the dorsum convex, keeled its whole length, transversely rugulose with low fine ridges, the large interspaces coarsely granulate and (under the microscope) covered with nearly sessile glochidia; venter keeled its whole length, rugulose with a few short oblique ridges, and granulate; scar triangular, nearly basal.

Type in the Gray Herbarium, collected in the San Joaquin Valley, California, May, 1884, by E. L. Greene.

**34. *Allocarya sigillata* Piper, sp. nov.**

Annual, branched from the base, the numerous slender branches 20 to 40 cm. long; stems strigillose; leaves linear to linear-spatulate, acute, glabrous above, strigillose beneath, 5 to 10 cm. long; racemes loose, some of the flowers bracteate; pedicels shorter than the calyces; corolla small, not exceeding the calyx; calyx markedly accrescent, the lobes at length 4 times as long as the nutlets; nutlets ovoid, 1.7 mm. long, the dorsum convex, keeled its whole length, transversely rugulose with low broken ridges, densely granulate in the interspaces, bearing a few tufts of short bristles mostly on the margins and keel, the venter rugulose and granulate, keeled its whole length; scar small, ovate, obliquely basal; bristles hyaline, divaricately barbed at tip.

Type in the Greene Herbarium, no. 21877, collected at Antioch, California, April 7, 1885, by E. L. Greene.

Somewhat intermediate between *A. scripta* Greene and *A. humistrata* Greene, but probably nearest related to *A. trachycarpa*.

**35. *Allocarya humistrata* Greene, Pittonia 1: 16. 1887.**

TYPE LOCALITY: "Frequent from San Diego throughout the state" of California.

## SPECIMENS EXAMINED:

CALIFORNIA: Near Antioch, Curran, in 1884 (B, C); marked "type" in the herbarium of the California Academy of Sciences, and "part of type" in the herbarium of the University of California. Byron Springs, Eastwood, April 14, 1914 (C). Colusa, Brandegee, April, 1889, in part (N); Brandegee, April, 1888 (B); Curran, April, 1884 (G).



No specimen from San Diego marked "type" has been found. It is possible, from the San Diego locality, that the name *A. humistrata* Greene should really be applied to *A. divergens* Piper, as specimens of the latter were collected at San Diego by Dr. Greene.

**36. *Allocarya cryocarpa* Piper, sp. nov.**

Annual, loosely few-branched, 5 to 15 cm. high; stems slender, strigillose; leaves linear, acute, strigillose on both sides, 1 to 3 cm. long; racemes very loose, the internodes in fruit 4 to 8 times as long as the calyces, some of the lower flowers bracteate; pedicels shorter than the calyces; calyx not accrescent, the lanceolate acute lobes setulose, 2 mm. long; corolla very small, barely exceeding the calyx; nutlets ovoid, 1.8 mm. long, the dorsum keeled near the apex, tuberculate-rugulose, densely granulate in the interspaces, the tubercles bearing short unarmed hyaline bristles, the venter keeled its whole length, rugulose and granulate; scar lanceolate to linear, one-fourth as long as the nutlet; epidermis of nutlets very muriculate, a few of the murications glochidiate.

Type in the herbarium of the California Academy of Sciences, collected near Lily Lake, Glen Alpine region, California, in 1906, by Alice Eastwood (no. 895).

ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Leontes Meadows, Bridgeport and Sonora road, Congdon, August 4, 1898 (G). Truckee, Heller 7055a, in part, July 20, 1903 (G).

OREGON: Blue Mountains, Sheldon 8380 (N).

**37. *Allocarya gracilis* Piper, sp. nov.**

Annual; stems few-branched at base, erect, slender, not succulent, very sparsely strigillose, 25 to 30 cm. high; leaves linear, acute, almost glabrous above, sparsely strigillose beneath, 2 to 5 cm. long; racemes subsecund, bractless or with one or two bracts below, loose, the internodes 4 to 6 times as long as the fruiting calyces; pedicels shorter than the calyces; calyx lobes lanceolate, acute, strigillose, erect or ascending, little longer than the nutlets, 2 to 3 mm. long; corolla 4 to 5 mm. broad; nutlets ovoid, obtuse, thick, dull, 1.5 mm. long, the dorsum convex, keeled near the apex, obliquely rugulose and somewhat reticulate, the rather large interspaces granulate, the hole covered with sessile microscopic glochidia, the venter rugulose, keeled from scar to apex; scar lateral, linear, raised, one-third as long as the nutlet.

Type in the herbarium of the University of California, no. 54555, collected at Deer Flat, Shasta County, California, June, 1903, by Hall and Babcock (no. 4276).

**38. *Allocarya laxa* Piper, sp. nov.**

Annual; stems weak, decumbent, not succulent, 20 to 25 cm. long, sparsely strigillose; leaves linear, acute, sessile or nearly so, 2 to 3 cm. long, thin, very sparsely strigillose-setulose on both faces; racemes very loose, 10 to 15 cm. long, subsecund, bractless or occasionally bracted; pedicels shorter than the calyx lobes; calyx lobes lance-linear, acute, very sparsely strigillose, 2 to 3 mm. long, enlarging somewhat and erect or spreading in fruit; corolla 4 to 5 mm. broad; nutlets 1.5 mm. long, ovoid, pale, the dorsum keeled near the tip, bearing about 20 evenly scattered, stout, conical prominences, these as well as the whole surface densely covered with short hyaline bristles each with spreading barbs at apex, the venter keeled its entire length, sharply rugulose and granulate; scar lateral, broadly ovate, concave, one-fourth as long as the nutlet.

Type in the U. S. National Herbarium, no. 324695, collected on the south side of Mount Shasta, California, August 1 to 15, 1897, by H. E. Brown (no. 590).

Also collected near Redding, California, May 30, 1905, by A. A. Heller (no. 7908; G, S). A single bract occurs on one raceme of a plant of this collection.



**39. *Allocarya pratensis* Piper, sp. nov.**

Annual; stems few-branched at base, erect or ascending, slender, not succulent, very sparsely strigillose, 10 to 25 cm. high; leaves linear, acute, strigillose, especially beneath, 2 to 5 cm. long; racemes subsecund, bractless, loose, the internodes 3 to 5 times as long as the fruiting calyx; pedicels shorter than the calyces; calyx lobes ascending, lance-linear, acute, strigillose, 3 mm. long; corolla 4 to 5 mm. broad; nutlets ovoid, acute, 1.7 mm. long, the dorsum keeled toward the tip, obliquely dentate-rugulose or the ridges separated into tubercles, covered with short hyaline bristles, these unarmed or, especially on the tubercles, barbed at tip, the venter obliquely rugulose, keeled from scar to apex; scar lateral, lanceolate.

Type in the herbarium of the University of California, no. 54554, collected in a meadow near Bear Creek, northeastern Shasta County, California, June, 1903, by Hall and Babcock (no. 4162).

**40. *Allocarya hispidula* Greene, Pittonia 1: 17. 1887.**

TYPE LOCALITY: "San Bernardino Mountains, Calif. (*Parish*, no. 1470), northward to Oregon (*T. J. Howell*)."

## SPECIMENS EXAMINED:

CALIFORNIA: Bear Valley, San Bernardino Mountains, *Parish* 1470, August, 1882 (C, N, G); *Parish* 3247, June 24, 1894 (N, G). San Bernardino Mountains, Talmadge Mill, *Parish* 3239, June 28, 1894 (N). Seeley's Flat, San Bernardino Mountains, *Parish* 2433, June 6, 1892 (G). Donner Lake, lower end, *Heller* 6891, in part, July 10, 1903 (N). Sierra County, *Lemmon* 492, in 1874 (G). Mountain Lake, Tulare County, *Dudley* 871, July 22, 1895 (S). Volcano Creek, Tulare County, *Hall & Babcock* 5318, July, 1904 (B). Connell Meadows, Tulare County, *Hall & Babcock* 5115, June 15, 1904 (B). Shackelford Canyon, Siskiyou County, *Chandler* 1704, June, 1901 (B). Prattville, *Brandegee*, July 3, 1892 (B).

NEVADA: Galena Creek, Washoe County, *Kennedy* 1228, August 1, 1906 (N, B).

OREGON: Fox Valley, Blue Mountains, *Griffiths & Hunter* 160, July, 1902 (N).

WASHINGTON: Waitsburg, *Horner* 360, in part, May 4, 1897 (N). Ellensburg, *Whited* 654, June 5, 1898 (N). Falcon Valley, *Suksdorf* 2113, May 27, 1892 (N, C, B). Harrington, *Sandberg & Leiberg* 217, June 14, 1893 (N, G).

IDAHO: Tamarack, *Clark* 210, August 8, 1911 (G, S, in part). St. Anthony, *Merrill & Wilcox* 832, July 5, 1901 (G).

**41. *Allocarya tenera* Greene, Pittonia 3: 109. 1896.**

TYPE LOCALITY: "Adam's Springs, Lake County, California," *Mrs. E. Booth*, July, 1894. Type in the Greene Herbarium.

## SPECIMENS EXAMINED:

CALIFORNIA: Type, as above (E). Fall River Springs, Shasta County, *Hall & Babcock* 4184, June, 1903 (N). Chico Meadows, *Heller* 11496, June 22, 1914 (G, S, in part); *Heller* 11969, June 11, 1915 (G, S). Lake Valley, Lake Tahoe, *Abrams* 4770, July 27, 1911, in part (G, S). Fallen Leaf Lodge, Lake Tahoe, *Abrams* 4876, July 30, 1911 (G). Burney, Shasta County, *Eastwood*, June 28, 1912, in part (C). Bear Flat, Shasta County, *Hall & Babcock* 4155, June, 1903 (B).

OREGON: Buck Lake, Klamath County, *Coville & Applegate* 66, July 24, 1897 (N).

**42. *Allocarya penicillata* Greene, Pittonia 1: 18. 1887.**

TYPE LOCALITY: "Donner Lake in the Sierra Nevada, Calif."

## SPECIMENS EXAMINED:

CALIFORNIA: Donner Lake, *Greene*, August, 1883 (C, E, G); *Heller* 6891, in part, July 10, 1903 (G, S); *K. Brandegee*, September, 1888 (B). Mount Shasta, *Palmer* 2447, July, 1892 (N). Sissons, *Brandegee*, July, 1899 (B). Truckee,



*Hitchcock* 238, in part, July 14, 1913 (N). Tioga Road, Tuolumne County, *Congdon* 46, June 8, 1897 (G). Sunnyside, Lake Tahoe, *Eastwood* 26, in 1909 (C). Camp Agassiz, Glen Alpine region, *Eastwood* 948, in 1906 (C). Fallen Leaf Lake, *Eastwood* 1066, in 1906 (C). Fallen Leaf Lodge, *Abrams* 4876, July 30, 1911 (S). Loyalton, Sierra County, *Eastwood* 7895, in part, June 27, 1918 (C). Webber Lake, *Kennedy & Doten* 117, July 8, 1901 (B). Summit Soda Springs, Placer County, *Eastwood*, June 12, 1898 (B). Morgan, Tehama County, *Hall & Babcock* 4365, July 1 or 2, 1903 (B). Chico Meadows, Butte County, *Heller* 11496, in part, June 22, 1914 (S). Pine Ridge, Fresno County, *Hall & Chandler* 282, July, 1900 (S, N). Redrock Meadows, Tulare County, *Hall* 8397, July 19, 1908 (B). Chagoopa Creek, Tulare County, *Dudley* 2256, July 24, 1897 (S). Funston Meadows, Tulare County, *Dudley* 2185, July 27, 1897 (S). Whitney Meadows, Tulare County, *Dudley* 2497, August 8, 1897 (S).

NEVADA: Carson City, *Purpus*, in 1889 (B).

The Tulare County specimens may be distinct. Their nutlets are smaller and narrower, and not so prominently sculptured on the back nor with so many ridges on the venter, nor are the edges sharp margined, while the scar is lanceolate and not linear as in the type of the species.

#### 43. *Allocarya cervina* Piper, sp. nov.

Annual, not succulent, much branched from the base, the branches prostrate to ascending, 10 to 20 cm. long, the whole herbage densely strigillose; leaves linear, acute, 1 to 2 cm. long, strigillose on each surface, more so beneath; racemes moderately dense, subsecund, 5 to 10 cm. long, bractless or with occasional leafy bracts; pedicels shorter than the calyces; calyx lobes lance-linear, acute, erect, loosely setulose, 2 mm. long, not enlarging in fruit, mostly about half as long as the internodes; corolla very small, 1 mm. broad; nutlets ovoid, acutish, dull, brownish gray, 1.5 to 1.7 mm. long, the dorsum convex, obscurely keeled near the apex, densely and evenly granulate and with about four sinuous transverse ridges, the granulations each tipped with a slender, hyaline, irregularly branched bristle, these longest near the margins, the venter keeled its whole length, obliquely reticulate-rugulose and minutely bristly; scar nearly basal, broadly triangular.

Type in the U. S. National Herbarium, no. 611646, collected in sand, near Redding, California, May 29, 1905, by A. A. Heller (no. 7891).

A specimen of the same collection is in the Gray Herbarium. Distributed as *A. californica* (Fisch. & Mey.) Greene.

#### 44. *Allocarya ramosa* Piper, sp. nov.

Annual, branched from near the base, not succulent, the branches prostrate to curved-ascending, 10 to 30 cm. long, sparsely strigillose; leaves linear, acute, glabrous or nearly so above, strigillose beneath, 1 to 5 cm. long, reduced upward; racemes slender, loose, 5 to 20 cm. long, some of the flowers in the axils of leafy bracts; pedicels mostly shorter than the calyx lobes; calyx lobes lance-oblong, acute, erect, setulose, 2 to 2.5 mm. long in fruit, one-fourth to one-third as long as the internodes; corolla 2 mm. broad; nutlets dull brown, ovoid, acutish, 2 mm. long, the dorsum rounded, densely granulate and with fine transverse broken ridges, minutely bristly, especially near the tip, the bristles hyaline, elongate, irregularly branched or occasionally forked near the apex, the short branches spreading, the venter keeled its entire length, marked with anastomosing ridges, and minutely bristly; scar suprabasal, narrowly pyriform, one-fifth as long as the nutlet.

Type in the U. S. National Herbarium, no. 287604, collected near Prineville, Oregon, in the Crooked River Valley, June 23, 1894, by J. B. Leiberger (no. 318).

Specimens of the same collection are in the Gray Herbarium and in the herbarium of Stanford University.



## ADDITIONAL SPECIMENS EXAMINED:

WASHINGTON: Waitsburg, *Horner* 360, in part, in 1897 (G). Wenaha Forest, Blue Mountains, *Darlington* 261, July, 1913 (G). Without locality, *Brandegee* 989, in 1883 (B).

OREGON: Without locality, *Henderson* (G). Eastern Oregon, *Cusick* 1754, in 1897 (N, S, in part, B). Stinking Water Creek, *Leiberg* 2346, June 21, 1896 (N, G, B). Laidlaw, *Whited* 3090, July 17, 1906 (N). Blue Mountains, *Sheldon* 8436 (N).

IDAHO: Coeur d'Alene, *Rust* 372, August 11, 1913 (N). Boulder Creek, Owyhee County, *Macbride* 517, July 31, 1910 (G, N, S, B). Soldier Mountain, *Henderson* 3194, July 16, 1895 (N). House Creek, Owyhee County, *Macbride* 1805, June 29, 1912 (N). Dry Creek, *Palmer* 326, July 13, 1893 (N). Tamarack, *Clark* 210, August 8, 1911 (S, in part).

UTAH: Altus, *Mrs. Clemens*, July 7, 1908 (S).

45. *Allocarya hirta* Greene, *Pittonia* 1: 161. 1888.

TYPE LOCALITY: "Umpqua Valley, Ore., *Howell*, June 25, 1887."

## SPECIMENS EXAMINED:

OREGON: Umpqua Valley, *Howell*, June 25, 1887 (N, B). Wimer, Jackson County, *Hammond* 296, May 17, 1892 (N).

46. *Allocarya calycosa* Piper, sp. nov.

Annual, erect, sparingly branched, 30 cm. high; stems strigillose; leaves few, linear, acutish, loosely pustulate-setulose on both sides, 2 to 4 cm. long; racemes bractless, 10 to 20 cm. long, the internodes 2 to 4 times as long as the fruiting calyces; pedicels shorter than the calyces; calyx lobes oblong-lanceolate, acutish, erect, loosely pustulate-setulose, 5 mm. long in fruit; corolla 6 to 7 mm. broad; nutlets ovoid, tumid, dull, 1.5 mm. long, the dorsum keeled its whole length, obscurely marked with dentate fine transverse ridges and densely coarse-granulate, the venter keeled its whole length and obliquely rugulose with many entire ridges, these forked near the margin of the nutlet; scar ovate, lateral, one-fourth as long as the nutlet.

Type in the University of Oregon herbarium, collected in the Umpqua Valley, Oregon, June, 1887, by T. J. Howell.

Very near *A. hirta* Greene, but differing in the looser racemes, larger calyx, and the sculpturing of the nutlets.

47. *Allocarya figurata* Piper, sp. nov.

Annual, erect, loosely and mostly dichotomously branched, 15 to 25 cm. high; stems slender, strigillose; leaves linear, acute, rather coarsely strigillose on both sides, 2 to 5 cm. long; racemes bractless, 5 to 12 cm. long, the internodes mostly about twice as long as the fruiting calyces; pedicels shorter than the calyces; calyx not accrescent, the lance-linear, acutish, somewhat spreading lobes loosely strigillose, about 3 mm. long; corolla rotate 3 to 5 mm. broad; nutlets ovoid, barely acute, dull, 1.5 mm. long, the dorsum convex, faintly keeled its whole length, transversely dentate-rugulose with about 5 low ridges, the interspaces granulate, the venter keeled its whole length and obliquely rugulose; scar suprabasal, ovate, seated with the base of the keel in a shallow depression surrounded by a conspicuous ridge; epidermal cells produced into very short conical trichomes, each with one or more minute terminal cells.

Type in the Gray Herbarium, collected at Frye's Ranch, Illahe, Curry County, Oregon, June 25, 1917, by J. C. Nelson (no. 1509).

48. *Allocarya vallata* Piper, sp. nov.

Annual, erect, 15 to 40 cm. high, simple at base, usually few-branched above; stems almost glabrous, very sparsely strigillose; leaves linear or lance-linear, acutish, glabrous or sparsely strigillose above, strigillose and more or less pustulate beneath,



1 to 5 cm. long; racemes bractless, many-flowered, the internodes 2 to 4 times as long as the calyces; pedicels shorter than the calyces; calyx strigillose, the lobes lanceolate, erect, 2 to 3 mm. long, a little exceeding the nutlets; corolla well exceeding the calyx, 6 to 7 mm. broad; nutlets ovoid, dark, 2 mm. long, the dorsum obscurely keeled, densely covered with granulations and more sparsely with pale tubercles, or the tubercles forming obscure ridges, the venter rugulose and granulate, the keel fully exposed but the basal part in a shallow groove; scar lateral, narrowly ovate, in a shallow pit surrounded by the free edges of the nutlet.

Type in the herbarium of the California Academy of Sciences, collected in Goose Valley, Shasta County, California, June 29 to July 11, 1912, by Alice Eastwood (no. 718). Nos. 746 and 718a of the same collector, from the same locality, also belong here.

ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA; Near Redding, Shasta County, *Heller* 7908, May 30, 1905 (N). Upper Sacramento, *Parkinson* (N). Without locality, *Newberry*, collected on Williamson's Expedition (N). Prattville, Plumas County, *Austin*, June, 1878 (G).

Very closely allied to *A. scouleri* (Hook. & Arn.) Greene, but the flowers are smaller, the nutlets are narrower and less rugulose, and the somewhat circumvallate scar is different. This species and *A. hirta* Greene form connecting links to the species with a deep ventral groove. In all three the surface of the nutlets shows under the microscope a very dense cellular scabridity. All of the specimens seen are from northern California.

49. *Allocarya scouleri* (Hook. & Arn.) Greene, *Pittonia* 1: 18. 1887.

*Myosotis scouleri* Hook. & Arn. Bot. Beechey Voy. 370. 1840.

*Eritrichium* ? *scouleri* A. DC. in DC. Prodr. 10: 130. 1846.

*Krynitzkia scouleri* A. Gray, Proc. Amer. Acad. 20: 267. 1885.

TYPE LOCALITY: Columbia River.

SPECIMENS EXAMINED:

BRITISH COLUMBIA: Nanaimo, *Cooley*, July 19, 1891 (G, N). Victoria, *Fletcher*, May, 1885 (G).

WASHINGTON: Without locality, *Cooper* (N). Western Klickitat County, *Suksdorf* 177 (E). Near Union City, *Piper* 1053 (G). Seattle, *Meany* 531; *Piper*, in 1885. Succotash Valley, *Piper*, in 1895. Western Klickitat County, *Suksdorf* 105, May 26, 1881 (N); *Suksdorf* 45,<sup>1</sup> May 26, 1881 (G).

OREGON: Without locality, *Kellogg & Harford* 767 (N); *Howell* 46, in 1880 (N); *Mullen's Expedition* (N); *Hall* 408, 406 (G); *Howell* 339, in 1880 (G); *Howell*, in 1881 (E, B). Gladstone, *Piper* 6190, June 9, 1904 (N, G); *Howell* 427, June, 1894 (B). Myrtle Point, *Holzinger* 58, July 3, 1893 (N). Wimer, Jackson County, *Hammond* 297a, May 27, 1893 (N). Oregon City, *Lyon* 62, June 11, 1905 (N). Salem, *Hall* 206, in 1871 (N). Oakland, April, 1875 (N). Grants Pass, *Heller* 10026 (E). Chemawa, *Nelson* 1207 (G). Rogue River, *Cusick* 4621, May 7, 1915. Woodville, *J. Howell*, May, 1889. Portland, *Gorman* 4125, June 30, 1917. Lake Labish, *Gorman* 4057, May 26, 1917 (S).

50. *Allocarya lithocarya* Greene, *Pittonia* 1: 12. 1887.

*Krynitzkia lithocarya* Greene; A. Gray, Proc. Amer. Acad. 20: 265. 1885.

TYPE LOCALITY: "Lakeport, Lake County, California, 1884, Mrs. Layne-Curran."

<sup>1</sup> This was referred by Dr. Greene (*Pittonia* 1: 16. 1887) to *A. hirta*, but the nutlet characters are those of *A. scouleri*, while the pubescence is intermediate toward *A. hirta*.



Type in the Gray Herbarium.

SPECIMENS EXAMINED:

CALIFORNIA: Lakeport, Lake County, *Curran*, May, 1884 (C, E, G, B). Potter Valley, Mendocino County, *Purpus*, April, 1889 (N); *Purpus*, April, 1899 (N, B). Big River, Mendocino County, *McMurphy*, April, 1903; immature and very doubtful (N, S).

**51. *Allocarya chorisiana* (Cham.) Greene, Pittonia 1: 13. 1887.**

*Myosotis chorisiana* Cham. Linnaea 4: 444. 1829.

*Eritrichium chorisianum* DC. Prodr. 10: 130. 1846.

*Krynitzkia chorisiana* A. Gray, Proc. Amer. Acad. 20: 267. 1885.

*Eritrichium connatifolium* Kellogg, Proc. Calif. Acad. 2: 103. 1863. Type in the herbarium of the California Academy of Sciences; in flower.

TYPE LOCALITY: San Francisco, California.

SPECIMENS EXAMINED:

CALIFORNIA: Near San Francisco, *Torrey* 334, in 1865 (G, N); *Kellogg & Harford* 769 (N); *H. Mann* (G); *Bolander* 149, in 1864 (G); *Miss E. Cannon*, in 1891 (C); *Kellogg*, in 1866 (N); *Vasey*, in 1870 (G). Mount Olympus, San Francisco, *Miss E. Cannon* (C). Monterey, *Elmer* 4674, April, 1903 (N). Cypress Point, Monterey, *Gray*, in 1885 (G); *Eastwood* 68, May 28, 1912 (C). Pacific Grove, *Elmer* 4674, April, 1905 (C); *Heller*, May 10, 1903 (G). Crystal Springs Lake, San Mateo County, *C. F. Baker* 429, March 30, 1902 (N, E, G). Lake Merced, *Heller* 8439, April 20, 1907 (N, G, S). Belmont, *Greene*, May 10, 1886 (N, E, G). Mission Hills, *Bioletti*, in 1893 (E). San Gregorio, *C. F. Baker* 503 (E). Montara Point, *Copeland* 3322, 3339 (E). Oakland, *Rattan*, April 3, 1867 (S); *K. Brandegee*, April, 1890 (B). Pescadero Ranch, Monterey County, *Brewer* 664, May 24, 1861 (N, C, G). La Honda, *K. Brandegee*, April 9, 1892 (B). Santa Cruz, *Davy*, April 16, 1899 (B); *Helen Cone*, in 1889 (G); *Setchell*, April 15, 1897 (B). Santa Cruz Mountains, *Kellogg* (B). Colma, *Chandler* 806, March 15, 1901 (B). Searsville, *Brandegee*, May 20, 1890 (B). Ben Lomond, *K. Brandegee* April 25, 1890 (B). San Gregorio Creek, *Elmer* (B). Crystal Springs, *Eastwood*, April, 1896 (B). San Bruno Hills, *Eastwood*, June 18, 1915 (C). Granada, *Eastwood* 4717, June 13, 1915 (C). Without locality, *Coulter* 519 (G); *Hartweg*, in 1874, very young (G); *Douglas*, very young (G); *Vasey*, in 1875 (N); *Bigelow* (N); *Bolander*, in 1872 (G).

Specimens from Cedar Hill, Victoria, British Columbia, collected by *Macoun*, May 11, 1887, are certainly not *A. chorisiana*, and with scarcely a doubt are *A. media*.

**52. *Allocarya hickmanii* Greene, Pittonia 1: 13. 1887.**

TYPE LOCALITY: Southern Monterey County, California. Type collected by *J. B. Hickman* in 1886.

SPECIMENS EXAMINED:

CALIFORNIA: Southern Monterey County, *Hickman*, in 1886 (E, C, B); a supposed duplicate in the Gray Herbarium is *A. californica*. Point Sur, *Brandegee*, July, 1888 (B).

**53. *Allocarya myriantha* Greene, Erythea 3: 125. 1895.**

TYPE LOCALITY: Monterey, California. Type, in the Greene Herbarium, collected by *E. L. Greene*.

SPECIMENS EXAMINED:

CALIFORNIA: Pacific Grove, *Heller* 6748, May 18, 1903 (N, G, S); *Gwendolen Newell*, July 8, 1914 (C). Near Monterey, *Heller* 6825, June 5, 1903 (N, E, G, S); *M. R. Mann*, February 13, 1886 (E). Near Del Monte, *Heller* 6696, May 8, 1903 (N, G, S). Ojai Ranch or Gaviote Pass, *Goodale*, in 1866; young and doubtful (N). Pescadero, *Abrams* 4248, August 2, 1909 (S). Seaside, *Dudley*, April 13, 1894 (S). Joco Point, *Abrams*, May 31, 1916 (S). San Simeon, *K. Brandegee*, June 9, 1889 (B).



**54. *Allocarya undulata* Piper, sp. nov.**

Annual, branched below, the branches ascending, 20 cm. high; stems thinly strigillose; leaves linear, acutish, 1 to 4 cm. long, strigillose or pustulate-strigillose on both surfaces; racemes loose, some of the flowers bracted, the internodes 2 to 6 times as long as the calyces; pedicels shorter than the calyces; calyx densely strigillose, the lanceolate acute lobes erect, about 3 mm. long, half longer than the nutlets; corolla small, about 2 cm. broad; nutlets ovoid, 1.6 to 1.8 mm. long, black, the dorsum faintly keeled near the tip, transversely rugulose with numerous undulate low ridges, not at all granulate, the venter similarly but more reticulately rugulose, the keel fully exposed but in a shallow groove, at least basally; scar half as long as the keel, narrowly linear, lying in a narrow groove.

Type in the herbarium of the California Academy of Sciences, collected at Santa Barbara, California, May 12, 1907, by Alice Eastwood.

## ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Pilarcitos Lake and Canyon, San Mateo County, *Davy* 1135, 1136, 1143, June, 1893 (B). Suisun, *K. Brandegee*, May 3, 1892 (B).

**55. *Allocarya minuta* Piper, sp. nov.**

Annual; stems erect, loosely branched above, very slender, very finely and sparsely strigillose, 6 to 20 cm. high; leaves narrowly linear, acute, 0.5 to 2 cm. long, sparsely strigillose on both sides; racemes bractless, many-flowered, 5 to 10 cm. long, the internodes 3 to 6 times as long as the calyces; pedicels very short; calyx very small, less than 2 mm. long, the lanceolate acutish strigillose lobes ascending, not accrescent; corolla 3 mm. broad, large in contrast to the calyx; nutlets ovoid, as thick as broad, obtuse, dull, 0.6 to 0.7 mm. long, the epidermal cells muriculate, the dorsum very convex, closely reticulate with low fine ridges, not granulate, keeled near the apex, the venter similarly rugulose, sulcate along the middle with a narrow shallow groove. the keel exserted and extending from the small ovate suprabasal scar to the apex.

Type in the herbarium of the University of California, collected at Fort Seward Humboldt County, California, "abundant in wet places," May 14, 1914, by J. P. Tracy (no. 4469).

The exceedingly slender stems, small calyx, rather large corolla, and especially the minute nutlets make this a very distinct species.

**56. *Allocarya stricta* Greene, *Pittonia* 2: 231. 1892.**

TYPE LOCALITY: Calistoga, California. Type, in the Greene Herbarium, collected by E. L. Greene, April 20, 1892; duplicate in the University of California herbarium,

## SPECIMENS EXAMINED:

CALIFORNIA: Calistoga, *Eastwood*, May 7, 1900 (N, B, S, G); *Eastwood* 4627, June 5, 1915 (C); *Jepson*, in 1893 (E); *Tracy* 1857 (G, B).

**57. *Allocarya scalpta* Piper, sp. nov.**

Annual, loosely branched below, 15 to 20 cm. high; branches slender, erect or ascending, strigillose; leaves linear-ob lanceolate, nearly glabrous above, strigillose beneath, 2 to 3 cm. long; racemes with a few leafy bracts, loose, the internodes 4 to 8 times as long as the fruiting calyces; pedicels shorter than the calyces, a few of the lowermost elongate; calyx not accrescent, the lobes ascending, lance-linear, acutish, strigillose, about 3 mm. long in fruit; corolla 3 mm. broad; nutlets dull, ovoid, twice as long as broad, acute, 1.5 mm. long, the dorsum keeled only near the apex, closely transverse-rugulose, sometimes sparsely granulate near the base, the venter reticulate-rugulose, sulcate with a narrow groove (this most conspicuous basally), keeled from scar to apex; scar ovate, suprabasal, only one-sixth as long as the nutlet.

Type in the herbarium of the University of California, collected on Alder Point Flat, Eel River, Humboldt County, California, May 22, 1903, by J. P. Tracy (no. 1878).



**58. *Allocarya reticulata* Piper, sp. nov.**

Annual, branched from the base, the slender branches erect, strigillose, 10 to 40 cm. high; leaves linear to linear-oblongate, acute, nearly glabrous above, strigillose beneath, 2 to 5 cm. long; racemes with a few leafy bracts, loose, the internodes mostly 4 to 8 times as long as the calyces; pedicels mostly shorter than the calyces, a few of the lowermost ones elongate; calyx not accrescent, the lobes lance-linear, acute, setulose, ascending or spreading, about 3 mm. long in fruit; corolla 1 to 2 mm. broad; nutlets ovoid, obtusish, shiny, 1.2 to 1.3 mm. long, the dorsum convex, sometimes faintly keeled near the apex, loosely reticulate-rugulose with low ridges, the interspaces smooth, the edges rounded, the venter similarly rugulose, sulcate with an open shallow groove, at least basally, keeled from scar to apex; scar ovate, suprabasal, about one-fourth as long as the nutlet.

Type in the herbarium of the University of California, collected at Holmes Flat, Eel River, Humboldt County, California, May 3, 1916, by J. P. Tracy (no. 4691).

## • ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Humboldt Bay, Humboldt County, *Chandler* 1172, May, 1901 (B, N, S). Hydesville, Humboldt County, *Tracy* 4486, in part, May 30, 1914 (B).

**59. *Allocarya areolata* Piper, sp. nov.**

Annual, branched from the base, the branches erect, 15 to 25 cm. high; stems strigillose; leaves oblong-linear, obtusish, strigillose on both sides, 2 to 4 cm. long; racemes loose, the internodes 3 to 4 times as long as the calyces, some of the lower flowers bracteate; pedicels mostly much shorter than the calyces; calyx strigillose-hispid, the lanceolate acute lobes somewhat spreading, 3 mm. long, exceeding the nutlets; corolla small, 2 mm. broad; nutlets ovoid, dark, 1.5 mm. long, the dorsum keeled only near the apex, thickly and obscurely granulate, divided by low transverse ridges into a few large areoles, the venter more rugulose but not granulate, the fully exposed keel lying in a shallow groove, this deepest basally; scar narrowly ovate, suprabasal, lying in a depression surrounded by the free edges of the nutlet.

Type in the U. S. National Herbarium, no. 42064, collected at Mendocino, California, August 3, 1882, by C. G. Pringle.

## ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Fort Bragg, *Eastwood* 1614, August 8, 1912 (C). Grizzly Creek, Humboldt County, *Abrams* 6026, July 11, 1916 (S). Eureka, *Tracy* 3009, July 4, 1909 (B). Gualala, *Gwendolen Newell*, July, 1904 (B). Bodega Bay, *K. Brandegee*, June, 1905 (B). Point Reyes, *Davy* 6814, June or July, 1900 (B).

**60. *Allocarya diffusa* Greene, *Pittonia* 1: 14. 1887.**

TYPE LOCALITY: "San Francisco, in grassy lands about the U. S. Marine Hospital, April, 1886." Type in the Greene Herbarium.

## SPECIMENS EXAMINED:

CALIFORNIA: San Francisco, *Greene*, April 12, 1886 (G, B, C, E); *Greene*, May 1, 1887 (N).

**61. *Allocarya cooperi* (A. Gray) Greene, *Pittonia* 1: 19. 1887.**

*Eritrichium cooperi* A. Gray, *Proc. Amer. Acad.* 19: 89. 1883.

*Krynitzkia cooperi* A. Gray, *Proc. Amer. Acad.* 20: 267. 1885.

TYPE LOCALITY: "Mohave Desert, S. E. California, at Camp Cady, *Dr. Cooper*, 1860-61; Rabbit Springs, May, 1882, *P. B. & W. F. Parish*, near to and in water." Types in the Gray Herbarium.

## SPECIMENS EXAMINED:

CALIFORNIA: Rabbit Springs, Mohave Desert, *Parish* 1317, May, 1882 (N, G, S). Mohave Desert, *Parish* 2431 (E). Camp Cady, *Cooper*, in 1860-61 (G). Bishop to Laws, Inyo County, *K. Brandegee*, May, 1913 (B). Owens Valley, Inyo County, *S. W. Austin* 457 (B).



**62. *Allocarya nitens* Greene, Pittonia 3: 108. 1896.**

TYPE LOCALITY: Pine Valley, Nevada. Type collected by E. L. Greene, July 20, 1896.

## SPECIMENS EXAMINED:

NEVADA: Pine Valley, *Greene*, July 20, 1896 (E). Palisade, *Greene*, August 24, 1896 (E).

UTAH: Johnson, *Jones* 5288, May 23, 1894 (N). "Southern Utah, Northern Arizona, etc.," *Palmer* 357½, in part, in 1877 (N).

**63. *Allocarya salsa* T. S. Brandeg. Bot. Gaz. 27: 452. 1899.**

TYPE LOCALITY: "Alkaline soil, Twin Springs, Nevada, *Dr. C. A. Purpus*, no. 6339, August, 1898."

## SPECIMENS EXAMINED:

NEVADA: Twin Springs, *Purpus* 6339 (N, B).

**64. *Allocarya jucunda* Piper, Bull. Torrey Club 29: 643. 1902.**

*Allocarya cusickii jucunda* Nels. & Macbr. Bot. Gaz. 61: 36. 1916.

TYPE LOCALITY: "Christmas Lake, Oregon." Type, in the Gray Herbarium, collected by W. C. Cusick (no. 2723).

## SPECIMENS EXAMINED:

OREGON: Christmas Lake, *Cusick* 2723, August 5, 1901 (G, E, N, B).

NEVADA: Carson City, *Jones*, June 2, 1897, in part (N).

Cusick's no. 2724, also from Christmas Lake, is *A. cusickii* Greene, but it is unusually, strigillose.

**65. *Allocarya cusickii* Greene, Pittonia 1: 17. 1887.**

TYPE LOCALITY: "Union County, Oregon, 1883, *W. C. Cusick*; also at Reno, Nevada, 1884, *Mrs. Curran*." No specimens of the Cusick collection have been examined.

## SPECIMENS EXAMINED:

WASHINGTON: Crab Creek, *Suksdorf* 403, June 10, 1884 (G). Tshimikaine (Chamokane), *Geyer* 548, in part (G).

OREGON: Christmas Lake, *Cusick* 2724 (G, N, E). Eastern Oregon, *Cusick* 1754, in part (S).

NEVADA: Eagle Valley, Ormsby County, *C. F. Baker* 1266, July 7, 1902 (G, N). Reno, *Curran*, in 1884 (G, E). Deeth, *Heller* 9019, July 17, 1908 (G, S); *Greene*, July 5, 1896 (E). Carson City, *Anderson*, in 1865 (G); *Jones*, June 2, 1897, in part (N). Humboldt Wells, *Greene*, July 25, 1893 (E). Palisade, *Greene*, July 12, 1893 (E). Holborn, *Greene*, July 16, 1896 (E). Soda Springs, *Shockley* 322 (E). Elko, *Kennedy* 4495 (S).

UTAH: St. Thomas, *Goodding* 697, May 5, 1902 (G).

CALIFORNIA: Susanville, *McKee & Westover*, June 13, 1918 (G).

**66. *Allocarya inornata* Piper, sp. nov.**

Annual, erect, branched from the base, 15 to 30 cm. high; stems slender, nearly glabrous, very sparsely strigillose; leaves lance-linear, acutish 2 to 4 cm. long, nearly glabrous, with a few strigillose hairs beneath; racemes rather loose in fruit, the internodes 2 to 4 times as long as the calyces, a few of the lower flowers bracteate; pedicels shorter than the calyces; calyx not accrescent, the lobes lance-oblong, obtusish, sparsely strigillose beneath, 2 mm. long; corolla minute, barely exceeding the calyx; nutlets ovoid, dull, 1.2 mm. long, the dorsum keeled near the apex, reticulately rugulose, not at all granulate, the venter keeled and reticulately rugulose; scar linear, one-third as long as the nutlet.

Type in the U. S. National Herbarium, no. 444293, collected at Ramona, San Diego County, California, May 23, 1903, by T. S. Brandege (Baker, no. 3380). A specimen of the same collection is in the Gray Herbarium.

## ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Goshen, Tulare County, *Eastwood* 2918, March 26, 1914 (C). San Diego, *Abrams* 3451, May 10, 1903 (S).



**67. *Allocarya media* Piper, sp. nov.**

Annual, branched from the base, the branches ascending to erect, 15 to 30 cm. long; stems rather slender, strigillose; leaves linear, mostly obtuse, sparsely strigillose on both sides, 2 to 6 cm. long; racemes subsecund, rather loose in fruit, the internodes 2 to 4 times as long as the calyces, the lower flowers leafy-bracted; pedicels shorter than the calyces; calyx strigillose, ferruginous when young, scarcely accrescent, the lanceolate acute lobes 3 to 4 mm. long in fruit; corolla 4 to 5 mm broad; nutlets ovoid, 1.5 mm. long, the dorsum convex, keeled toward the apex, sparsely rugulose with low entire ridges but toward the base low-tuberculate, not at all granulate, the venter keeled its whole length and reticulate-rugulose; scar ovate, suprabasal; surface of nutlet, except the ridges, dull, but epidermal cells nearly all smooth.

Type in the U. S. National Herbarium, no. 620527, collected at Port Angeles, Washington, June 26, 1908, by J. B. Flett (no. 3378).

**ADDITIONAL SPECIMENS EXAMINED:**

WASHINGTON: Clallam County, *Elmer* 2755, June, 1900 (N, S). Cowichan Lake, *Rosendahl* 1759, June 13, 1907 (G, N). Friday Harbor, *Zeller* 856, in 1917 (G). Whidby Island, *N. L. Gardner* (B).

BRITISH COLUMBIA: Vancouver Island, *Lyall*, in 1858 (G); *Macoun* 56, May 16, 1887 (G). Esquimalt, *Anderson* 503, May 20, 1916; *Macoun* 78643, May 23, 1908 (B). Cedar Hill, *Macoun*, May 11, 1887 (G), very young and therefore doubtful, but certainly not *A. chorisiana*, as labeled. Victoria, *Fletcher*, May, 1885 (G); *Macoun* 680, May 22, 1893 (G); *A. J. Pineo*, June 21, 1899 (B); *Macoun* 78645, April 23, 1908 (B); *Macoun* 78646, April 29, 1908 (B); *Macoun* 78650, April 29, 1908 (B). Oak Bay, *Macoun* 78644, May 14, 1908 (B).

**68. *Allocarya divaricata* Piper, sp. nov.**

Annual, branched from the base, the stout, straight, strigillose, mostly simple branches widely spreading, 10 to 30 cm. long; leaves linear to oblanceolate, obtuse, nearly glabrous above, setulose beneath and ciliate, 1 to 4 cm. long; racemes loose in fruit, the internodes about 4 times as long as the calyces, most of the lower flowers leafy-bracted; pedicels shorter than the calyces; calyx not accrescent, the lanceolate acute lobes little spreading, strigillose, about 3 mm. long; corolla small, barely exceeding the calyx; nutlets ovoid, glossy, 1.5 mm. long, the dorsum keeled about half its length, transversely rugulose with low obtuse ridges, the rather large interspaces not at all or very obscurely granulate, the venter keeled and obliquely rugulose; scar suprabasal, ovate, small.

Type in the U. S. National Herbarium, no. 529836, collected on exposed rocks on the seashore, Victoria, British Columbia, June 6, 1905, by William Palmer.

**69. *Allocarya cognata* Greene, *Pittonia* 4: 235. 1901.**

TYPE LOCALITY: "Cache Valley, Utah." Type, in the Greene Herbarium, collected by Miss Isabel Mulford, June 17, 1898.

**SPECIMENS EXAMINED:**

UTAH: Cache Valley, *Mulford*, June 17, 1898 (E). Clayton Peak, Wasatch Mountains, *Stokes*, August, 1903 (N). Big Cottonwood Canyon, Salt Lake County, *Garrett*, August, 1904 (G).

WYOMING: Evanston, *Williams*, July 10, 1897 (N). Centennial, *Nelson* 8691 (N, G).

COLORADO: San Luis Valley, *Wolf* 704, in 1873 (N). Empire, *Patterson* 288, in part, in 1892 (G).

NEVADA: Reno, *Purpus*, in 1898 (B); *Hitchcock* 441, July 17, 1913 (N). Carson City, *Anderson* 197, in 1865 (G).



CALIFORNIA: Camp Agassiz, Glen Alpine region, *Eastwood*, in 1906 (C). Goose Valley, Shasta County, *Eastwood* 748, in 1912 (C). Loyalton, *Eastwood* 7850, June 29, 1918 (C).

The limits of this species are not clear. Some specimens approach *A. californica* very closely, the crucial difference relied upon being the smooth epidermal cells of the nutlets.

**70. *Allocarya trachycarpa* (A. Gray) Greene, Pittonia 1: 14. 1887.**

*Krynitzkia trachycarpa* A. Gray, Proc. Amer. Acad. 20: 266. 1885.

TYPE LOCALITY: "California, in Sonoma County, *Brewer*, and San Joaquin Valley, *Greene*." Types in the Gray Herbarium.

SPECIMENS EXAMINED:

CALIFORNIA: Sonoma County, *Brewer* 1007 (G, N, B); this number in the University of California Herbarium is another species, probably *A. conjuncta*. San Joaquin Valley, *Greene*, April 21, 1884 (G); *Greene*, April, 1881 (E). Livermore, *Bioletti*, April, 1892 (G). Byron Springs, *Eastwood* 3808, in part, March 14, 1892 (G, N); *Greene*, March 28, 1888 (B). Byron, *Greene*, March, 1889 (E). Anderson, *W. W. Jones* 264a, May 9, 1911 (G). Near Antioch, *Curran*, May 9, 1886 (C); *K. Brandegee*, May, 1892 (B); *Greene*, April 7, 1895 (E). King City, *Eastwood* 4074, April 2, 1915 (C). Tracy, *K. Brandegee*, April, 1889 (B). French Camp, San Joaquin County, *Sanford* 100, in part (B). Carmel Mission, *Abrams* 6414, April 2, 1917 (S). San Juan grade, Monterey County, *Abrams* 5649, June 1, 1916 (S).

**71. *Allocarya interrasilis* Piper, sp. nov.**

Annual, much branched from the base, 20 to 30 cm. high; branches slender, erect or ascending, sparsely strigillose; leaves linear to narrowly oblanceolate, acute, nearly glabrous above, strigillose beneath, 1 to 4 cm. long; racemes with many leafy bracts, the internodes 4 to 8 times as long as the fruiting calyces; pedicels all shorter than the calyces; calyx not accrescent, the lance-oblong lobes spreading, acute, strigillose, 3 to 4 mm. long in fruit; corolla small, 2 mm. broad; nutlets angularly ovoid, short-acute, 1.8 mm. long, the dorsum faintly keeled nearly its whole length, transversely crenulate-rugulose, the rather large interspaces densely and coarsely granulate, the edges angled, the venter reticulate-rugulose, keeled from scar to apex; scar suprabasal, broadly triangular-ovate, flange-margined, one-fourth as long as the nutlet.

Type in the herbarium of the University of California, no. 24554, collected at Hollister, California, April 14, 1897, by W. A. Setchell.

ADDITIONAL SPECIMEN EXAMINED:

CALIFORNIA: San Luis Obispo, *Condit*, April 25, 1912 (B).

Very close to *A. trachycarpa* (A. Gray) Greene, but the sculpturing of the nutlets is different.

**72. *Allocarya plebeja* (Cham.) Greene, Pittonia 1: 16. 1887.**

*Lithospermum plebejum* Cham. Linnaea 4: 446. 1829.

*Eritrichium plebeium* A. DC. in DC. Prodr. 10: 133. 1846.

*Krynitzkia plebeja* A. Gray, Proc. Amer. Acad. 20: 266. 1885.

TYPE LOCALITY: Unalaska.

SPECIMENS EXAMINED:

ALASKA: Unalaska, *Mertens* (G); *Chamisso* (G; type collection?); *Harrington*, October 14, 1870 (G); *Harrington*, in 1871-72 (N); *Evermann* 125, August 2, 1892 (N); *Coville & Kearney* 1706, July 8, 1899 (N). Unga Island, *Harrington*, July 16, 1872 (G). Kodiak, *Coville & Kearney* 2390, July 20, 1899 (N); *Evans* 349, July 13, 1897 (N).



**73. *Allocarya insculpta* Piper, sp. nov.**

Annual, branched from the base, the branches, 5 to 12 cm. long; stems slender, sparsely strigillose; leaves linear, acutish, glabrous above, sparsely pustulate-strigillose beneath, 1 to 3 cm. long; racemes loose in fruit, the internodes becoming 4 to 6 times as long as the calyces, the lower flowers leafy-bracteate; pedicels shorter than the calyces; calyx erect, 2 to 3 mm. long, the lobes oblong-lanceolate, obtusish, glabrous above, strigillose beneath, not accrescent; corolla very small, barely exceeding the calyx; nutlets ovoid, 1.5 mm. long, the dorsum obtusely keeled for about half its length, transversely rugulose with broad low broken glossy ridges, sparingly tuberculate, especially toward the base, the venter keeled its whole length and reticulately rugulose; scar nearly basal, ovate; epidermis of nutlet rather glossy but under the microscope finely muriculate, especially on the angles.

Type in the U. S. National Herbarium, no. 525596, collected on borders of alkaline swales, Coulee City, Washington, June 1, 1902, by C. V. Piper (no. 3869).

**74. *Allocarya dispar* Piper, sp. nov.**

Annual, much branched from the base, the whole herbage densely strigillose; branches spreading, 8 to 15 cm. long; leaves linear, obtusish, glabrous above, pustulate-strigillose beneath, 1 to 3 cm. long; racemes bracted, rather loose in fruit, the internodes 2 to 3 times as long as the calyces; pedicels shorter than the calyces; calyx lobes lanceolate, acute, somewhat spreading in fruit, 3 mm. long, not accrescent; corolla very small, barely exceeding the calyx; nutlets broadly ovoid, barely acute, 1.4 mm. long, the dorsum convex, somewhat keeled toward the apex, transversely rugulose with a few low obtuse entire polished ridges, the interspaces dull and not at all granulate, the venter keeled its length, smooth or nearly so; scar ovate, nearly basal; epidermal cells finely muriculate under the microscope.

Type in the Gray Herbarium, collected in dry soil, Agness, Oregon, June 22, 1917, by J. C. Nelson (no. 1433).

## ADDITIONAL SPECIMEN EXAMINED:

CALIFORNIA: Adams Station, *Eastwood* 203, in 1907 (C).

**75. *Allocarya granulata* Piper, sp. nov.**

Annual, branched from the base, the branches erect or nearly so, 15 to 30 cm. long; stems slender, strigillose; leaves linear to lance-linear, acutish, nearly glabrous above, pustulate-strigillose beneath, 2 to 5 cm. long; racemes rather closely flowered, the internodes mostly twice as long as the fruiting calyces, a few of the lower flowers bracteate; pedicels shorter than the calyces; calyx not accrescent, 2 to 3 mm. long, the lobes slightly spreading, lanceolate, obtuse, strigillose, ferruginous at tip; corolla exceeding the calyx, about 2 mm. broad; nutlets narrowly ovoid, dull, 1.4 mm. long, the dorsum convex, keeled near the apex, transversely rugulose with 3 or 4 very narrow ridges, very densely granulate in the interspaces, the venter keeled its whole length, finely rugulose and densely granulate; scar minute, oval, nearly basal.

Type in the Gray Herbarium, collected at Salem, Oregon, June 14, 1917, by J. C. Nelson (no. 1338).

## ADDITIONAL SPECIMENS EXAMINED:

OREGON: Orville, *Nelson* 1827, August 6, 1917 (G). Silverton, *Hall* 407, in 1871 (G, N). Yamhill County, *Summers*, May, 1880 (N). Lower Albina, *Sheldon* S10577, June 16, 1902 (N, G). Sauvies Island, *J. Howell*, May 12, 1886, and May, 1875.

WASHINGTON: Bingen, *Suksdorf* 2207, May 18, 1893 (N, B, G).

**76. *Allocarya conjuncta* Piper, sp. nov.**

Annual, branched from the base, the branches mostly simple, ascending to erect, 15 to 30 cm. high; stems slender, sparsely strigillose; leaves linear, acute or obtuse,



sparsely strigillose beneath, glabrous or nearly so above, 2 to 8 cm. long; racemes slender, at length very loose, the lower internodes 4 to 6 times as long as the calyces, a few of the lower flowers bracteate; pedicels shorter than the calyces; calyx not accrescent, the lanceolate acutish strigillose lobes erect or somewhat spreading, 2 to 3 mm. long; corolla exceeding the calyx, about 2 mm. broad; nutlets ovoid, 1.2 to 1.4 mm. long, the dorsum somewhat keeled for all or much of its length, conspicuously transverse-rugulose, granulate in the interspaces, the venter keeled its whole length and obliquely rugulose; scar ovate, small, nearly basal.

Type in the U. S. National Herbarium, no. 440896, collected at Chico, California, May 15, 1903, by E. B. Copeland (no. 3046). Specimens of the same collection are in the Gray Herbarium and the herbarium of the University of California.

ADDITIONAL SPECIMENS EXAMINED:

CALIFORNIA: Chico, *Palmer* 2088, in part, June, 1892 (N); *Greene*, June, 1890 (N). Rutherford, *Jepson*, April 26, 1893 (N). Sacramento, in 1870, collector unknown (N). Oakland, *Holder* 2527 (N). Livermore, *Heller* 7321, April 14, 1904 (N, G, B). Near Napa, *Heller & Brown* 5361, April 25, 1902 (N, G, S). Stanford University, *C. F. Baker* 401, March 27, 1902 (N, G); *Elmer* 4492, April, 1903 (N, S); *Abrams* 2352, April 20, 1902 (S); *Dudley*, April 29, 1902 (S); *Dudley*, May 9, 1906 (S); *Meta D. Dannell*, April 24, 1915 (S). Palo Alto, *Crosbie* 376, April 23, 1905 (N). Vinton to Beckwith, *Heller & Kennedy* 8680, in part (N, G, S, B). Boggs Lake, Lake County, *K. Brandegee*, June 30, 1911 (B). Petaluma, *Palmer* (B). Vanden, *K. Brandegee*, April 30, 1893 (B). Alma, *Brandegee*, April 22, 1890 (B). Middletown, *K. Brandegee*, May, 1890 (B). Capay Valley, *Blankinship*, April 15, 1893 (B). Antioch, *K. Brandegee*, May, 1884 (B). Goose Valley, *Baker & Nutting*, May 26, 1894 (B). Waverly, *Sanford*, in 1890-91 (B). Mount Eden, *K. Brandegee*, May 22, 1893 (B); *K. Brandegee*, April 27, 1890 (B); *T. S. Brandegee*, May 14, 1893 (B). Rose Springs, *M. H. Gates*, in 1879 (B). Near Folsom, *Heller* 12306, April 7, 1916 (S). Butte County, *Austin*, April, 1896 (B). Little Oak, *Jepson*, May 2 to 6, 1891 (B). Lancha Plana, *Hansen* 1274, April 19, 1895 (N). New York Falls, *Hansen* 429, May 3, 1894 (N). Camanche, *Hansen* 1274, April, 1895 (S). Amador, *Hansen* 427, May, 1893 (S). Plymouth, *Gross* 162, June 6, 1903 (S). Mariposa, *Congdon* 47, May 16, 1897 (G); *Congdon* 228, May 1, 1889 (B). Agua Fria, *Congdon* 99.49 (G). Eight miles north of Oroville, *Heller* 11308, April 17, 1914 (G, B, S). Eight miles north of Orland, *Heller* 11838, April 16, 1915 (G, S). Campbell, *Heller* 8512, May 7, 1907 (N, G, S). Anderson, *W. W. Jones* 264, May 9, 1911 (G); *L. E. Smith*, May, 1915 (C). St. Helena, *Jepson*, May 2, 1897 (G).

OREGON: Near Wimer, Jackson County, *Hammond* 292, June 7, 1892 (N).

LOWER CALIFORNIA: Northern Lower California, *Orcutt* 2259, April 6, 1886 (B).

Of the California specimens above listed *Heller & Brown* 5361, *Heller* 12306, and the plant collected by *Jepson* are referred doubtfully to this species.

77. *Allocarya corrugata* Piper, sp. nov.

Annual, sparingly branched from the base, the branches erect, 10 cm. high; stems slender but apparently somewhat fleshy, sparsely strigillose; leaves narrowly linear, sparsely pustulate-strigillose, 2 to 4 cm. long; racemes loose in fruit, the internodes 4 to 6 times as long as the calyces, the lower flowers bracteate; pedicels shorter than the calyces; calyx not accrescent, 2 mm. long, the lobes erect, lanceolate, acute, sparsely strigillose; corolla exceeding the calyx, 1.5 mm. broad; nutlets ovoid, 1.3 mm. long, the dorsum keeled near the apex, transversely rugulose with shiny, rather even ridges, sparsely tuberculate near the base, not at all granulate, the venter keeled its whole length, reticulately rugulose; scar suprabasal, narrow, one-fourth as long as the nutlet; epidermis of nutlet very finely muriculate.



Type in the U. S. National Herbarium, no. 880533, collected at Guernsey, Tulare County, California, March 25, 1914, by Miss Alice Eastwood (no. 3895). Specimens of the same collection are in the Gray Herbarium and in the herbarium of the California Academy of Sciences.

**78. *Allocarya scalpocarpa* Piper, sp. nov.**

Annual, branched from the base, the branches ascending to erect, 10 to 12 cm. high; stems slender, strigillose; leaves linear, acute, finely strigillose above, pustulate-strigillose beneath, 1 to 3 cm. long; racemes rather loose in fruit, the internodes 3 to 4 times as long as the calyces, a few of the lower flowers bracteate; pedicels nearly as long as the calyces; calyx not accrescent, the lobes lance-oblong, acute, little spreading, strigillose, 2 mm. long, little exceeding the nutlets; corolla 3 mm. broad; nutlets ovoid, dull, 1.6 mm. long, the dorsum convex, obscurely keeled near the apex, prominently tuberculate or the tubercles obscurely united as ridges, densely granulate, the venter keeled, somewhat reticulately rugulose; scar lanceolate, in a conspicuous circular depression; epidermis of the nutlets strongly muriculate under the microscope.

Type in the herbarium of the California Academy of Sciences, collected at Burney, Shasta County, California, June 28, 1912, by Miss Alice Eastwood.

**79. *Allocarya californica* (Fisch. & Mey.) Greene, Pittonia 1: 20. 1887.**

*Myosotis californica* Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 42. 1835.

*Eritrichium californicum* A. DC. in DC. Prodr. 10: 130. 1846.

*Krynitzkia californica* A. Gray, Proc. Amer. Acad. 20: 266. 1885.

*Allocarya scopulorum* Greene, Pittonia 1: 16. 1887.

TYPE LOCALITY: "In Nova California circa coloniam Ross."

Apparently authentic specimens are in the National Herbarium from the St. Petersburg Botanical Garden, and in the Gray Herbarium from the botanical gardens at Leipzig and Cambridge. All of these are plants 30 to 45 cm. high; the leaves are rather thin and strigillose on both faces, the racemes are loose, and the scar is linear to panduriform and one-fourth to one-third as long as the nutlet. In recent gatherings these specimens are well matched by Miss Eastwood's nos. 55 and 4591, Heller's no. 5929, and Blaisdell's plant from Mokelumne Hill. There seems to be, however, in California every gradation from the above to low plants with densely flowered racemes and ovate scar to the nutlet, the latter form not being distinguishable from *A. scopulorum* Greene. Some of the dwarfer plants have linear scars, as in Sonne's specimen from Truckee.

*Allocarya scopulorum* was based on "*Eritrichium californicum* var. *subglochidiatum* Gray as to the plant of Colorado, Wyoming, and Montana." Greene's original description evidently includes forms with bristly and with glabrous nutlets, while the synonym quoted refers only to forms with bristly nutlets. This, as shown by the Rocky Mountain specimens marked by Dr. Gray, includes *A. nelsoni* Greene and *A. asperula* Piper. Nevertheless, in his own herbarium Dr. Greene consistently used the name *A. scopulorum* for the very common plant of the Rocky Mountains with glabrous nutlets. In the Greene Herbarium no sheet is labeled type, but there is only one specimen collected previous to 1887, namely, "Denver, Colo., Greene, in 1870." In the herbarium of the California Academy of Sciences, Tweedy's no. 817, from Yellowstone Lake, collected in July, 1885, is labeled "type," but apparently not by Dr. Greene himself. Both specimens represent the common Rocky Mountain plant which has very consistently been recognized as *A. scopulorum* Greene. For the reasons indicated above it has seemed necessary to reduce *A. scopulorum* to synonymy.



## SPECIMENS EXAMINED:

- CALIFORNIA: Avery, *Eggleston* 9175 (N). Upper Sacramento, *Parkinson* (N). Without locality, *Newberry* (N). Yreka, *Butler* 1424 (N, S). Mendocino, *Brown* 737 (N). Mount Sanhedrin, *Heller* 5929 (N, G). Donner Lake, *Heller*, July 8, 1903 (N, G); *Heller* 6891 (S; in other herbaria this number includes *A. hispidula* and *A. penicillata*). Donner, *K. Brandegee*, in 1888 (B). Truckee, *Heller* 7055a (N, S, in part). Truckee, *Sonne*, June 27, 1884 (G). Yosemite Valley, *Canby*, August, 1895 (N); *Abrams* 4613 (G). Hetch-Hetchy, *Congdon* 9935 (G); *Hall & Babcock* 3366, July, 1902 (B). Calaveras Big Tree Grove, *Dudley*, August 19, 1906 (S). Calistoga, *Eastwood*, May 8, 1900 (G); *Tracy* 1852, May, 1903 (B); *Tracy* 1843, May, 1903 (B). Cuyamaca Lake, *Abrams* 3845 (N, G, S); *K. Brandegee*, July 17, 1906 (B). Cuyamaca, *T. S. Brandegee*, June 5, 1896 (B). Modoc Ranch, *T. S. Brandegee* 1066 (B). Modoc County, *Austin* (B); *M. S. Baker* (B). Goose Lake, *Austin*, June, 1885 (B). Butte County, *Austin* (B). Prattville, *Cleveland*, July, 1882 (B). Little Hot Spring Valley, Modoc County, *Baker & Nutting*, June 4, 1894 (B). Sherwood Valley, *Blasdale* 1057, May 29, 1899 (B). Comptche, *Walker* 215, June, 1906 (B). Cazadero, *Congdon* 55 (G). Jolon, *Eastwood* 4132, in part (C). Petrified Forest, *Eastwood* 4591 (C). Kentfield, *Eastwood* 55 (C). Fallen Leaf Lake, *Eastwood*, in 1906 (C). Mount Diablo, *W. W. Carruth*, April 29, 1902 (C). Mokelumne Hill, *Blaisdell* (C). Blockman Ranch, Mariposa County, *Eastwood* 4279 (C).
- WASHINGTON: Calispell Lake, *Kreager* 605 (N, G). Satus, *Cotton* 1134 (N). Without locality, *Vasey*, in 1885 (N); *Vasey* 424 (N, G); *Vasey* 423 (N, G). Whitman County, *Elmer*, in 1896 (N). Ellensburg, *Whited* 654 (G). Yakima Region, *Brandegee*, in 1882 (B).
- IDAHO: Santianna Creek, *Leiberg* 1028 (G, N); *Leiberg* 1065a (G). Corral, Camas Prairie, *Macbride & Payson* 2922 (G). Big Potlatch River, *Sandberg, Heller & MacDougal* 365 (G). Falk's Store, Canyon County, *Macbride* 219 (G, S, B, N). Near Dixie, *Macbride & Payson* 2856 (G). Lewiston, *Heller* 3214 (N). Moscow, *Henderson*, June 16, 1894 (N). Lower Priest River, *Leiberg* 2892 (N). St. Anthony, *Merrill & Wilcox* 815, in part (N, G). Pend Oreille, *Greene*, August 9, 1889 (B).
- OREGON: Elk Creek, *Leiberg* 4171, in part (N). Shirk, *Leiberg* 2591 (N, G, B). Klamath Valley, *Cronkhite* 65 (N, B); *Cronkhite* 23 (N, B).
- UTAH: Fish Lake, *Rydberg & Bessey* 7605 (N, G). Burrill Sink, *Jones* 5638f (N). Panguitch Lake, *Jones* 6015am (N). Clayton Peak, Wasatch Mountains, *Stokes*, August 12, 1903 (N). Farmington, *W. W. Jones* 266 (G). Humboldt Basin, *Gray*, in 1872 (G).
- NEVADA: Lee, Elk County, *Heller* 9435 (G, S). Truckee Valley, *Watson*, July, 1867 (N). Franktown to Washoe, *Heller*, July 22, 1912 (S).
- NEW MEXICO: Chama, *Standley* 6800 (N, G).
- ARIZONA: Flagstaff, *Hitchcock*, August, 1915 (N). Without locality, *Palmer* (N).
- COLORADO: Denver, *Greene*, June 15, 1870 (E). Grizzly Creek, *Goodding* 1866, August 12, 1903 (N). Routt County, *Crandall* 354 (N). Gunnison County, *Cowen*, August 9, 1892 (N). Gunnison, *Baker* 938, August 27, 1901 (N, G). Buffalo Pass, *Shear* 3920, August 14, 1898 (N). Middle Park, *Parry*, in 1864 (N).<sup>1</sup> Georgetown, *Shear*, August 19, 1895 (N). Cerro Summit, *Baker* 152, June 17, 1901 (N, B, G). South Park, *Wolf* 691 (N). Camp Creek, Larimer County, *Goodding* 1469 (G). Del Norte, *Brandegee*, in 1875 (B). Tab-

<sup>1</sup> Determination doubtful.



eguache Basin, *Payson* 573 (G). Allanspark, *Johnston & Hedgcock* 519 (G); *Johnston & Hedgcock* 517 (G). Longs Peak Inn, *Johnston & Hedgcock* 518 (G).

WYOMING: Little Laramie River, *E. Nelson* 3451, July 24, 1897 (B). Teton Forest. *Brandeggee*, in 1897 (N, B.) Crazy Mountain, *Williams*, July 31, 1898 (N). Bighorn Mountains, *Williams*, July 30, 1898 (N). Glenrock, *Nelson* 8379 (N, G). Doyle Creek, Bighorn County, *Goodding* 360 (N, B, G). Norris, *Nelson* 6136 (N, G). Dubois, *Nelson* 768 (N, B, G). Evanston, *Williams*, July 10, 1897 (N). Yellowstone Lake, *Tweedy* 817, August, 1885 (N, G); marked "type" in the herbarium of the California Academy of Sciences. Yellowstone Lake, *Burglehaus*, September, 1893 (N); *Rydberg & Bessey* 4881 (N, G). Yellowstone Park, *Mearns* 1841 (N). Camp Crawford, *Clemens*, August 6, 1908 (G, S). Centennial Valley, *Nelson* 1855, August 25, 1895 (B). MONTANA: Wreck Creek, Sweet Grass County, *Eggleston* 7987 (N). Bozeman, *Blankinship* 371 (N). Cedar Mountain, *Rydberg & Bessey* 4880 (N, G.) NORTH DAKOTA: Devils Lake, *Geyer*, August 1, 1839 (N). YUKON: Dawson, introduced, *Macoun* 78738, July 15, 1902 (B).

## DOUBTFUL SPECIES.

ALLOCARYA SUBGLOCHIDIATA (A. Gray) Piper, Contr. U. S. Nat. Herb. 11: 485. 1906. *Eritrichium californicum subglochidiatum* A. Gray in Brewer & Wats. Bot. Calif. 1: 526. 1876.

*Krynitzkia californica subglochidiata* A. Gray, Proc. Amer. Acad. 20: 266. 1885.

TYPE LOCALITY: "Placer to Sierra Co. (*Kellogg, Lemmon*), Nevada (*Watson*), etc."

The following specimens in the Gray Herbarium were before Dr. Gray in 1876, and were marked by him "*subglochidiatum*—Syn. Fl. N. A."

Battle Mountains, Nevada, *Watson* 851, June, 1868. Very young.

Truckee Valley, Nevada, *Watson* 851, May, 1868. Very young.

Carson City, Nevada, *Watson* 851, April, 1868. Very young.

Clover Mountains, Nevada, *Watson* 851, September, 1868. *A. asperula* Piper.

Fort Bridger, Wyoming, *Porter*, July 11, 1873. *A. asperula* Piper.

Uinta Mountains, Utah, *Porter*, July 28, 1873. *A. californica*? Too young for certain identification.

*Kellogg & Harford* 722. Nutlets only; *A. asperula* Piper?

Rocky Mountains, latitude 39°–41°, *Hall & Harbour* 433, in part. *A. nelsoni* Greene.

Rocky Mountains, *Hall*, grown from seed. *A. nelsoni* Greene.

The "Placer to Sierra Co. (*Kellogg, Lemmon*)" specimens have not been found. Upon the establishment of their identity or identities will depend the application of the name *subglochidiata*.

ALLOCARYA BRACTEATA Howell, Fl. Northw. Amer. 481. 1901.

There is no specimen in the Howell Herbarium marked *A. bracteata*, the type of which was collected "in wet places, Umpqua Valley, Oregon," nor have any been seen elsewhere. From the description alone it is very difficult to say what the plant may be.

ALLOCARYA HENDERSONI A. Nels. Erythea 7: 69. 1899.

For the examination of the type specimens thanks are due to Dr. Aven Nelson. The specimens cited in the original description are all immature, but all represent the northwestern species of *Cryptantha* which has commonly been referred to *C. muriculata* (Hook. & Arn.) Greene, but which is different from that California species and much nearer to *C. ambigua* (A. Gray) Greene.



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