THE ALLIONIACEAE OF THE UNITED STATES, WITH NOTES ON MEXICAN SPECIES.

By Paul C. Standley.

INTRODUCTION.

Of all the families of North American plants none, probably, have been more neglected than the Allioniaceae. In the last fifty-five years no monograph of the American representatives of the family has appeared. Linnæus in the Species Plantarum published two North American genera of this family—Mirabilis, with one species, and Boerhaavia with four species, only two of which, however, occur in the region under consideration. Other genera and species of the family were soon published, all of them in scattered publications. The first treatment of the family as a whole was that of Choisy in De Candolle's Prodromus. In that work, 10 North American genera were described and, under them, 31 species, not including several species of Pisonia. Choisy's work is interesting and at times helpful, but the author labored under the difficulty of not having seen some of the plants of which he wrote, as a result of which some serious mistakes were made. The next work of any importance dealing with the family was that of Asa Gray, in the Botany of the Mexican Boundary Survey;[a] that paper is a very brief one and includes descriptions of but few species, although Gray described at various times a considerable number of new genera and species in the Allioniaceae.

Dr. Anton Heimerl, of Vienna, probably the foremost student of this group of plants, contributed to Engler and Prantl's Natürlichen Pflanzen-Familien[b] the section dealing with the Allioniaceae, a paper valuable for the excellent discussion it contains of the various genera. The work is exceedingly conservative, and the family is treated as

[a] A. Gray in Torrey, Bot. Mex. Bound. 172–175. 1859. (Emory, Rep. U. S. & Mex. Bound. Surv. Vol. II, Pt. 1.)

[b] Teil III, Abt. 1 b, pp. 14–32. 1889.

European botanists so commonly treat groups of American plants. The genus Allionia, for instance, is made a mere section of Mirabilis, and other adjustments of the same kind are made which, although they may be the easiest way of disposing of genera, are certainly not conducive to clearness.

In 1902 Mr. M. E. Jones published in his Contributions to Western Botany [a] a paper dealing with the family as it is represented in the Great Plateau region, an area in which are found almost all the species at that time known to occur in the United States. In the same year there appeared in the Bulletin of the Torrey Botanical Club [b] a paper by Dr. Per Axel Rydberg dealing with the Allioniaceae of the Rocky Mountains and containing descriptions of a number of new species, which is undoubtedly the most critical and valuable publication dealing with any group of the American representatives of the family.

The work, the results of which are here discussed, was carried on at the New Mexico Agricultural College during the years 1907 and 1908. The writer had the privilege of examining all the material of the Allioniaceae to be found in the herbaria of the following institutions and individuals: National Herbarium; Missouri Botanical Garden, including the Engelmann and Bernhardi herbaria; Field Museum of Natural History; University of California, including the Brandegee Herbarium; University of Wyoming; University of Nevada; University of Arizona; Mr. A. A. Heller, Mr. K. K. Mackenzie, Prof. E. O. Wooton, and the New Mexico Agricultural College. He wishes here to express his obligations to the curators or owners of these collections; also to Mr. G. E. Osterhout, who furnished material for examination. It was only through the kindness of those who have charge of these various collections that this work was made possible. The author is under special obligations to Prof. E. O. Wooton, under whose direction the work was begun and completed.

The present paper is intended to cover all the representatives of the family occurring within the United States and most of those found in Mexico and the West Indies, with the exception of the genus Pisonia.

The drawings are by the author, with the exception of Plates XXXIV and XXXV, which are by the German artist, W. Liepoldt. The author wishes especially to express his indebtedness to Dr. Anton Heimerl, who forwarded to him the two latter drawings and the descriptions which accompany them, with permission to use them here. Doctor Heimerl's notes attached to the sheets of the National Herbarium have also in several instances been of great help in the preparation of this paper.

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[a] 10: 34–54.

[b] 29: 680–693.

SYSTEMATIC TREATMENT.

ALLIONIACEAE Reichenb. Consp. 85. 1828.

Nyctaginaceae Lindl. Nat. Syst. ed. 2. 213. 1836.

Annual or perennial herbs, often shrubs or trees, with branching or dichotomous-forking stems; stems usually with swollen joints, sometimes armed with spines; leaves opposite or alternate, simple, entire, or sometimes repand, exstipulate; inflorescence various; flowers regular, perfect or sometimes unisexual, often subtended by bracts which form a calyx-like involucre; perianth consisting of a calyx only, this often showy and corolla-like, tubular, funnelform, or campanulate, usually deciduous above the ovary; stamens 1 to many; filaments filiform, distinct or united at the base, often unequal in length, exserted or included; anthers 2-celled, opening by longitudinal fissures; ovary 1-celled, superior but surrounded by the calyx tube, sessile or short-stalked; style slender; stigma usually capitate; ovule solitary, erect, sessile; fruit an anthocarp, indehiscent, fleshy, leathery, or hard, angled, ribbed, grooved, or winged; seed erect, with a hyaline testa which is free from or adnate to the pericarp; endosperm variable; embryo straight or curved.

The family consists of about 26 genera and 250 species. Most of the genera and species are confined to the Western Hemisphere. In the Old World there are found one species of Allionia, several of Boerhaavia and Pisonia, and the monotypic South African genus Phaeoptilon. Of these only one, a species of Boerhaavia, occurs in Europe (in southern Spain), the others being confined to Africa, southern and eastern Asia, and the islands of the Pacific. Doctor Heimerl mentions the fact that one or two American species have become naturalized at various places in Europe.

In the Western Hemisphere there seem to be two centers of distribution, one in tropical and subtropical South America and the West Indies, characterized by such genera as Pisonia, Neea, Bougainvillea, and others; the other in Texas, New Mexico, Arizona, California, and northern Mexico, especially characterized by such genera as Boerhaavia, Abronia, Acleisanthes, Allionia, but presenting several others. Of the entire number of genera included in the family 16 occur in the latter region embracing more than 160 species. It is the region about this center that this paper attempts to cover.

KEY TO THE GENERA.

Flowers involucrate.

Involucre polyphyllous, composed of 5 to 15 bracts which surround a few-flowered or many-flowered head.

Fruit winged or at least with rudimentary wings; bracts few; stamens and pistil included.

Wings not completely encircling the fruit but interrupted above and below ---- 1. ABRONIA (p. 306).

Wings completely encircling the fruit -- 2. TRIPTEROCALYX (p. 327).

Fruit not winged but merely 10-ribbed; bracts more numerous; stamens and pistil exserted ---------- 3. NYCTAGINIA (p. 330).

Involucre gamophyllous; flowers 1 to several.

Fruit with prominent lateral wings which are often toothed; with 2 rows of glands along the dorsal surface---------- 4. WEDELIA (p. 331).

Fruit not winged.
Fruit with 5 prominent ribs; involucre enlarged and membranous in fruit.... 5. ALLIONIA (p. 334).
Fruit smooth or somewhat 5-angled but not ribbed; involucres not membranous and usually not enlarged in fruit.
Involucre rotate, slightly enlarged in fruit, 3-flowered.---------- 6. ALLIONIELLA (p. 356).
Involucres campanulate, not enlarged in fruit.
Involucres containing several flowers which have a rather thick tube of medium length or sometimes rather long---- 7. OXYBAPHUS (p. 357).
Involucres 1-flowered.
Perianth campanulate---- 8. HESPERONIA (p. 360).
Perianth funnelform with a long, slender tube---- 9. MIRABILIS (p. 366).
Flowers without an involucre or each flower subtended by 1 to 3 bracts.
Fruit with conspicuous, thin, membranous wings- 16. SELINOCARPUS (p. 387).
Fruit not conspicuously winged; wings when present thick and coriaceous.
Flowers large, 2 cm. long or usually more.
Perianth with a long slender tube and broad limb, each flower subtended by 2 or 3 small, narrow bracts. ---- 10. ACLEISANTHES (p. 369).
Perianth campanulate, subtended by a large, ovate, leaf-like bract. ------ 11. HERMIDIUM (p. 372).
Flowers small, 2 cm. long or usually much less.
Fruit 10-angled or 10-ribbed.
Fruit asymmetrical, flowers in racemes. ---------- 12. SENKENBERGIA (p. 372).
Fruit symmetrical, flowers not in racemes.
Fruit with conspicuous, mucilaginous glands; climbing or reclining plants with thin leaves; flowers in umbels---- 12. SENKENBERGIA (p. 372).
Fruit without conspicuous glands; erect plants with very thick leaves; flowers irregularly clustered, not in umbels---------- 14. ANULOCAULIS (p. 374).
Fruit 5-angled, 5-ribbed, or sometimes with low, thick wings; perianth campanulate ---------- 15. BOERHAAVIA (p. 375).

1. ABRONIA Juss.

Abronia Juss. Gen. 448. 1789.

Tricratus L'Her.; Willd. Sp. Pl. 1: 807. 1799.

Annual or perennial herbs, erect or prostrate, glabrous or pubescent; leaves opposite, petioled, the blades unequal and entire; flowers few or numerous in the head, this surrounded by 5 or more distinct bracts; perianth colored and

corolla-like, with an elongated tube which is constricted above the ovary, expanding above into a 5-lobed limb; stamens 3 to 5, included, their filaments unequal; fruit leathery, usually 3 to 5-winged but sometimes only ribbed or almost smooth; seed filling the pericarp, to which it adheres; one of the cotyledons abortive, the seedling thus appearing monocotyledonous.

Of the history of this genus Doctor Rydberg says:[a] "In the original publication no type species was mentioned. The genus was described from a plant collected on Dé la Pérouse's journey in California and cultivated by Mr. Colignon. Hooker, in his Exotic Flora,[b] identifies Colignon's plant as *Abronia umbellata*. The type of Tricratus is the same."

The genus is a North American one and is confined chiefly to the western part of the United States. One or two species extend into southwestern Canada and three into northwestern and northeastern Mexico. On the east the range extends into western Nebraska and Kansas, and on the west to the Pacific coast. The writer has seen no specimens from southern central Arizona, where the genus would be expected to occur, since it is common to the east in southern New Mexico and to the west in California, but Prof. J. J. Thornber states that it is represented in that part of the Territory by one or more species.

Most if not all the species seem to be in a variable or mutating state. They are rather numerous and most of them are confined to comparatively small areas. One of the most striking illustrations of the latter fact is found in A. *carletoni*, the type of which was collected about sixteen years ago in eastern Colorado, but which, as far as the writer is able to learn, has never been collected since. Its closest ally has not been collected nearer than 350 miles to the south.

The writer has tried, but with little success, to arrange the species in a lineal sequence. There are so many different lines along which different species vary that it is almost, if not quite, impossible to do this. There are several groups of species, for instance, which are closely related to A. *fragrans*; but these groups vary in different directions so that it is impracticable to arrange them in a lineal succession which will show their closest relationships. This is true of sections as well as of species and applies equally to the other large genera such as Allionia and Boerhaavia. It is also difficult to arrange the species in sections, and the arrangement which is given here is not at all satisfactory on account of the many intergradient species. The *maritima* and *latifolia* groups are distinct enough. The *fragrans* and *turbinata* groups are most difficult of separation on account of such forms as A. *carletoni* and A. *mcalleyi*, either of which is as closely related to A. *fragrans* as to A. *turbinata*. The *nana* group is easiest to separate because of the peculiar habit of the plants, a habit with which other peculiar characteristics are concurrent.

Among the various characters which are of use in separating species of Abronia the habit is of importance, especially in the *turbinata* group. This is a character that is not well shown in dried specimens generally, for in such specimens it is difficult to tell whether a stem is erect, ascending, or prostrate. The pubescence is variable, but not nearly so much so as in the genus Boerhaavia. While the leaves upon a single plant are usually of the same general shape, the earlier ones commonly differ somewhat from the later, especially in size. It is worthy of note that in all the Abronias the opposite leaves are unequal in size, sometimes very strikingly so, a peculiarity characteristic of some other genera of the family. The difference in outline in opposite leaves is also sometimes conspicuous.

The size and shape of the involucral bracts are among the best characters by which to distinguish species in this genus, for they show little variation

[a] Bull. Torr. Club 29 : 681. 1902. [b] 3 : *pl. 193, 194*. 1827.

within a group of plants that may be taken as a species; the same is true of the size of the flowers. The color of the flowers is more or less variable, white-flowered forms of normally red-flowered species being occasionally found. The fruit is perhaps of the most importance. The outer and inner fruits in a single head are often very different in form; but the inner ones in different heads on the same plant are remarkably uniform in shape. A word may be necessary in explanation of the terms "turbinate" and "biturbinate," as employed by Doctor Rydberg, whose usage I have followed. The distinction between the two is difficult to understand from mere descriptions, but I hope that by reference to the accompanying drawings it may be more easily grasped.

KEY TO THE GROUPS.

Flowers yellow ..... I. LATIFOLIAE.
Flowers red or white, never yellow.
  Flowers dark, deep red; fruit large and with very thick wings ..... II. MARITIMAE.
  Flowers lighter, purplish red or white; fruit smaller and with thinner wings.
    Low perennials which are almost acaulescent, with a short and thick caudex ..... IV. NANAE.
    Annuals or perennials with long stems which have conspicuous internodes.
      Involucral bracts small, usually not scarious, mostly narrow.
        Central cavity of the fruit extending quite to the edges of the wings when wings are present ..... V. TURBINATAE.
        Central cavity of the fruit not extending quite to the edges of the wings ..... III. UMBELLATAE.
      Involucral bracts usually much larger, scarious, mostly broad ..... VI. FRAGRANTES.

KEY TO THE SPECIES BY GROUPS.

I. LATIFOLIAE. Prostrate perennials with thick, fleshy roots, and thick, orbicular leaves; fruit coriaceous, large, with 4 or 5 thick wings which are widest in the middle and narrowed above and below. A single species ..... 1. *A latifolia.*

II. MARITIMAE. Prostrate perennials; fruit coriaceous, large, with 4 or 5 thick wings, the central cavity extending almost or quite to the edges of the wings; bracts thick, narrowly elliptical. A single species ..... 2. *A. maritima.*

III. UMBELLATAE. Prostrate annuals or perennials; flowers red (white in one species); bracts mostly lanceolate, small; fruit with thin or rarely somewhat thickened wings, the central cavity not extending quite to the edges of the wings.
Fruit not winged; plant very small; leaves orbicular; only 3 or 4 flowers in each head ..... 17. *A. alpina.*
Fruit winged.
  Stems puberulent or glabrous, not villous.
    Wings thickened and coriaceous.
      Stems almost glabrous, internodes long, flowers red ..... 3. *A. insularis.*
      Stems puberulent, internodes short, flowers white ..... 4. *A. alba.*

Wings of the fruit thin.
Flowers about 1 cm. long.
Fruit with broad wings which are prolonged above the body of the fruit and are acute ..... 5. *A. acutalata.*
Fruit with very narrow wings which are widest in the middle and not prolonged above ..... 6. *A. breciflora.*
Flowers 1.5 cm. long or more.
Leaves thick, broad, and shining; bracts thick ..... 10. *A. neurophylla.*
Leaves thin, not shining, narrow, or if broad puberulent; bracts thin.
Wings truncate above or sloping up to the short beak ..... 7. *A. umbellata.*
Wings prolonged above the body of the fruit.
Leaves narrowly elliptical or lanceolate; wings of fruit much narrowed below ..... 8. *A. minor.*
Leaves wider and irregular; wings little narrowed below ..... 9. *A. variabilis.*
Stems typically villous.
Fruit small, with only 2 wings, which are large, considering the size of the body of the fruit; plants erect or ascending when young, later prostrate ..... 16. *A. pogonantha.*
Fruit larger, almost always with more than 2 wings.
Fruit with the wings little narrowed below and broad; body of the fruit small, not ribbed or pitted; leaves more or less sinuate-margined.
Wings rather thin; leaves only slightly sinuate; plant stout ..... 11. *A. platyphylla.*
Wings thick and tough; leaves conspicuously sinuate; plant slender ..... 12. *A. gracilis.*
Fruit with the wings much narrowed below; body of the fruit large and conspicuous, frequently strongly ribbed or pitted; leaves not sinuate.
Flowers about 12 mm. long ..... 13. *A. villosa.*
Flowers about 25 mm. long.
Wings not much prolonged above the body of the fruit, the sinus between them broad and shallow ..... 14. *A. pinetorum.*
Wings much prolonged above the body of the fruit, forming a deep and narrow sinus ..... 15. *A. aurita.*

IV. NANAE. Low perennials, 20 cm. high or less, with thick woody caudices; fruit with thin, double wings, the central cavities extending to their edges.

Bracts narrowly lanceolate ..... 18. *A. corillei.*
Bracts elliptical or obovate, broader.
Leaves broadly or narrowly elliptical ..... 19. *A. nana.*
Leaves narrowly oblanceolate ..... 20. *A. bigelovii.*

V. TURBINATAE. Annuals, erect, ascending, or prostrate; flowers red or almost white; wings of the fruit often surmounted by disks; bracts small, usually 1 cm. long or less, and usually narrowly lanceolate.

Bracts elliptical or obovate, obtuse.
Leaves broad, elliptical or ovate; fruit not winged ..... 21. *A. cralata.*
Leaves narrowly lanceolate; fruit with prominent wings, which are surmounted above by disks ..... 27. *A. carletoni.*
Bracts lanceolate, acute.
Flowers pale, whitish; plants with a tendency to erectness if not quite erect ..... 22. *A. turbinata.*
Flowers red; plants prostrate.
Stems almost or quite glabrous; leaves obtuse, frequently cordate at the base ..... 23. *A. arizonica.*
Stems viscid-puberulent.
Leaves conspicuously lobed ..... 24. *A. lobatifolia.*
Leaves not conspicuously lobed.
Leaves mostly ovate, rounded or broadly cuneate at the base; seed lanceolate, 2 to 2.5 mm. long ..... 25. *A. torreyi.*
Leaves narrowly lanceolate, much narrowed at the base; seed narrowly ovate in outline, 1.5 mm. long ..... 26. *A. angustifolia.*

VI. FRAGRANTES. Perennials, mostly erect or ascending; flowers white or greenish; fruit turbinate or biturbinate, variously winged or ridged.
Fruit biturbinate, i. e., tapering at both ends; or, if inclined to be turbinate, merely ridged and not winged.
Stems pubescent.
Stems hirsute; fruit not very decidedly biturbinate, almost truncate above; bracts 7 mm. long, lanceolate ..... 39. *A. robusta.*
Stems variously pubescent, but not hirsute.
Flowers 12 mm. long or less.
Plant prostrate; bracts lanceolate ..... 44. *A. ammophila.*
Plant erect; bracts ovate ..... 37. *A. neallegi.*
Flowers about 20 mm. long.
Bracts more than 10 mm. long ..... 41. *A. fragrans.*
Bracts less than 8 mm. long.
Bracts narrowly elliptical ..... 38. *A. texana.*
Bracts broadly ovate ..... 42. *A. undata.*
Stems glabrous.
Plant tall; fruit with distinct ridges; bracts acute .. 43. *A. glaucescens.*
Plant low; fruit very slightly ridged or smooth; bracts obtuse ..... 30. *A. glabrifolia.*
Fruit turbinate, i. e., obpyramidal or obcordate in outline, winged.
Bracts lanceolate, attenuate.
Stems almost or quite glabrous; wings rather narrow and thick ..... 45. *A. lanceolata.*
Stems puberulent; wings broad and thin ..... 46. *A. mellifera.*

Bracts broadly ovate or obovate, acute or acutish.
Stems densely viscid-pubescent or hirsute-pubescent; bracts 10 to 15 mm. long.
Fruit narrow, almost twice as long as wide; stems hirsute ..... 40. *A. fendleri.*
Fruit about as broad as long; stems viscid-pubescent.
Blades of stem leaves elliptical; bracts broadly obovate, 12 to 15 mm. wide, rather obtuse ..... 35. *A. salsa.*
Blades of stem leaves lanceolate; bracts oval, acute, 6 or 7 mm. wide ..... 36. *A. fallax.*
Stems finely puberulent or glabrous; bracts 5 to 8 mm. long.
Leaf blades puberulent.
Wings of fruit with disks above ..... 29. *A. ramosa.*
Wings of fruit without disks above.
Leaves orbicular in outline ..... 33. *A. orbiculata.*
Leaves elliptical, ovate, or lanceolate .. 31. *A. pumila.*
Leaf blades glabrous.
Stems glabrous ..... 28. *A. glabra.*
Stems puberulent.
Branches from the base of the plant simple; bracts obtuse ..... 32. *A. elliptica.*
Stems branched; bracts acute ..... 34. *A. sparsifolia.*

1. **Abronia latifolia** Eschsch. Mem. Acad. Petersb. **5**: 271. 1826.

FIGURE 49.

Abronia arenaria Menz.; Hook. Exot. Fl. **3**: *pl. 193.* 1827.

This is easily distinguished by its yellow flowers and orbicular leaves. The species is variable in several respects; the Oregon and Washington plants have broader leaves and thicker petioles than those from California; their fruit has wider wings, which are more often truncate above; and their bracts are frequently much wider than those of southern specimens. Heller's 3943 from Westport, Wash., is especially worthy of notice in these respects.

FIG. 49.—Fruit of *Abronia latifolia*. Scale 2.

This species ranges from Victoria, British Columbia, southward along the Pacific coast to Santa Barbara County, Cal. (Carpenteria).

2. **Abronia maritima** Nutt.; S. Wats. in Brewer & Wats. Bot. Cal. **2**: 4. 1880.

FIGURE 50.

This species exhibits but little variation, and that mostly in the size of the fruit and the texture of the wings.

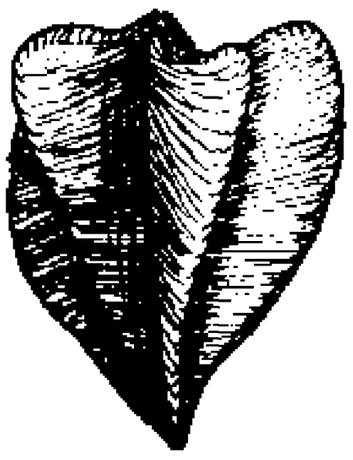


FIG. 50.—Fruit of *Abronia maritima*. Scale 2.

Ranges along the Pacific coast from Los Angeles County, Cal., southward through Lower California to the Territorio de Tepic, Mexico; also found on many of the islands off the southern Californian and Lower Californian coasts.

3. **Abronia insularis** Standley, sp. nov. PLATE XXVIII.

Perennial?; stems long and slender, perfectly glabrous except at the nodes, there minutely puberulent; leaf blades elliptical, obtuse, much narrowed at the base, glabrous, the opposite leaves unequal but of the same shape, 15 to 30 mm. long and 6 to 14 mm. wide; petioles as long as the blades or shorter, sparingly and very minutely puberulent; flowers many, 15 mm. long, their tubes sparingly puberulent; fruit about 10 mm. long and 12 mm. wide,

light yellowish-brown, the body indurated and depressed between the wings; wings 4, broad, 5 mm. wide above, much narrowed below, rounded above but not usually prolonged above the body, tough, thick, coriaceous, distinctly transversely veined.

A species to be separated from *A. umbellata* on account of its glabrous stems and the thick, coriaceous wings of the fruit; also of its internodes, which are very long, so that the plant does not appear at all leafy. Type U. S. National Herbarium no. 444666, collected on San Clemente Island off the coast of southern California, by Mrs. Blanche Trask, October, 1902 (no. 50). A younger plant from the same locality has slightly puberulent stems, leaves broader and orbicular or broadly elliptical, the petioles longer than the blades. I doubt if it is the same as the plant described above. Another specimen probably to be placed here is one collected at Santa Barbara, 1902, *Elmer* 3754.

EXPLANATION OF PLATE XXVIII.—*a*, Plant of *Abronia insularis*; *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

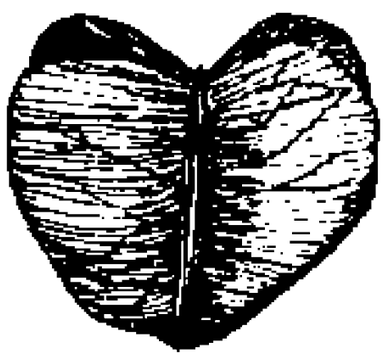


FIG. 51.—Fruit of *Abronia alba*. Scale 2.

4. Abronia alba Eastwood, Proc. Cal. Acad. III. 1: 97. 1898. FIGURE 51.

Abronia umbellata alba Jones, Contr. Western Bot. **10**: 45. 1902.

This species is distinguished by its white flowers. From *A. insularis* it can be separated by the thinner wings of its more puberulent fruit and by its shorter internodes and densely viscid-puberulent stem.

Specimens examined:

CALIFORNIA: On San Nicolas Island, April, 1897, *Mrs. Blanche Trask*, type collection.

5. Abronia acutalata Standley, sp. nov. PLATE XXIX, FIGURE 1.

Perennial ?; stems prostrate, puberulent; leaf blades elliptical, obtuse or acutish, attenuate at the base, 15 to 20 mm. long and 5 to 12 mm. wide, sparingly viscid-puberulent; petioles 10 to 25 mm. long, viscid-puberulent; bracts 4 or 5, lanceolate, acute, about 5 mm. long and 2 mm. wide, puberulent; flowers about 8, 10 mm. long, the limb 5 mm. wide, apparently of a brighter red than in *A. umbellata*, the tube with abundant fine, white pubescence; fruit about 10 mm. long and as wide, its wings very broad and thin, about 5 mm. wide, narrowed to the base of the body, spreading above and prolonged above the body of the fruit, acute above at the ends of the wings; beak of fruit very short.

This is distinguished from *A. umbellata* by its smaller flowers and by the prolonged, acute wings of the fruit; from *A. breviflora* it differs in the shape of the leaf blades and the characteristics of the fruit. Type in the Herbarium of the Missouri Botanical Garden, cotype National Herbarium no. 402105; collected in the Olympic Mountains, Clallam County, Washington, August, 1890, *Elmer* 2790.

EXPLANATION OF PLATE XXIX.—Fig. 1, *a*, plant of *Abronia acutalata*; *b*, fruit of same. Fig. 2, *a*, plant of *A. minor*; *b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

6. Abronia breviflora Standley, sp. nov. PLATE XXX.

Annual; stems spreading, slender, with very short and scanty viscid pubescence; leaf blades with a very few minute, scattered, glandular-viscid hairs, ovate, 20 to 25 mm. long and 15 to 19 mm. wide, acutish, broadly obtuse or truncate at the base; petioles puberulent, 20 to 30 mm. long; peduncles about 30 mm. long, with very short, fine, viscid pubescence; bracts 4 or 5, narrowly lanceolate, attenuate, 5 mm. long or less, less than 2 mm. wide, puberulent; flowers 10 to 12, about 10 mm. long; limb about 6 mm. wide, apparently of a rather bright red color, the tubes with a fine viscid pubescence longer than

ABRONIA INSULARIS STANDLEY.

ABRONIA ACUTALATA STANDLEY AND A. MINOR STANDLEY.

ABRONIA BREVIFLORA STANDLEY.

that of the peduncles; fruit about 8 mm. long and 4 mm. wide, tapering toward both ends and widest in the middle, very narrowly winged or exalate, the wings widest about the middle, puberulent.

Nearest *A. umbellata* and *A. acutalata*; differing from both in the form of the fruit, from the former, also, by its smaller flowers, which seem to be of a brighter color, and from the latter by the different shape of its leaves. Type U. S. National Herbarium no. 343656, cotype in the Herbarium of the Missouri Botanical Garden; collected at Mendocino, California, June, 1898, *H. E. Brown* 833; also same station, September 27, 1865, *Bolander*.

EXPLANATION OF PLATE XXX.—*a*, Plant of *Abronia breviflora*; *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

7. **Abronia umbellata** Lam. Tabl. Encycl. 1: 469. *pl. 105*. 1791. FIGURE 52.

This species has a glandular-pubescent stem; leaf blades ovate or elliptical, acutish at both ends; plant appearing leafy on account of the rather short internodes; flowers about 15 mm. long, the limb 7 mm. broad; bracts small, lanceolate, reddish; fruit about 10 mm. long and about as wide; its wings mostly 5, thin, much narrowed below and either truncate or tapering above, never rounded or prolonged above the body of the fruit; the outer fruits in the head sometimes tapering toward both ends and with slightly narrower wings.

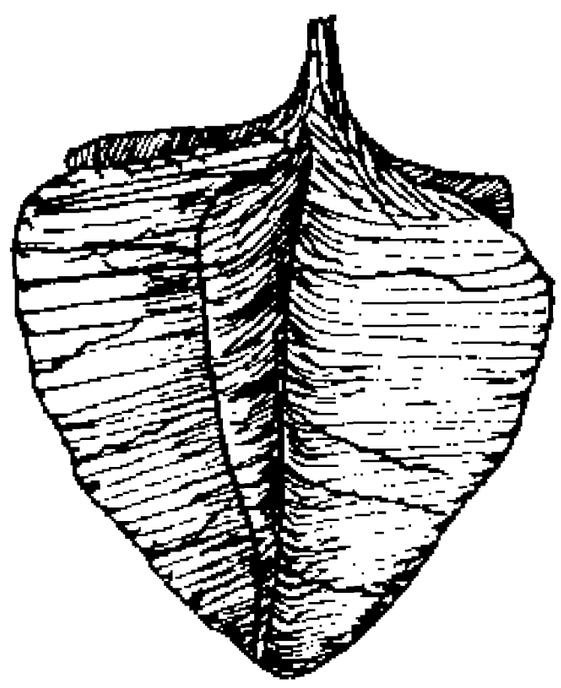


FIG. 52.—Fruit of *Abronia umbellata*. Scale 4.

Specimens examined:

CALIFORNIA: Pescadero, 1861, *F. Guirado* 696; Bay Farm Island, 1898, *Davy;* Pillar Point, 1902, *Baker* 1742; Point Pinos, 1903, *Heller* 6574; Monterey, 1899, *Brandegee;* Oxnard, 1901, *Davy* 7798; Monterey, 1891, *V. Bailey;* Santa Cruz, 1881, *Jones* 2276; San Francisco County, 1869, *Kellogg & Harford* 849; Pacific Grove, 1895, *Rattan* 208; Monterey, 1895, *Canby;* Point Pinos, 1891, *Michener & Bioletti;* Monterey, *M. E. B. Norton;* without locality, *Bridges* 291.

8. **Abronia minor** Standley, sp. nov. PLATE XXIX, FIGURE 2.

Perennial ?; stems spreading, very slender, almost or quite glabrous: leaf blades very narrowly elliptical or oblanceolate, glabrous, obtuse, gradually narrowed towards the base, 18 mm. long and 3 to 6 mm. wide; petioles shorter than the blades, glabrous; peduncles about 35 mm. long, glabrous or scantily and minutely puberulent; bracts 5, narrowly lanceolate, acuminate, puberulent, scarious, 7 mm. long and 2 mm. wide or less; flowers 12 to 15, 15 to 20 mm. long, limb 6 mm. wide, tubes puberulent; fruit broader than long, its body not coriaceous; the wings very broad, much narrowed below, produced above the body of the fruit; outer fruits with very narrow wings which are widest in the middle and narrowed above and below, the wings thin and soft.

This differs from *A. umbellata* in its more glabrous and slender stem, larger bracts, and narrower and more glabrous leaves, while the fruit has wider and thinner wings which are prolonged above the body. Type U. S. National Herbarium no. 23103, cotype in the Herbarium of the Missouri Botanical Garden; collected 25 miles northeast of San Luis Obispo, California, in 1876 by Palmer (no. 521).

Other specimens examined:

Fremont's Exped. to California, 1846; seashore in southern California, April, 1899, *Grant.*

EXPLANATION OF PLATE XXIX.—See under *Abronia acutalata*, p. 312.

9. Abronia variabilis Standley, sp. nov. PLATE XXXI, FIGURE 1.

Perennial, spreading; stems slender, almost glabrous below but puberulent above, especially at the nodes; leaf blades small, 9 to 15 mm. long and 6 to 12 mm. wide, very irregular in shape, usually irregularly rhomboidal, almost as broad as long, obtuse, cuneate at the base, more or less sinuate-margined, minutely puberulent; leaves few and not conspicuous, the internodes long; peduncles 5.5 to 6.5 cm. long, slender, sparsely puberulent; bracts ovate-lanceolate, 4 mm. long and 1 mm. wide, thick, acute; flowers almost 2 cm. long, their limbs 8 mm. wide, tubes sparsely puberulent; fruit small, about 6 mm. high and 8 mm. wide, its body firm and with vertical ribs between the wings; the wings broad, not narrowed below, rounded above but not prolonged above the beak, nerved, of medium thickness, rather thicker than those of *A. minor*, puberulent above.

This plant is nearest *A. minor*, but has broader, irregular leaves and longer petioles, while its fruit has narrower wings which are not so much narrowed at the base. From *A. umbellata* it may be distinguished by its more slender stems, irregular and smaller leaves, and broader bracts, and by the wings, which are more broadly rounded above. Type National Herbarium no. 465257, cotype in the Herbarium of the University of California; collected at Redondo, California, May 25, 1892, *Ernest Braunton* 258.

Other specimens examined:

CALIFORNIA: Redondo, 1904, *Grant;* Long Beach, 1900, *Jones* 6500; San Luis Obispo County, 1883, *Mrs. R. W. Summers;* Playa del Rey, 1902, *Abrams* 2494; Los Angeles County, 1880, *H. E. Hasse;* Coronado Beach, 1889, *Brandegee;* Los Angeles County, 1880, *E. A. Bush;* mouth of Tia Juana River, 1894, *Hearns* 3915.

EXPLANATION OF PLATE XXXI.—Fig. 1, *a*, plant of *Abronia variabilis*: *b*, fruit of same. Fig 2, *a*, plant of *A. sparsifolia*; *b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

10. Abronia neurophylla Standley, sp. nov. PLATE XXXII.

Perennial, prostrate; stem stout, minutely puberulent throughout but the stem appearing almost glabrous; internodes 10 cm. long or more; leaf blades large, 28 to 42 mm. long and almost as wide, very broadly ovate or rhomboidal, thick and fleshy, minutely puberulent beneath and on the margins, the midrib and lateral veins prominent, the opposite leaves of about the same size and shape; petioles as long as the blades, broad, densely viscid-puberulent, prominently nerved; peduncles about 12 cm. long, minutely puberulent, stout; bracts thick, ovate-lanceolate, acute, 8 mm. long, densely puberulent; flowers many, red, almost 2 cm. long, limb 9 mm. broad, tubes puberulent; fruit not seen.

This is distinguished by its prominently nerved, thick, fleshy leaves, and thick, strongly nerved petioles. The bracts are much thicker than those of *A. umbellata*, and the plant is larger, stouter, and much different in general appearance. Type U. S. National Herbarium no. 339934, collected on San Nicolas Island, California, April, 1897, by Mrs. Blanche Trask (no. 23). I have seen two sheets of this plant, one in the National Herbarium and one in the herbarium of Missouri Botanical Garden; neither specimen is very good, but the two taken together supply material enough for the diagnosis of the species. It is unfortunate that fruit is lacking, for it would probably help to differentiate the species still more definitely. The collector says of the plant: "Covering vast areas of drifted sand; leaves shining; flowers red and fragrant."

EXPLANATION OF PLATE XXXII.—Plant of *Abronia neurophylla*. Scale ½.

11. Abronia platyphylla Standley, sp. nov. PLATE XXXIII.

Perennial?; stems spreading, stout, viscid-puberulent or villous throughout; leaf blades orbicular to broadly elliptical, slightly sinuate-margined, puberulent

ABRONIA VARIABILIS STANDLEY AND A. SPARSIFOLIA STANDLEY.

ABRONIA NEUROPHYLLA STANDLEY.

ABRONIA PLATYPHYLLA STANDLEY.

throughout, obtuse, rounded or broadly cuneate at the base, 15 to 35 mm. long and 15 to 25 mm. wide; one of the opposite leaves large and broadly elliptical, the other as broad but shorter and orbicular; petioles almost or quite as long as the blades; peduncles stout, 5 or 6 cm. long, puberulent or villous; bracts 4 or 5, broadly lanceolate, 7 mm. long and 2.5 mm. wide, scarious, acute, densely viscid-puberulent; flowers about 20 mm. long, limb 8 to 10 mm. wide, tubes densely viscid-puberulent; fruit 8 mm. long and a little wider, whitish, the body with inconspicuous ribs between the wings, puberulent; wings 3 to 5, very broad, 5 to 7 mm. wide, thin and soft, rounded at the summit and prolonged above the body of the fruit, not much narrowed below.

Distinguished from *A. umbellata* by its broader and slightly sinuate leaves, its more scarious bracts, and its whiter fruit, the wings of which are much broader and less narrowed below as well as more prolonged above. From *A. gracilis* it differs in the thinner and much broader wings; in the shape of the fruit, which is broader than long; and in the leaves being less sinuate and the whole plant larger and stouter. From *A. variabilis* it is readily separated by its larger leaves, more pubescent stems and leaves, broader bracts, and larger flowers. Type in the herbarium of the University of California, collected at Del Mar, California, May 12, 1894, *Brandegee*; same, also, at San Diego, April 21, 1894, *Brandegee*.

EXPLANATION OF PLATE XXXIII. *a*, Plant of *Abronia platyphylla*; *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

12. Abronia gracilis Benth. Bot. Voy. Sulph. 44. 1844.

FIGURE 53.

FIG. 53.—Fruit of *Abronia gracilis*. Scale 2.

This species can be determined by its annual root, strongly sinuate leaves, and large flowers, and by the characters of the fruit, which is 10 mm. long and almost as wide, with 4 or 5 broad wings, these thick and more or less coriaceous, light-colored, not prolonged above, and little narrowed below.

Specimens examined:

LOWER CALIFORNIA: Magdalena Island, 1889, *Brandegee*; Abrejos Point, 1876, *Streets*; San Ramon, 1886, *Orcutt*; Magdalena Bay (type locality), *W. E. Bryant*; Calmalli, 1898, *Purpus* 81.

13. Abronia villosa S. Wats. Am. Nat. 7: 302. 1873. FIGURE 54.

Specimens examined:

FIG. 54.—Fruit of *Abronia villosa*. Scale 2.

NEVADA: 1872, *Lieut. Wheeler*, type collection; Vegas Wash, Lincoln County, 1891, *Coville & Funston* 425; Monpa, 1905, *Kennedy* 1101.

CALIFORNIA: San Felipe, 1898, *Purpus*; Colorado Desert, 1905, *Brandegee*; Temecula, 1887, *Cleveland* 740; near San Luis Obispo, 1876, *Palmer*; southeastern California, 1897, *Purpus* 5382; San Diego County, 1887, *Orcutt*; The Needles, 1884, *Jones* 3821; San Bernardino Mountains, 1894, *Parish* 3207; Antelope Valley, 1896, *Davy* 2214; Ash Hill, Mohave Desert, 1905, *Hall* 6101; Colorado Desert, 1903, *Abrams* 3224; Carrizo Creek, 1901, *Brandegee*; Fort Mohave, 1860-61, *Cooper*.

UTAH: St. George, 1869, *Palmer*.

ARIZONA: Yuma, 1881, *Vasey*; Beaver Dam Creek, 1902, *Goodding* 765.

14. **Abronia aurita** Abrams, Bull. Torr. Club **32**: 537. 1905. FIGURE 55.

This is much like *A. villosa*, but is a larger and stouter plant; its flowers are considerably larger, sometimes 3 cm. long; and its fruit is broader than long, the body thick and large, vertically ribbed, but with few or no transverse ribs, so that the fruit has not the pitted appearance of that of *A. villosa*; the wings very broad and usually elevated above the body of the fruit.

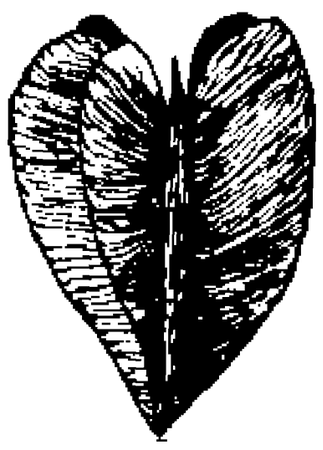


FIG. 55.—Fruit of *Abronia aurita*. Scale 2.

Specimens examined:

CALIFORNIA: Palm Springs, 1896, *Parish* 4138, type collection; San Jacinto Plains, 1882, *S. B. & W. F. Parish* 1156; San Jacinto, 1892, *Hasse*; near San Jacinto, 1898, *Leiberg* 3119; San Jacinto Mountain, 1897, *Hall* 769; Winchester, *Hall* 2915; Temecula, 1888, *Vasey* 514; San Jacinto, 1890, *Mrs. Gregory*.

15. **Abronia pinetorum** Abrams, Bull. Torr. Club **32**: 537. 1905. FIGURE 56.

This differs from *A. aurita* in its differently shaped wings and rather wider bracts, its somewhat smaller and thicker leaves, and its more slender and less pubescent perianth tubes, and in the smaller size of the plant.

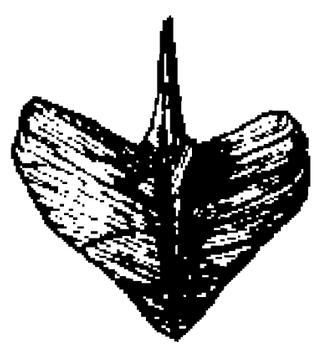


FIG. 56.—Fruit of *Abronia pinetorum*. Scale 2.

Specimens examined:

CALIFORNIA: Thomas Valley, San Jacinto Mountains, 1901, *Hall* 2166, type collection.

16. **Abronia pogonantha** Heimerl, Engl. Bot. Jahrb. **11**: 87. *pl. 2.* 1889. FIGURE 57.

Abronia angulata Jones, Contr. Western Bot. **8**: 39. 1898.

This plant can be distinguished from all other species of the genus by its peculiar fruit, which has but two wings. The fruit is smaller than in most species, being about 4 mm. long, and is obcordate in outline.

FIG. 57.—Fruit of *Abronia pogonantha*. Scale 2.

Specimens examined:

CALIFORNIA: Mohave River, 1882, *Parish* 1345, type collection; Lancaster, 1902, *Elmer* 3663; Argus Mountains, 1897, *Purpus* 5379; near Bakersfield, 1891, *Coville & Funston* 1239; Mohave River at Burcham's ranch, 1901, *Parish* 4995; Darwin Mesa, Argus Mountains, 1897, *Jones*, type of *A. angulata*; Mohave Desert, 1895, *Parish* 3775; near Hesperia, 1892, *Parish* 2453; Antelope Valley, 1896, *Dary* 2214; Hesperia, 1892, *Trelease*.

17. **Abronia alpina** Brandeg. Bot. Gaz. **27**: 456. 1899. FIGURE 58.

This is quite distinct from all other Abronias by the small size of the plant, its small orbicular leaves, their long petioles, the few flowers in each head, and the exalate fruit. It may be merely a depauperate form of *A. villosa*.

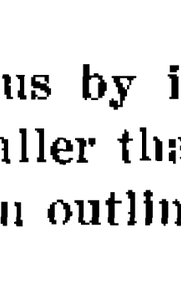


FIG. 58.—Fruit of *Abronia alpina*. Scale 4.

Specimens examined:

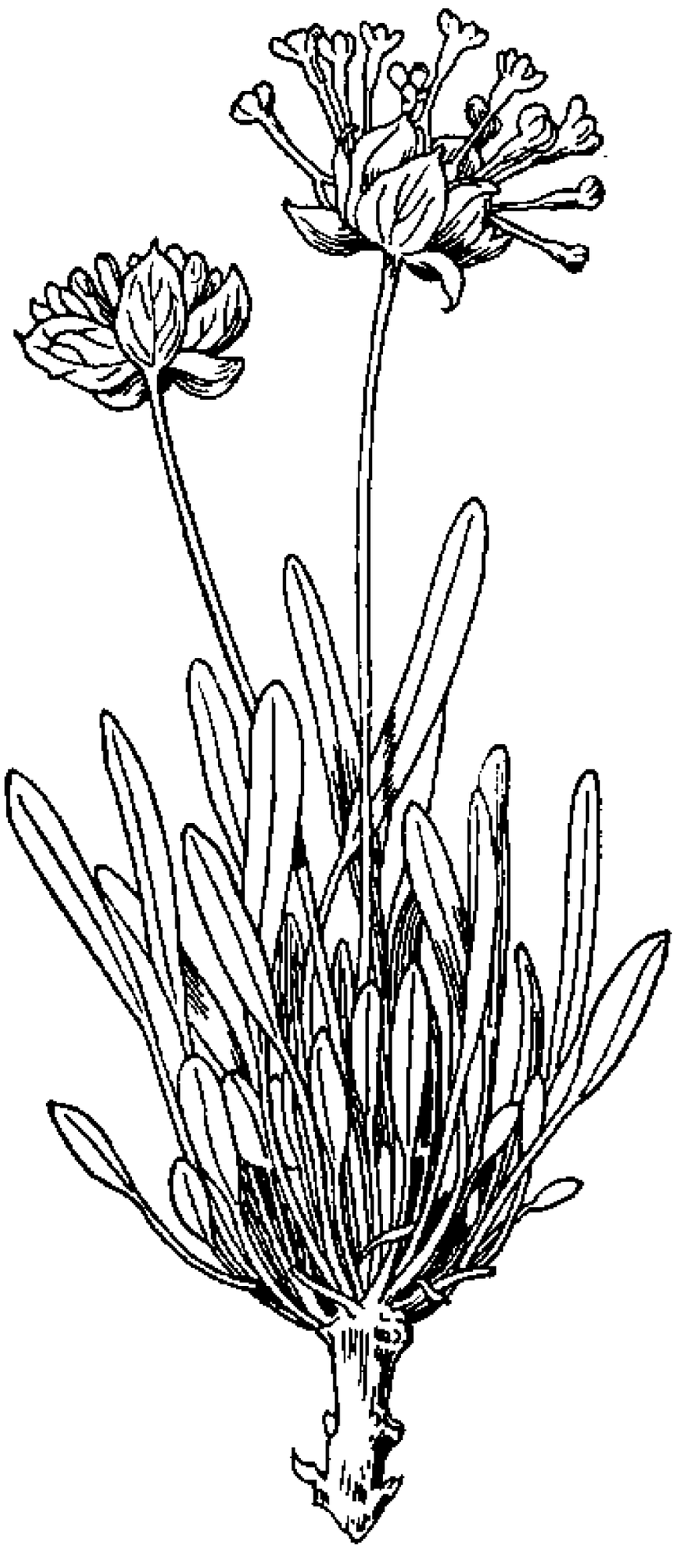
CALIFORNIA: Monatchy Meadows, Mount Whitney, *Purpus* 1877, type.

18. **Abronia covillei** Heimerl, Smithson. Misc. Coll. **52**: 197. 1908.[a] PLATE XXXIV.

A perennial plant, cespitose, forming dense, leafy clumps which are 10 to 15 cm. wide; root stout, about 1 cm. thick above; stems many rising from the

[a] The descriptions of this and *A. bigelorii* were translated by the author from Latin descriptions furnished by Doctor Heimerl, which are published in their original form in the Smithsonian Miscellaneous Collections as here cited.

ABRONIA COVILLEI HEIMERL.



ABRONIA BIGELOVII HEIMERL.

top of the root, woody, the branches interlaced, procumbent, much shortened, about 3 or 4 cm. long, bearing fascicles of leaves and pedunculate heads of flowers, the aspect of the plant being very much like that of *A. nana;* leaves radical (in appearance only), small; blades shortly ovate, subtruncate at the base or obtuse or slightly cordate, 7 to 13 mm. long and 5 to 9 mm. wide, abruptly contracted into a petiole 10 to 30 mm. long, at the apex very obtuse to rounded, thickish, of the same color on both surfaces, light-green, subentire or somewhat undulate, very minutely pulverulent-puberulent with very short, spreading, eglandulose, rather abundant hairs, the lateral nerves fine and few (2 or 3); peduncles 17 to 24 mm. long, slender, erect, more or less reddish, hirtellous above with more or less unequal, minute hairs, the pubescence being like that of the leaves only more conspicuous; heads of flowers rather small, about 2 cm. broad, each composed of 6 to 12 flowers, the flowers rather erect; bracts few (usually only 4 to 6) and membranaceous, lanceolate, about 6 mm. long and 2 mm. wide, rather acute to somewhat acuminate, greenish-white, densely and finely puberulent; flowers small, about 11 mm. long; ovary subturbinate, 2.5 mm. long and 2 mm. wide, with 5 prominent angles, puberulent (the glabrate base excepted) with rather long and puberulent, eglandulose hairs; tube of the perianth 1 mm. wide below, slightly and gradually dilated above to 1.5 mm., greenish, finely and sparingly puberulent above, the pubescence being a little more dense below; limb about 8 mm. wide (white?), deeply divided with obcordate lobes which are emarginate for about half their length; stamens 5 to 7, the anthers a little more than 1 mm. long; pistil 6 mm. long, the stigma about 1.5 mm. long; fruit not present in the specimens.

Fine specimens were collected in California in the Inyo Mountains in Inyo County by Coville & Funston, Death Valley Expedition, no. 1782, distributed as *A. nana.* Type in the National Herbarium.

The plant differs from *A. nana* in its very minute pubescence which is not glandular and its ovate leaves, in having lanceolate bracts which are not scarious and are smaller than in that species, and in its smaller flowers.

EXPLANATION OF PLATE XXXIV.—Plant of *Abronia covillei.* Natural size. Drawing by W. Liepoldt.

19. **Abronia nana** S. Wats. Proc. Am. Acad. **14**: 294. 1870.

Specimens examined:

UTAH: Pahreah, 1894, *Jones* 5291a.

NEVADA: Highland Peak, 1898, *Purpus* 6431, 6278; Mormon Mountains, 1906, *Kennedy & Goodding.*

ARIZONA: Grand Canyon, 1884, *Lemmon.*

CALIFORNIA: San Bernardino Mountains, 1894, *Parish* 3046.

19a. **Abronia nana lanciformis** Jones. Contr. Western Bot. **11**: 2. 1903.

This differs slightly from the species in the rather narrower bracts and narrow, oval, acute leaves which have a tapering, acutish base.

Specimens examined:

ARIZONA: Hackberry, 1884, *Jones* 4689, type collection: Peach Springs, 1884, *Jones.*

20. **Abronia bigelovii** Heimerl, Smithson. Misc. Coll. **53**: 197. 1908.[a]

PLATE XXXV.

A perennial plant with a shortened, woody stem which bears at the top a dense fascicle of leaves and a long-peduncled head of flowers like *A. nana;*

[a] See footnote, page 316.

leaves all basal, very distinct in shape, linear-oblong to linear, rather obtuse to very obtuse at the apex, gradually cuneately narrowed into a petiole, the blade and petiole together being about 34 mm. long and 3.5 to 4 mm. wide; petiole equaling or noticeably surpassing the blade, usually gradually widening into it, rather wide, whitish, somewhat puberulent; the blade of the same color on both surfaces, grayish-green, entire, at first very finely eglandulose-puberulent but finally glabrous, the midrib distinct, especially toward the base, the lateral nerves inconspicuous; pedunceles 5 to 7 cm. long, slender, erect, angled in the dried state, pulverulent-puberulent with eglandulose hairs, these very short, moderately dense below and more dense above; heads (only those which have finished flowering are present on the specimens) with numerous flowers; the bracts like those of *A. fragrans*, membranaceous, broadly ovate to ovate-elliptical, shortly acuminate, acutish, about 8 mm. long and 5 mm. wide, sparingly pulverulent-puberulent; perianths densely puberulent; fruits apparently like those of *A. turbinata*.

Collected by Dr. J. M. Bigelow "near Galisteo"[a] in an expedition made in the year 1853 (Lieutenant Whipple's Exploration for a Railway Route from the Mississippi River to the Pacific Ocean, near the thirty-fifth parallel of latitude in 1853–54). Type in the National Herbarium.

EXPLANATION OF PLATE XXXV. Plant of *Abronia bigelovii*. Natural size. Drawing by W. Liepoldt.

21. **Abronia exalata** Standley, sp. nov. PLATE XXXVI, FIGURE 1.

Annual; stems ascending, 20 to 40 cm. long, minutely glandular, slender; leaf blades broadly ovate to elliptical and deltoid-ovate, obtuse, truncate at the base, 13 to 26 mm. long and 12 to 25 mm. broad, almost or quite glabrous; petioles slightly shorter than the blades, glandular; pedunceles slender, longer than the leaves; bracts broadly elliptical or obovate, obtuse, some of them short-mucronate, about 4 mm. long and 3 mm. wide; flowers 1 cm. long, seldom longer, their tubes densely pubescent; fruit small, 3 mm. long and 1.5 mm. thick, not winged, its body smooth or slightly ridged, rounded or tapering above, puberulent.

This is nearest *A. turbinata*, from which it can be distinguished by its broader, obtuse bracts, its smaller fruit which is not winged but merely slightly ridged or more frequently smooth, and its smaller flowers. The plant itself is as large as plants of *A. turbinata* and does not seem at all depauperate. Type U. S. National Herbarium no. 23087, collected near Keeler, Inyo County, Cal., at an altitude of 1,100 meters, May 14, 1891, *Coville & Funston* 845.

Other specimens examined:

CALIFORNIA: North Fork of Kern River, 1888, *Palmer* 125.

NEVADA: Belleville, 1882, *Shockley* 267.

EXPLANATION OF PLATE XXXVI.—Fig. 1, *a*, plant of *Abronia exalata*; *b*, *c*, fruits of same. Fig. 2, fruit of *A. turbinata*. Fig. 1, *a*, scale ½; fig. 1, *b*, *c*, fig. 2, scale 2.

22. **Abronia turbinata** Torr.; S. Wats. Bot. King Explor. 285. *pl. 31*. 1871.

PLATE XXXVI, FIGURE 2.

Annual; stems puberulent; leaf blades glabrous, broadly elliptical, bright green; bracts lanceolate, acute or acuminate, 10 mm. or less in length; flowers about 18 mm. long, their tubes greenish, limb greenish-white or pinkish; fruit 7 mm. long and about as wide, truncate above, obpyramidal in outline, hispidulous at the summit; wings prominent, much wrinkled, with prominent vertical nerves; outer fruits sometimes narrowed above into a stout beak.

[a] In northern New Mexico south of Santa Fe.

ABRONIA EXALATA STANDLEY AND A. TURBINATA TORR.

ABRONIA ARIZONICA STANDLEY AND A. LOBATIFOLIA STANDLEY.

Specimens examined:

NEVADA: Hot Spring Butte, Humboldt County, *Watson*, type collection; Hawthorn, 1882, *Jones* 4039; Goldfield, *Shockley* 149; Pyramid Lake, 1906, *Frandsen & Brown*; Wadsworth, 1897, *F. H. Hillman*; Pyramid Lake, 1905, *Kennedy* 1016; Wadsworth, 1897, *Jones*.

CALIFORNIA: Deep Spring Valley, 1898, *Purpus* 5822; near Bishop, 1906, *Heller* 8346.

OREGON: Alvord Desert, 1896, *Leiberg* 2428; Alvord Desert, 1901, *Cusick* 2592.

EXPLANATION OF PLATE XXXVI. See under preceding species.

23. **Abronia arizonica** Standley, sp. nov. PLATE XXXVII, FIGURE 1.

Annual; prostrate or ascending: stems stout, almost glabrous, except at the nodes, there sparingly pubescent: leaf blades deltoid-ovate, semicordate or truncate at the base, narrowed above to the obtuse apex, glabrous, or minutely and sparingly puberulent on the lower surface: petioles as long as the blades or those of the upper leaves shorter: pedunceles about 4 cm. long, almost glabrous: bracts 10 to 12 mm. long and 2 to 2.5 mm. wide, lanceolate, acute, sparingly puberulent; flowers about 12 in each head, 15 mm. long, red; fruit 8 mm. long and 9 mm. wide, with several thin wings, these considerably narrowed below and sloping slightly above from the beak, not rising above it; outer fruits irregular, with wings very narrow or wanting, sometimes biturbinate.

From *A. torreyi*, to which this is most closely related, it may be separated by its larger bracts, broader and more glabrous leaves, almost glabrous stem, and wings without disks above: from *A. lobatifolia* it is distinguished by its different leaves, more glabrous stem, and larger bracts.

Type U. S. National Herbarium no. 23094, collected in Arizona by Vasey, October, 1882.

EXPLANATION OF PLATE XXXVII.—Fig. 1, *a*, plant of *Abronia arizonica*; *b*, fruit of same. Fig. 2, *a*, plant of *A. lobatifolia*; *b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

24. **Abronia lobatifolia** Standley, sp. nov. PLATE XXXVII, FIGURE 2.

Annual; prostrate; stems branched, puberulent throughout but not viscid, stout; leaf blades puberulent, irregularly ovate, truncate or rounded at the base, acutish above, mostly with two rounded lobes, one on each side a little above the middle of the blade; petioles almost as long as the blades; pedunceles short, 2 or 3 cm. long; bracts linear, 10 to 13 mm. long and 1.5 mm. wide, attenuate, ciliolate-margined, puberulent; flowers numerous, about 15 mm. long, red; fruit very light-colored, 7 mm. long and 5 or 6 mm. wide, with 4 or 5 double but very thin wings, these much narrowed below and rounded above to the beak, but not rising above it, scarcely veined, hispidulous above.

Differing from *A. turbinata* in habit, shape of leaves, color of flowers, and form of fruit; from *A. torreyi* in its lobed leaves and narrower bracts, and in the wings of the fruit, which are mostly without disks above, and are less veined and thinner. Type U. S. National Herbarium no. 23098, collected in Arizona in 1869 by Palmer.

This was designated by Doctor Heimerl in herbarium as a variety of *A. turbinata* under the name here taken up.

EXPLANATION OF PLATE.—See under preceding species.

25. **Abronia torreyi** Standley, sp. nov. PLATE XXXVIII.

Annual; stems prostrate, 10 to 50 cm. long, rather stout, covered with a fine close pubescence; internodes short, 4 or 5 cm. long, the joints swollen; leaf

blades ovate or deltoid-ovate, 20 to 40 mm. long and 10 to 25 mm. wide, obtuse or acutish at the apex, the base varying, unequal, semicordate, rounded, truncate, or broadly cuneate, very minutely and sparsely puberulent; petioles as long as the blades or longer, pubescent; peduncles longer than the leaves; bracts narrowly lanceolate, acuminate, 8 mm. long and 1.5 mm. wide, puberulent, ciliolate; flowers 15 to 18 mm. long, bright purplish-red, the tubes viscid-pubescent; fruit 7 mm. long and 5 or 6 mm. wide, hispidulous, with a short, narrow beak, which is usually depressed below the wings; wings narrow, thin, their corners rounded above, surmounted by conspicuous flat disks; seed 2 to 2.5 mm. long, lanceolate in outline, black, smooth.

This plant can be separated from *A. angustifolia*, its nearest relative, by its smaller, narrower seed, broader leaves which are not attenuate at the base, and more densely pubescent stem. Type U. S. National Herbarium no. 330234, collected at Mesilla, Donna Ana County, New Mexico, June 15, 1897, *Wooton* 11. The plant is very common on the sandhills of the Mesilla Valley, flowering from early spring until late in autumn. It has been confused with *A. turbinata*, from which it can readily be distinguished by its prostrate habit and red flowers. The fruit is distinct, also, and the general appearance of the plant is very different. I have little doubt that this is the plant to which Doctor Torrey originally applied the name *A. turbinata*. Doctor Watson, however, in publishing the description had in mind another plant, one from Nevada which he himself had collected and which he took to be the same as Doctor Torrey's. It is the Nevada plant which is figured in the plate accompanying the original description of *A. turbinata*, and which is accordingly to be taken as the type, although Doctor Watson also mentions several plants which are to be placed rather in *A. torreyi*.

Additional specimens examined:

NEW MEXICO: Camp 2, Emory's 55th monument, 1892, *Mearns* 165; Mexican Boundary Survey 1120; Mesilla Valley, 1904, *Wooton*, and numerous other collections from the same locality.

TEXAS: *Wright* 1710 and 601; El Paso, 1881, *Vasey*; El Paso, 1884, *Jones* 3706; El Paso, 1893, *Mearns* 1486.

CHIHUAHUA: Paso del Norte (Ciudad Juarez), 1885, *Pringle* 77; Juarez, 1901, *Pringle* 9465; sandhills below El Paso, 1846, *Wislizenus* 93; Ciudad Juarez, 1905, *Purpus*.

EXPLANATION OF PLATE XXXVIII.—*a*, Plant of *Abronia torreyi*; *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

26. Abronia angustifolia Greene, Pittonia 3: 344. 1898.

Abronia turbinata forma *stenophylla* Heimerl, Ann. Cons. et Jard. Genev. 5: 190. 1901.

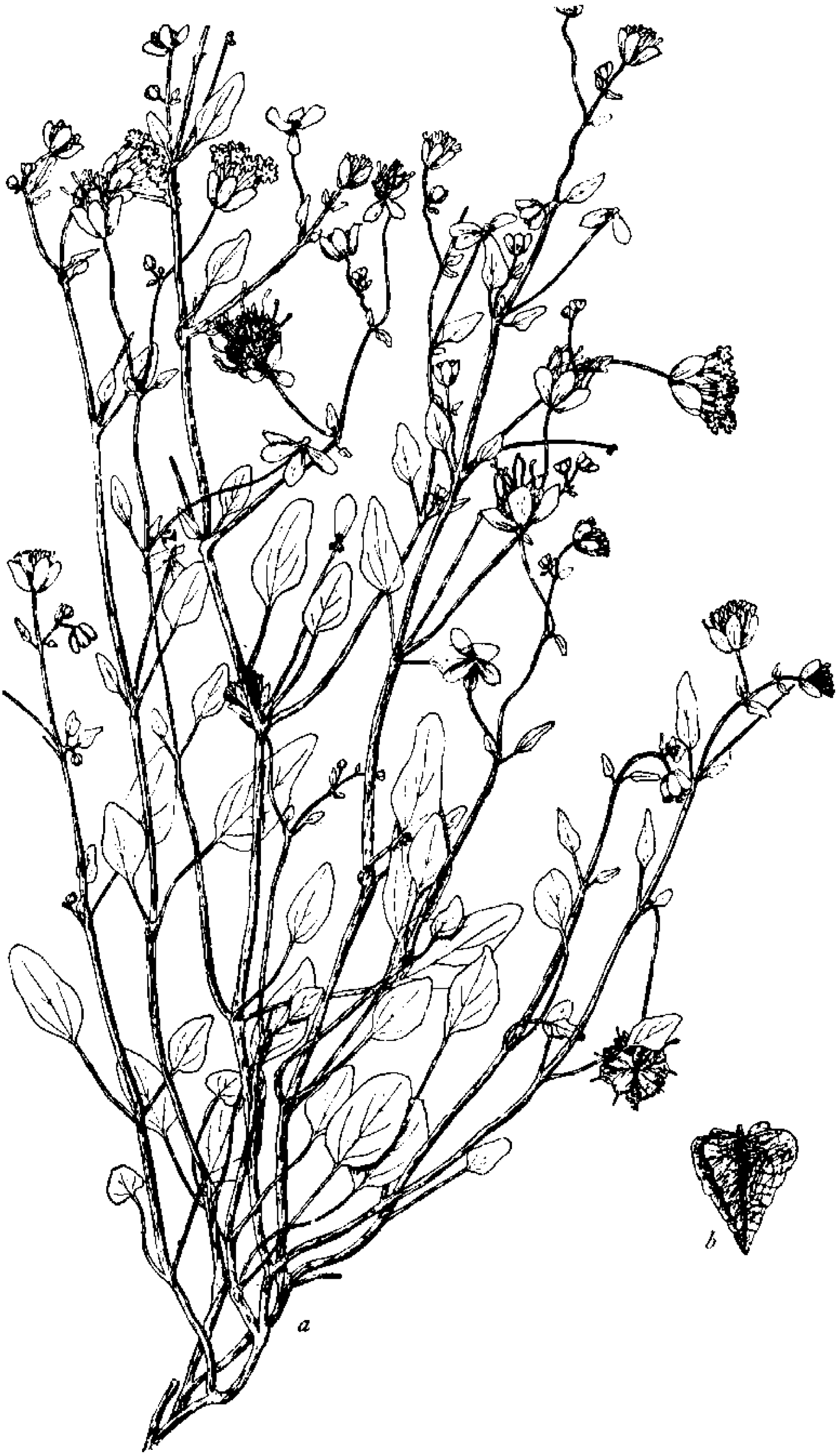
Abronia angustifolia is much like *A. torreyi*; its leaves, however, are lanceolate, narrowly cuneate at the base; stems minutely puberulent; flowers 15 mm. long; seed 1.5 mm. or less in length, ovate in outline.

Specimens examined:

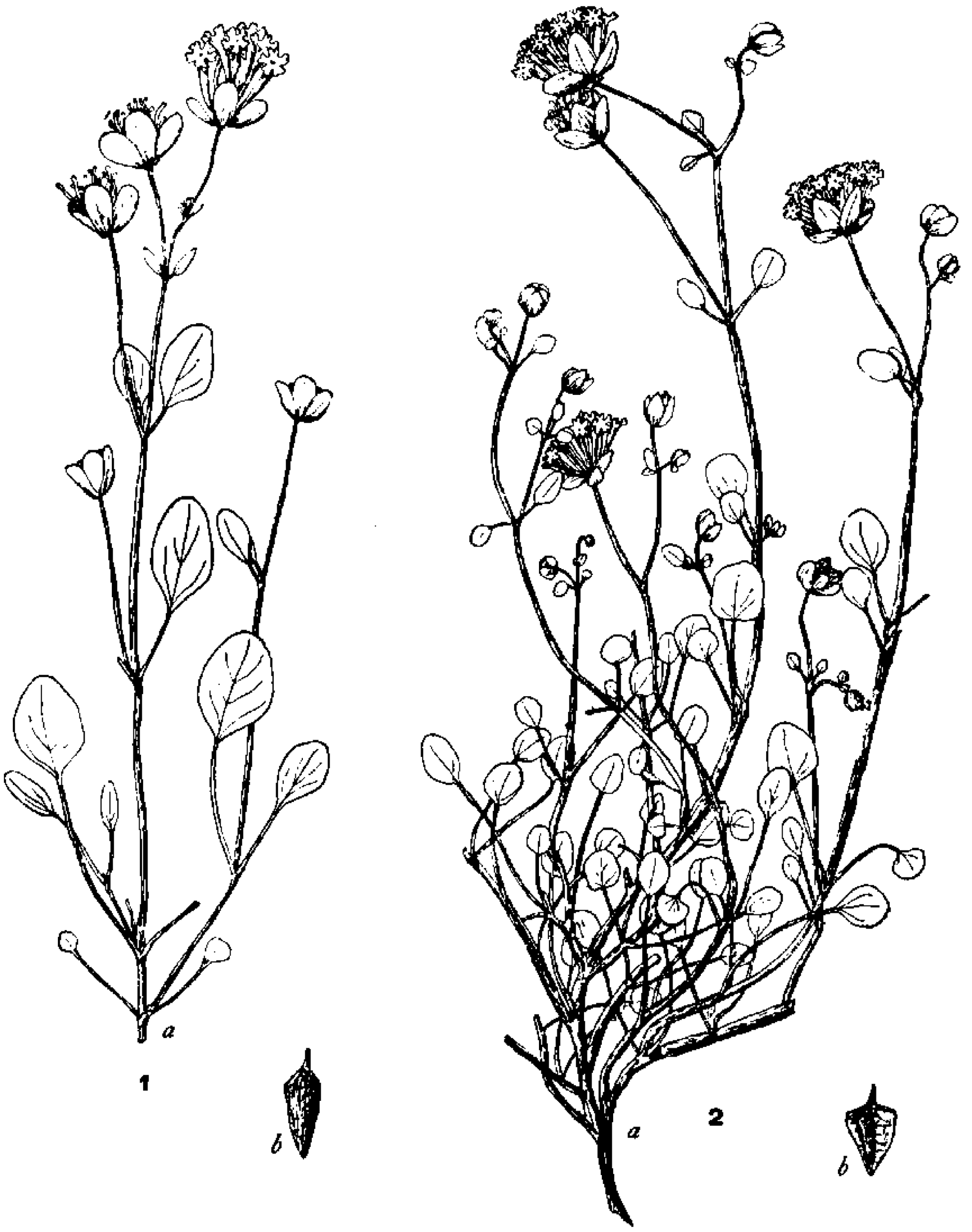
NEW MEXICO: White Sands, 1897, *Wooton* 157, type, and several other collections from the same locality by the same collector.

This is one of the rather few plants that grow upon the great dunes of pure white gypsum sand which occur in eastern Donna Ana County. White-flowered specimens are occasionally found. The White Sands are separated by a high range of mountains from the nearest locality at which *A. torreyi* occurs, the valley of the Rio Grande 40 miles to the west.

ABRONIA TORREYI STANDLEY.



ABRONIA RAMOSA STANDLEY.



ABRONIA GLABRIFOLIA STANDLEY AND A. ORBICULATA STANDLEY.

27. **Abronia carletoni** Coult. & Fisher, Bot. Gaz. **17**: 349. 1892.

Abronia turbinata carletoni Jones, Contr. Western Bot. **10**: 44. 1902.

I have not seen the type of this species which is in the herbarium of the University of Chicago, now deposited with the Field Museum of Natural History; Doctor Millspaugh, however, was kind enough to send a full-sized photograph of the specimen which shows the characteristics of the plant almost as well as the specimen itself could do. It is not the same as *A. angustifolia*, as Mr. Jones claims, but seems to me much nearer *A. fragrans*. The bracts are elliptical or obovate, acute, scarious, about 5 mm. long, the plant slender, the leaf blades 1 to 3 cm. long, oblanceolate, acutish at the apex. Type collected in eastern Colorado in 1891, *M. A. Carleton* 459; apparently not since collected.

28. **Abronia glabra** Rydb. Bull. Torr. Club **29**: 685. 1902. FIGURE 59.

Specimens examined:

COLORADO: Grand Junction, 1883, *Jones*, type; hills near Grand Junction, 1900, *S. G. Stokes*.

This is very closely related to *A. elliptica* and perhaps hardly separable.

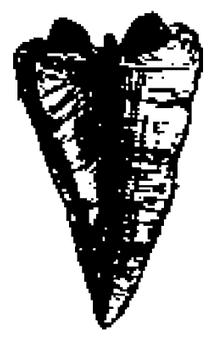


FIG 59.—Fruit of *Abronia glabra*. Scale 2.

29. **Abronia ramosa** Standley, sp. nov. PLATE XXXIX.

Perennial; stems ascending, slender, about 30 cm. high, pale, much-branched, minutely puberulent throughout but not viscid; leaf blades thick, minutely puberulent on both surfaces, elliptical, oblique at the base, obtuse; petioles as long as the blades or longer; peduncles densely puberulent, 2 to 4 cm. long; bracts obovate, 1 cm. long, obtuse; flowers 12 mm. long, their tubes densely puberulent; fruit cuneate-obpyramidal in outline, with 5 thin double wings; these closely veined, much narrowed below, truncate above, and surmounted by conspicuous flat disks, minutely puberulent.

This is nearest *A. elliptica* and *A. glabra*. From the former it differs in its branched stem and smaller flowers and in the wings of the fruit, which are surmounted by disks; from the latter, in its puberulent stem, larger obtuse bracts, and the slightly different fruit. Type U. S. National Herbarium no. 410003, collected at Holbrook, Arizona, June 16, 1901, by L. F. Ward.

Other specimens examined:

ARIZONA: Holbrook, 1896, *Myrtle Zuck*; Moki Reservation, 1896, *Hough* 16a; Carrizo, 1892, *Wooton*; Woodruff, 1892, *Wooton*.

EXPLANATION OF PLATE XXXIX.—*a*, Plant of *Abronia ramosa*; *b*, fruit of same. *a*, Scale $\frac{1}{2}$; *b*, scale 2.

30. **Abronia glabrifolia** Standley, sp. nov. PLATE XL, FIGURE 1.

Stems erect, slender, branched, few-leaved, glabrous; leaf blades broadly elliptical, rounded at both ends, thick and fleshy, glabrous; petioles as long as the blades or longer; peduncles 4 cm. long or less, slender; bracts broadly elliptical to obovate, scarious, obtuse, 10 to 12 mm. long and 7 or 8 mm. wide; flowers 15 mm. long, their tubes glabrous; fruit 5 or 6 mm. long and 2 mm. in diameter, clavate or cylindrical in form, not at all winged or ridged, but smooth, acute or obtuse above, not at all angled, glabrous.

This can be distinguished from any other species of Abronia by its smooth and glabrous fruit; otherwise it is much like *A. elliptica*, except for its more branched stem. Type in the herbarium of the University of California, collected in Colorado in 1878, "ex herb. Wm. F. Flint."

EXPLANATION OF PLATE XL.—Fig. 1, *a*, plant of *Abronia glabrifolia*; *b*, fruit of same. Fig. 2, *a*, plant of *A. orbiculata*; *b*, fruit of same. Figs. 1 and 2, *a*, scale $\frac{1}{2}$; *b*, scale 2.

31. **Abronia pumila** Rydb. Bull. Torr. Club **29**: 683. 1902.

Specimens examined:

UTAH: Emery, 1894, *Jones* 5445q; 6 miles up Salida Canyon, 1894, *Jones* 5416a, types.

32. **Abronia elliptica** A. Nelson, Bull. Torr. Club **26**: 7. 1899. FIGURE 60.

Abronia bakeri Greene, Plantae Bakerianae **3**: 32. 1901.

Abronia fragrans elliptica Jones, Contr. Western Bot. **11**: 3. 1903.

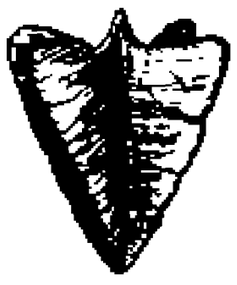


FIG 60.—Fruit of *Abronia elliptica*. Scale 2.

This plant has numerous glabrous or puberulent stems from a woody base; the bracts usually have a reddish or purplish tinge below, which is characteristic of this species alone; the stems also have a peculiar reddish tinge or are sometimes glaucous.

Specimens examined:

WYOMING: Green River, 1897, A. *Nelson* 3021, type; Fort Steele, 1901, *Tweedy* 4615; Medicine Bow River, 1898, *E. Nelson* 4398; Bates Creek, 1901, *Goodding* 196; Sheep Creek, 1899, *Charles Schuchert*; Cummins, 1895, A. *Nelson* 1475.

UTAH: Diamond Valley, 1902, *Goodding* 822; Modena, 1902, 1006.

COLORADO: Deer Run, 1901, *Baker* 89; Grand Junction, 1901, *Baker* 92; Rifle, Garfield County, 1900, *Osterhout* 2131; Grand Junction, 1891, *Eastwood*.

33. **Abronia orbiculata** Standley, sp. nov. PLATE XL, FIGURE 2.

Perennial, much branched from the base; stems ascending, 25 cm. high, glandular-puberulent throughout; leaf blades orbicular or very broadly elliptical, rounded at both ends, thick, glandular-puberulent throughout; petioles mostly much longer than the blades; peduncles 35 to 50 mm. long, sparingly puberulent; bracts 5, elliptical, scarious, obtuse; flowers scarcely more than 10 mm. long, their tubes sparingly puberulent or glabrous; fruit turbinate, 5 mm. long and 3 mm. wide, with narrow thin wings, these truncate above or slightly rounded, the fruit thus either obpyramidal or obcordate in outline.

Nearest *A. elliptica*, from which it is distinguished by its thicker, orbicular leaves, its smaller flowers, and its viscid-puberulent stem. From *A. pumila* it differs chiefly in the shape of the leaves and the larger obtuse bracts. Type U. S. National Herbarium no. 230457, collected at Cottonwood Springs, Vegas Valley, Nevada, April 30, 1891, Vernon Bailey, 1886.

EXPLANATION OF PLATE XL. See under *Abronia glabrifolia*, p. 321.

34. **Abronia sparsifolia** Standley, sp. nov. PLATE XXXI, FIGURE 2.

Annual; stems erect, slender, branched, glaucescent, minutely glandular-pubescent above; internodes rather long; leaf blades ovate, the lower ones broadly so, obtuse, thick, glaucous beneath, glabrous; bases of the lower leaves semicordate, of the upper ones rounded, the uppermost blades more or less puberulent; petioles of the lower leaves much longer than the blades, those of the upper ones shorter; peduncles 2 to 4 cm. long, granular-puberulent, divaricate; bracts elliptical or narrowly obovate, acutish, 10 mm. long and 4 or 5 mm. wide, puberulent, scarious; flowers numerous, 15 mm. long, their tubes glandular-puberulent; fruit obpyramidal in outline, 5 mm. long and about as wide, with several wide, thin, double wings which are rounded or truncate above.

From *A. elliptica* this can be distinguished by its narrow, acutish bracts, broader leaves, and more branched stem: from *A. fallax* by its broader and glaucous leaves, less leafy stems, and more slender habit. Type in the her-

PLATE XLI.

ABRONIA NEALLEYI STANDLEY AND A. TEXANA STANDLEY.

barium of the University of California, cotype in the National Herbarium; collected at Quartz Spring, Mount Irish, Nevada, altitude 1,530 to 1,880 meters, 1898, *Purpus* 6325.

EXPLANATION OF PLATE XXXI.—See under *Abronia variabilis*, p. 314.

35. **Abronia salsa** Rydb. Bull. Torr. Club **29**: 684. 1902. FIGURE 61.

Abronia fragrans pterocarpa Jones, Contr. Western Bot. 11: 3. 1903.

Specimens examined:

UTAH: Salt Lake City, 1869, *Watson* 965, type collection; Great Salt Lake, 1871, *Hayden*; Marysville, 1894, *Jones* 5355w; Silver Reef, 1894, *Jones* 5149aj; Springdale, 1894, *Jones* 5261u; Garfield County, 1883, *A. L. Siler*; Kanab, 1894, *Jones* 5286z; Garfield Beach, *Rydberg & Carleton* 6895.

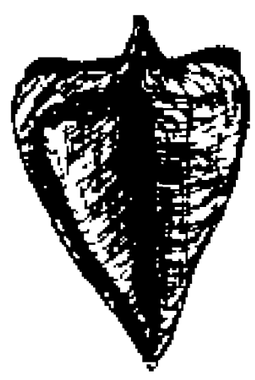


FIG. 61.—Fruit of *Abronia salsa*. Scale 2.

36. **Abronia fallax** Heimerl, Bull. Torr. Club **29**: 684. 1902. FIGURE 62.

I have seen no specimens besides the type that could be referred here. The plant differs from *A. salsa*, which it most resembles, in its narrower, lanceolate leaves, more densely leafy stem, smaller bracts, and slightly different fruit.

The type is from Salt Lake City, Utah, 1879, *Jones* 1337.

FIG. 62.—Fruit of *Abronia fallax*. Scale 2.

37. **Abronia nealleyi** Standley, sp. nov. PLATE XLI, FIGURE 1.

Perennial; stems erect, branching from the base, 15 cm. high, rather densely puberulent throughout; leaf blades thick, lanceolate or narrowly elliptical, 20 to 25 mm. long and 5 to 9 mm. wide, rather obtuse at the apex, cuneate at the base, glabrous except the veins, these puberulent; petioles as long as the blades or shorter; peduncles 25 to 45 mm. long, densely puberulent; bracts scarious, broadly ovate, acute, 4 to 6 mm. long and 3 mm. wide; flowers 12 mm. long, numerous, their tubes puberulent; fruit biturbinate, broadest about one-third below the summit, 4 mm. long and almost as wide, narrowly ridged.

This is a very distinct species because of its small bracts, narrow leaves, small fruit and flowers, and low habit; the plant appears to be vigorous and not at all like a depauperate form. Type in the herbarium of the Missouri Botanical Garden, collected at Screw Bean, Reeves County, Texas, in 1903, by G. C. Nealley. In the National Herbarium there is another plant, collected October, 1881, in Texas by Havard, that should probably be placed here. One collected by Havard at Odessa Tank, September, 1881, with the habit and general appearance of *A. nealleyi*, but the fruit with prominent wings and not biturbinate, is probably of an undescribed species, but the material is insufficient for determination.

EXPLANATION OF PLATE XLI.—Fig. 1, *a*, plant of *Abronia nealleyi*; *b*, fruit of same. Fig. 2, *a*, plant of *A. texana*; *b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

38. **Abronia texana** Standley, sp. nov. PLATE XLI, FIGURE 2.

Perennial; stems slender, ascending; plant rather more leafy than *A. fragrans*, i. e., the internodes shorter; stems very sparingly puberulent, almost glabrous below; leaf blades ovate, obtuse or acutish at the apex, semicordate, truncate, or rounded at the base, glabrous; petioles mostly shorter than the blades, sparsely puberulent; peduncles slightly puberulent, 7 or 8 cm. long; bracts elliptical, 6 or 7 mm. long and 4 mm. wide, acute; flowers mostly 15 mm. long; fruit biturbinate, about 7 mm. long and 3 mm. wide, with very narrow wings or ridges, these widest a little above the middle; outer fruits more strongly biturbinate than the inner ones; minutely puberulent above.

I have separated this plant from *A. fragrans* because of its less erect habit, more glabrous leaves inclined to be semicordate at the base, rather smaller flowers, and much smaller and narrower bracts. Some of the plants referred here have much narrower bracts than the type, often narrowly lanceolate. Type U. S. National Herbarium no. 501296; cotype in the herbarium of the Missouri Botanical Garden: collected "on sands" at Estelline, Texas, May 25, 1904, *Reverchon* 4282.

Other specimens examined:

TEXAS: Mitchell County, 1882, *Reverchon* 1345; Big Springs, 1903, *Tracy* 8073; Wichita County, 1880, *J. Ball;* Estelline, 1903, *Reverchon* 3686a.

EXPLANATION OF PLATE XLI.—See under preceding species.

39. Abronia robusta Standley, sp. nov. PLATE XLII.

Perennial; stems erect, 60 cm. high or less, very thick and stout, as much as 13 mm. in diameter, covered with an exceedingly dense short-hirsute pubescence; plant very leafy; leaf blades ovate, 4 to 8 cm. long, 2 to 5 cm. broad, obtuse or acute, cordate or truncate or broadly rounded at the base, densely puberulent on both surfaces or sometimes almost glabrous above; petioles thick, as long as or longer than the lower blades, those of the upper leaves shorter than the blades; peduncles 8 to 11 cm. long, stout, hirsute; bracts 6, puberulent, scarious, lanceolate, acuminate, 7 mm. long and 2 or 3 mm. wide; flowers numerous in rather dense heads, 2 cm. long, their tubes almost glabrous; fruits bituribinate, the outer ones of the head strongly so, the inner less markedly so, narrow, 5 to 7 mm. long and 3 mm. wide, with a stout beak above; the outer fruits merely ridged, the inner with narrow, thick wings or ridges, these not more than 1 mm. wide.

Nearest *A. fragrans*, but more robust, its bracts narrower, its stem densely hirsute. The type material in the herbarium of the Missouri Botanical Garden consists of 4 sheets collected on sand hills near Monahans, Ward County, Texas, May 10, 1901, by H. Eggert. This is the most densely pubescent Abronia that I have seen.

EXPLANATION OF PLATE XLII.—Fig. 1, *a*, plant of *Abronia robusta*; *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

40. Abronia fendleri Standley, sp. nov. PLATE XLIII.

Apparently perennial; stems stout, erect, 30 or 40 cm. high, densely hirsute throughout; leaf blades rather broadly lanceolate, rather obtuse or acute at the apex, unequally and rather broadly cuneate at the base or subcordate in young plants, 25 to 50 mm. long and 12 to 20 mm. wide, sparingly puberulent on both surfaces, especially on the veins; petioles of the lower leaves as long as the blades, those of the stem leaves shorter, hirsute; peduncles 25 to 60 mm. long, hirsute, stout; bracts elliptical, scarious, 12 to 15 mm. long and 5 to 8 mm. wide, acute or sometimes cuspidate; flowers many, 2 cm. long, with a limb about 3 mm. wide, tubes densely puberulent; fruit narrowly turbinate, 9 mm. long and 5 mm. wide, with a very small body and 4 or 5 narrow wings which are 2.5 mm. wide, thin, rounded above, and projecting considerably above the body; the outline of the fruit narrowly obcordate, the beak short and small, hispidulous on beak and top of wings; seed 2 mm. long, dark brown, linear in outline.

The fruit of this plant is quite unlike that of *A. fragrans*, to which the species is most closely related; the pubescence, too, is more dense. Type in the herbarium of the Missouri Botanical Garden, collected at Santa Fe, New Mexico, May 19, 1847, *Fendler* 739, growing in "moist places near fields, etc." A sheet of the same collection in the National Herbarium was labeled "*A.*

ABRONIA ROBUSTA STANDLEY.

ABRONIA FENDLERI STANDLEY.

fragrans, Typ." by Doctor Heimerl, but the specimen is without fruit, which would have distinguished it at once.

Other specimens examined:

NEW MEXICO: Coolidge, 1889, *Hunson & Hopkins;* Chama River, 1904, *Wooton* 2827; Santa Fe, 1889, *Cockerell.*

The following specimens from farther south should probably be referred here. They do not altogether agree with *A. fendleri* and may possibly form a distinct species; they are certainly not *A. fragrans.* The plants are more erect, less branched, and less spreading than the Santa Fe plant, besides differing in several other particulars.

NEW MEXICO: Mesilla Valley, 1893, *Wooton;* Tortugas Mountain near Las Cruces, 1900, *Cockerell;* Mexican Boundary Survey 1121; Jornado del Muerto, 1846, *Wislizenus* 81.

CHIHUAHUA: Near Paso del Norte, 1886, *Pringle* 794.

TEXAS (?): *Wright* 1711.

EXPLANATION OF PLATE XLIII.—*a*, Plant of *Abronia fendleri; b*, fruit of same. *a*, Scale ½; *b*, scale 2.

41. **Abronia fragrans** Nutt.; Hook. Kew Journ. Bot. 5: 261. 1853. FIGURE 63.

Perennial, erect; stems more or less puberulent throughout, rather stout; leaf blades ovate or elliptical, rounded or narrowed at the base, mostly obtuse or acutish at the apex, minutely puberulent and roughened on both surfaces or glabrous above; bracts ovate or broadly elliptical, acute or attenuate, 10 to 15 mm. long and about 8 mm. wide; flowers 2 cm. long or more, greenish-white; fruit 6 mm. long and 4 mm. wide or often larger, usually distinctly biturbinate, the outer ones strongly so and often irregular; fruit not winged, but with low, thickened ridges which are strongly veined.

FIG. 63.—a, b, Two views of the fruit of *Abronia fragrans.* Scale 2.

The plants included here are, as a whole, remarkably uniform, although a few variant forms will be found. A form of the species which extends into western Kansas differs considerably in general appearance, but I have been unable to separate it. A plant from Oklahoma is reported to have red flowers, but otherwise it does not seem remarkable.

Specimens examined in part:

NEBRASKA: War Bonnet Canyon, 1890, *T. A. Williams;* Alliance, 1889, *H. L. Webber;* near Thedford, 1893, *Rydberg* 1263.

KANSAS: Arkalon, 1888, *Kellerman;* Syracuse, 1893, *C. H. Thompson* 124; Hamilton County, 1895, *Hitchcock* 422.

COLORADO: Fossil Creek, 1897, *Crandall* 4076; Fort Collins, 1896, *C. F. Baker;* Buena Vista, 1892, *C. S. Sheldon* 562; Crow Creek, 1896, *Knowlton* 98; Half-moon Creek, 1873, *John Wolf* 813; north of Denver, 1881, *L. F. Ward;* Arkansas Canyon, 1881, *G. Engelmann;* Colorado Springs, 1903, *E. R. Warren* 1961; near Boulder, 1902, *Tweedy* 4976; Manitou, 1890, *G. C. Broadhead.*

WYOMING: Sybille Creek, 1894, *A. Nelson* 335; Egbert, 1899, *Pammel* 17; Pine Bluffs, 1897, *A. Nelson* 3504; Platte River, 1894, *A. Nelson* 3123.

NEW MEXICO: Thirty-five miles west of Roswell, 1900, *Earle* 372; Delaware Creek, 1893, *Nealley,* a narrow-bracted form; Cimarron on the Santa Fe Road, 1846, *Wislizenus* 462; Fort Wingate, *Rusby* 6992; Lamy, 1895, *Hulford* 65; Farmington, 1904, *Wooton* 2825; La Vega de San José, 1892, *Wooton;* Willard, 1904, *Wooton* 2826; near Gallup, 1903, *Wooton;* Upper Rio Pecos, 1905, *Mrs. Florence Bartlett.*

42. **Abronia nudata** Rydb. Bull. Torr. Club **29**: 683. 1902. FIGURE 64.

FIG. 64.—Fruit of *Abronia nudata*. Scale 2.

This differs from *A. fragrans* in its smaller bracts, more glabrous stem, and its decumbent habit.

Specimens examined:

MONTANA: Colgate near Glendive, 1892, *Sandberg, MacDougal & Heller* 1016, type collection.

43. **Abronia glaucescens** (A. Nelson) Standley.

Abronia fragrans glaucescens A. Nelson, Bot. Gaz. **34**: 364. 1902.

The glabrous stem and flowers, the thick leaves, and the glaucous leaves and stems separate this from *A. fragrans*, which it resembles in habit. From *A. nudata* it can be separated by its larger bracts and leaves, more erect habit, and more glabrous fruit and stem. No type was designated in the original description, and I would suggest as a type the collection from Casper, Natrona County, Wyoming, "in sandy, rocky river bottoms," July 6, 1901, *Goodding* 210.

Other specimens examined:

WYOMING: Inyan Kara Divide, 1892, *Buffum* 786; Casper, 1891, *Buffum* 785; Cheyenne, 1895, *A. Nelson* 1996; Powder River, 1894, *Vernon Bailey* 30.

COLORADO: Manitou, 1886, *Pritchep.*

44. **Abronia ammophila** Greene, Pittonia **4**: 226. 1900. FIGURE 65.

Abronia arenaria Rydb. Mem. N. Y. Bot. Gard. **1**: 137. 1900, not Menz.

Abronia nelsoni Heimerl, Ann. Cons. et Jard. Genev. **5**: 191. 1901.

Abronia cheradophila A. Nelson, Bot. Gaz. **34**: 364. 1902.

FIG. 65.—Fruit of *Abronia ammophila*. Scale 2.

This much-named species is a very distinct one because of its prostrate habit, narrow leaves, lanceolate bracts only about 4 mm. long, and peculiar fruit.

Specimens examined:

WYOMING: Yellowstone Lake, 1880, *A. & E. Nelson* 6633; Yellowstone Lake, 1871, *Robert Adams*; same locality, 1885, *Tweedy* 1442.

FIG. 66.—Fruit of *Abronia lanceolata*. Scale 2.

45. **Abronia lanceolata** Rydb. Bull. Torr. Club **29**: 685. 1902.

FIGURE 66.

Specimens examined:

IDAHO: Idaho Falls, 1901, *Merrill & Wilcox* 870, type: Idaho Falls, 1893, *Palmer* 384: Blackfoot, 1893, *Palmer* 462; St. Anthony, 1900, *Merrill* 441.

46. **Abronia mellifera** Dougl. in Hook. Bot. Mag. **56**: *pl. 2879*. 1829. FIGURE 67.

Abronia suksdorfii Coult. & Fisk. Bot. Gaz. **17**: 348. 1892.

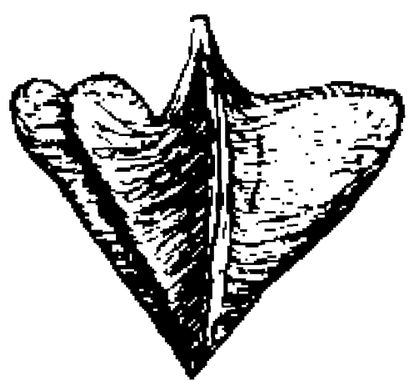


FIG. 67.—Fruit of *Abronia mellifera*. Scale 2.

This can be distinguished from any other member of the *fragrans* group by the broad, thin wings of the fruit and the narrow bracts; its stem is finely pubernlent throughout, while the stems of *A. lanceolata* are almost or quite glabrous. *A. suksdorfii* I can not separate from any other form of the species; the types of this and *A. mellifera* are from nearly the same locality.

Specimens examined:

WASHINGTON: Near Columbus, 1886, *Suksdorf* 897; near Rock Island, 1893, *Sandberg & Leiberg* 464; Cow Creek, 1902, *Griffiths & Cotton* 543; Pasco, 1898, *Elmer* 1055; Walla Walla, Wilkes

Exploring Exped.: Walla Walla, 1903, *J. S. Cotton* 1058; Kiona, 1902, *Cotton* 724; Craigs Ferry, Kittitas County, 1903, *Cotton*; Washington, 1883, *Canby* 1037.

OREGON: Near The Dalles, 1881, *Howell*.

ABRONIA TURBINATA MARGINATA Eastwood, Proc. Cal. Acad. II. 6: 313. I have not been able to determine this from the description, nor have I succeeded in seeing the type collection, which consisted of only a single specimen.

2. TRIPTEROCALYX Hook.

Tripterocalyx Hook. Kew Journ. Bot. 5: 261. 1853.

Abronia § *Tripterocalyx* Torr. Frem. First Rep. 92. 1843.

Cycloptera Nutt.; A. Gray, Am. Journ. Sci. II. 15: 319. 1853, not Endl. Enchir 113. 1841.

Apaloptera Nutt.; A. Gray, loc. cit.

Abronia of various authors, in part.

Stout, much branched annuals, usually more or less pubescent, the pubescence consisting of flattened, several-celled hairs; stems erect, ascending, or rarely procumbent; leaves opposite, entire, usually unequal; involucral bracts 4 to 6, separate, folded over the flowers in the bud; perianth with a long slender tube and a broad, expanded, 5-lobed limb; flowers in the involucre numerous; stamens 5, with very short filaments, attached at irregular intervals to the upper part of the tube of the perianth; fruit almost orbicular in outline, with a coriaceous or spongious body, this often ribbed and completely surrounded by the 2 to 4 broad wings, which are thin and strongly reticulate-veined; stipe prolonged below through the membranous wings; seeds narrowly elliptical, cylindrical.

Type species, *Abronia micrantha* Torr. This is also the type of the genera Cycloptera and Apaloptera.

This genus is well worthy of separation from the true Abronias because of its peculiar fruit, whose wings completely surround the body. The central cavity, moreover, does not extend into the wings as it does in all or most species of Abronia. The plants are so different in general appearance, habit, and especially in the appearance of the heads of the fruit, that no one can have any difficulty in distinguishing the two genera at a glance. The two are sharply defined, there being no intergradient forms.

KEY TO THE SPECIES.

Body of the fruit between the wings transversely wrinkled or ribbed, the ribs extending into the wings	1. *T. crux-maltae*.
Body of the fruit not transversely wrinkled, but frequently with vertical ribs between the wings.	
Flowers 2 cm. long or less.	
Body of the fruit spongious, without vertical ribs; stems pubescent; peduncles shorter than the leaves	2. *T. micranthus*.
Body of the fruit scarcely spongious, frequently with longitudinal ribs between the wings; stems glabrous; peduncles as long as the leaves or longer	3. *T. pedunculatus*.
Flowers more than 2 cm. long, usually almost 3 cm.	
Fruit 20 to 28 mm. long: flowers bright pink; plant stout; stems sparingly pubescent; bracts narrowly ovate	4. *T. cycloptera*.

Fruit less than 20 mm. long; plant lower and less robust; flowers whitish or very pale pink; stems rather densely pubescent; bracts narrowly lanceolate ..... 5. *T. wootonii.*

1. **Tripterocalyx crux-maltae** (Kellogg) Standley.

Abronia crux-maltae Kellogg, Proc. Cal. Acad. 2: 71. 1863.

This species has probably more handsome flowers than any other species of Tripterocalyx or Abronia.

Specimens examined:

NEVADA: Wadsworth, 1904, *Kennedy* 871; Truckee Pass, Virginia Mountains, 1903, *Kennedy* 734; 1 mile west of Reno, 1901, *Heizer* 309; Reno, 1888, *Sonne* 488; Carson City, 1897, *Jones;* Gillis, 1883, *Shockley* 349; Empire City, 1882, *Jones* 4038; Pah Ute Mountains, 1869, *Watson* 967.

CALIFORNIA: Sierra Nevada Mountains, 1875, *Lemmon.*

2. **Tripterocalyx micranthus** (Torr.) Hook. Kew Journ. Bot. 5: 261. 1853.

Abronia micrantha Torr. in Frem. First Rep. 92. 1843.

This can be easily distinguished from *T. cycloptcrus*, with which it has often been confused, by its smaller, greenish-white flowers, smaller bracts, and spongious fruit, which has no vertical ribs.

Specimens examined, in part:

MONTANA: Glendive, 1892, *Sandberg, Heller & MacDougal;* Yankee Jim Canyon, 1899, *Blankinship* 424; Beaver Head County, 1888, *Tweedy* 121.

WYOMING: Marquette, 1893, *Rose* 123; Fort Steele, 1901, *Tweedy* 4614; Washington's Ranch, Sweetwater County, 1901, *Merrill & Wilcox* 795; Evanston, 1897, *A. Nelson* 4123; Willow Creek, 1894, *A. Nelson* 3742; Laramie, 1897, *E. Nelson* 3414; Dunn's Ranch, Albany County, 1900, *A. Nelson* 7624; Alcova, 1901, *Goodding* 155.

UTAH: Price, 1898, *Susan G. Stokes.*

COLORADO: Near Grand Junction, 1900, *S. G. Stokes;* valley of the Arkansas, *Wheeler Survey* 815; Denver, 1885, *Letterman;* Platte Valley below Greeley, 1881, *Ward;* Telluride, 1894, *Tweedy* 129; Grand Junction, 1894, *Jones* 3476; Fort Collins, 1892, *Crandall;* headwaters of Sangre de Cristo Creek, 1900, *Rydberg & Vreeland* 6311; Canyon City, 1871, *Brandegee* 100.

NEVADA: Muddy Valley, Lincoln County, 1906, *Kennedy & Goodding* 1700.

ARIZONA: Beaver Dam Creek, 1902, *Goodding.*

NEW MEXICO: Albuquerque, 1853, *Bigelow;* opposite San Juan, Rio Arriba County, 1897, *Heller* 3766.

KANSAS: Syracuse, 1893, *C. H. Thompson.*

NEBRASKA: Cheyenne County, 1891, *Rydberg* 339.

3. **Tripterocalyx pedunculatus** (Jones) Standley.

Abronia micrantha pedunculata Jones, Proc. Cal. Acad. II. 5: 716. 1895.

Abronia pedunculata Rydb. Bull. Torr. Club **29**: 686. 1902.

Specimens examined:

UTAH: St. George, 1894, *Jones* 5101, type; St. George, 1894, *Jones* 5139; Green River, 1895, *Jones;* Green River, 1894, *Jones* 5482m; La Verkin, 1894, *Jones* 5183; Thompsons Springs, 1892, *Eastwood.*

ARIZONA: Twenty miles above Pierces Ferry, 1894, *Jones* 5077a.

4. Tripterocalyx cyclopterus (A. Gray) Standley.

Abronia cycloptera A. Gray, Am. Journ. Sci. II. 15: 319. 1853, excluding synonyms.

Abronia carnea Greene, Pittonia 3: 343. 1898.

This name might very properly be reduced to synonymy if it were not for the fact that certain excuses can be offered for it. Doctor Gray evidently intended it merely as a new name for *Abronia micrantha* because he considered the latter name inapplicable to specimens he had examined which were really not *A. micrantha* at all, but a southwestern plant which resembles it somewhat. From what he says at the time he proposed the name it can be definitely stated that he had in mind the specimens collected by Wright in western Texas and not the northern plant to which the name *micrantha* was originally applied. The name will be considered a *nomen nudum* by some, or a mere synonym of *T. micranthus*, but the present author believes that long-established usage makes it allowable and preferable to retain it.

Abronia carnea is certainly a synonym of *T. cyclopterus;* the types of the two came from localities separated by not more than 40 miles. The plant is not a perennial, as Doctor Greene surmises in his description, but an annual which blooms from early in the spring until late in the summer.

Specimens examined:

TEXAS: *Wright* 1712, type collection; San Antonio, 1891, *L. H. Dewey;* Belen, El Paso County, 1893, *Mearns* 1514.

CHIHUAHUA: Near Paso del Norte, 1885, *Pringle* 75.

NEW MEXICO: Rincon, 1884, *Jones;* Deming, 1895, *Mulford* 1015; Mesilla Valley, 1893, *Wooton;* same locality, 1897, *Wooton* 56; Chavez, 1892, *Wooton;* near Albuquerque, 1853, *Bigelow;* Pecos River, 1905, *Mrs. Florence Bartlett;* Mexican Boundary Survey 1117; Chavez, 1846, *Wislizenus* 23.

5. Tripterocalyx wootonii Standley, sp. nov.

Annual; stems ascending, 25 cm. high, with scattered rough pubescence throughout, finer than that of *T. cyclopterus;* leaf blades rather broadly lanceolate, 30 or 40 mm. long and 10 to 15 mm. wide, the margins sometimes slightly undulate, ciliolate; blades with rather abundant chaffy pubescence beneath and frequently above, acute or rarely rather obtuse, narrowed at the base into a petiole as long as the blade or shorter; peduncle 6 cm. long, with rather abundant viscid pubescence; bracts 11 to 15 mm. long and 2 mm. wide, narrowly lanceolate, long-acuminate; flowers 25 to 30 mm. long, whitish or very pale pink, tube densely glandular-pubescent, limb 9 mm. broad; fruit 15 to 20 mm. long and almost as broad, hispidulous especially on the ribs and along the margins of the wings; wings not as much narrowed below as those of *T. cyclopterus*, rounded above, finely reticulate-veined, the body with usually 3 strong ribs between each pair of wings; seed 5 mm. long.

Most of the material from northwestern New Mexico and northeastern Arizona which has passed as *T. cyclopterus* is to be placed here. This species is distinguished from that by its considerably smaller, hispidulous fruit (the fruit of some of the northern plants is much smaller than that of the type), narrower bracts, more pubescent stems and peduncles, and pale flowers, and by its lower, less erect habit; the leaves when fresh have a peculiar glaucous appearance different from leaves of *T. cyclopterus*. The differences in general appearance between the two species are less apparent in dried than in living material. Type in the herbarium of the New Mexico Agricultural College, con-

sisting of two plants, both collected by E. O. Wooton, one near Ojo Caliente, Zuni Reservation, New Mexico, July 20, 1906, and the other on the Zuni Reservation in 1904, no. 2820.

Other specimens examined:

NEW MEXICO: Zuni valley, 1902, *Coward* 14.

ARIZONA: Near Hardy, 1903, *Wooton;* Winslow, 1892, *Wooton;* St. Joe, 1892, *Wooton;* 11 miles east of Winslow, 1892, *Wooton;* Adamana to Long H Ranch, 1903, *Griffiths* 5162; northeastern Arizona, 1896, *Hough* 16; 18 miles below Black Falls, 1901, *Ward;* 3 miles northeast of Winslow, 1901, *Ward;* Little Colorado River, 1896, *Fernow;* Winslow, 1903, *Griffiths* 5025; Holbrook, 1896, *Myrtle Zuck.*

3. NYCTAGINIA Choisy.

Nyctaginia Choisy in DC. Prod. 13²: 429. 1849.

Annual, erect, or ascending viscid herbs with dichotomous-branching stems; leaves opposite, the blades somewhat toothed or entire, petioled; flowers reddish, numerous, surrounded by a polyphyllous, many-bracted involucre; perianth funnelform with a narrow tube and a broad, 5-lobed limb; stamens unequal, exserted, their filaments slender, dilated, united below; style slender, the stigma capitate; fruit leathery, turbinate, 10-ribbed, the seed filling and adhering to the pericarp.

KEY TO THE SPECIES.

Leaves triangular-ovate, their margins mostly entire; flowers orange-red ..... 1. *N. capitata.*

Leaves triangular-hastate, thicker, their margins irregular or toothed; flowers crimson ..... 2. *N. cockerellae.*

1. **Nyctaginia capitata** Choisy in DC. Prod. 13²: 429. 1849.

Boerhaavia capitata Heimerl, Jahresb. Staats-Oberrealsch. Fünfhaus Wien 23: repr. 28. 1897.

Type locality, In Texas apud S. Antonio de Bexar.

Specimens examined:

TEXAS: *Wright* 1709, 600; San Antonio, 1881, *Rererchon* 786; Mexican Boundary Survey 1122; Dallas, 1882, *Rererchon* 2336; Roma, 1889, *Nealley* 227; Knickerbocker Ranch, Tom Green County, 1880, *Tweedy;* Del Rio, 1891, *L. H. Dewey;* Barstow, 1902, *Tracy* 8343; Bexar County, *Jermy* 64; Fort Davis, 1881, *Havard;* near Bracken, 1903, *Groth* 73; San Angelo, 1903, *Rererchon;* San Antonio, *E. H. Wilkinson* 122; Laredo, 1879, *Palmer* 1114; near Laredo, 1899, *Mackenzie* 5; prairies near Big Springs, 1900, *Eggert;* near Stanton, 1900, *Eggert.*

MEXICO: Gallejo Springs between El Paso and Chihuahua, 1846, *Wislizenus* 111; Saltillo, 1848, *Gregg.*

2. **Nyctaginia cockerellae** A. Nelson, Proc. Biol. Soc. Wash. 16: 29. 1903.

This plant differs from *N. capitata* in its thicker, subhastate leaves, rather smaller flowers, and less exserted stamens. The difference in number of stamens mentioned by Professor Nelson does not hold, neither does the difference in their insertion. I have not been able to see any essential difference in the shape of the lobes of the perianth in the two species. The flowers in this species are of a much deeper red color. The plant seems to be a very distinct one, readily distinguishable almost at a glance by its appearance, a species confined in its range to the upper valley of the Rio Pecos.

Prof. T. D. A. Cockerell,[a] guided evidently by the original description of this species, was led to found upon it a separate section of the genus under the name Roswellia. The plant certainly does not differ generically from *A. capitata*, as he was inclined to believe, and I think it can not be worthy even of a separate section.

Specimens examined:

NEW MEXICO: Roswell, 1902, *Wilmatte P. Cockerell*, type; Dexter, 1905, *Wooton*; 20 miles south of Roswell, 1900, *Earle* 324; Delaware Creek, 1893, *Neallcy* 4.

TEXAS: Screw Bean, 1893, *Neallcy* 5.

4. WEDELIA Loefl.

Wedelia Loefl. Iter Hisp. 180. 1758.

Allionia L. Syst. ed. 10. 890. 1759, in part.

Annual or perennial prostrate herbs; leaves opposite, unequal, entire, petioled; flowers reddish or rarely white, 3 in each involucre; involucres composed of 3 sepal-like bracts which are united at the base, solitary on pedunceles in the axils of the leaves; perianth corolla-like, with a short oblique tube and an unequally 4-lobed limb; stamens exserted or included, their filaments slender; ovary 1-celled, the style filiform, stigma capitate; fruit leathery, winged on each side, smooth upon the inner side or crested in one species, but with two parallel rows of glands on the outer surface.

The plant upon which this genus was founded later received the name of *Allionia incarnata* L.

KEY TO THE SPECIES.

Fruit crested on the inner surface	1. W. *cristata*.
Fruit not crested on the inner surface.	
Wings with numerous sharp teeth, these not incurved	2. W. *glabra*.
Wings with fewer teeth, which are much less acute and usually strongly incurved.	
Stems villous; teeth obtuse, 2 or 3; perianths large about 12 mm. wide; stems abundantly leafy above	3b. W. *incarnata villosa*.
Stems mostly pubescent, but not strongly villous.	
Upper internodes long and the upper leaves considerably reduced	3c. W. *incarnata nudata*.
Upper internodes not especially long and the upper leaves not noticeably reduced; teeth obtuse to somewhat acute	3. W. *incarnata*.

1. **Wedelia cristata** Standley, sp. nov.

Stems rather slender, viscid-puberulent, straw-colored; leaf blades elliptical to oblong, the two sides asymmetrical, acute, oblique at the base or rounded, dull green above and paler beneath, sparingly short-puberulent, especially above, 21 mm. or less in length and 14 mm. or less in width; petioles one-third to one-half as long as the blades; pedunceles 18 mm. long or less; bracts almost orbicular, slightly saccate, rounded at the apex, 3 mm. long or less; flowers 8 or 9 mm. long, the lobes of the perianth with deep and narrow sinuses between them, the lobes themselves rather deeply 2-cleft; stamens included; fruit 4 to 5 mm.

[a] Proc. Biol. Soc. Wash. **16**: 52.

long, each wing having 3 or more incurved teeth straw-color; the inner surface of each fruit in most species furnished in place of the ventral nerve with a crest 1 mm. high or more, with the margin entire or slightly toothed, the crest wider below, i. e., at the end at which the fruit is attached.

The remarkable fruit of this plant separates it at once from any other species of the genus. Type U. S. National Herbarium no. 349027, collected at Holbrook, Arizona, July 15, 1896, by Myrtle Zuck.

2. **Wedelia glabra** (Choisy) Standley.

Allionia incarnata glabra Choisy in DC. Prod. 13²: 435. 1849.

Annual; stems reddish, prostrate, much branched from the base, slender, sparingly white-puberulent with rarely a few longer, soft, white hairs; leaf blades oblong or elliptical, 23 mm. or less in length and 11 mm. or less in width, obtuse at the apex, rounded or sometimes oblique at the base, almost glabrous, yellowish-green above, glaucous below and usually conspicuously purplish; petioles shorter than the blades, mostly about one-third as long, slender; peduncles 11 mm. or less in length, usually one at each node; bracts somewhat saccate, broadly obtuse, ciliolate, puberulent; flowers 4 mm. long or less, rose-red; stamens included; fruit light straw-color or greenish, 4 mm. long and about as wide, with 3 prominent vertical ribs on the ventral surface and about 7 sharp, narrow, long teeth on each side, these usually not incurved, but extended in the same plane as the body of the fruit; on the dorsal surface of the fruit are two rows of short-pedicled glands, about 6 glands in each row; leaves more or less wavy-margined and the whole surface of the blade often more or less wavy.

The description is based upon plants collected in the Mesilla Valley, New Mexico, which seem well to match portions of the type collection preserved in the Bernhardi Herbarium. The name *glabra* is not an especially appropriate one.

The species is distinguished by its peculiar fruit whose wings are not incurved as they are in other species; whose teeth, too, are sharper and more numerous. It is also separated by its small, obtuse, purplish and often glaucous, undulate leaves, and by its slender stems. It is, in New Mexico and in other places from which I have examined specimens with roots, an annual plant, while most of the other species are perennials.

Specimens examined:

MEXICO: Environs de Mexico (City), *Berlandier*, type collection; San Luis Potosi, 1879, *Schaffner* 562; near Saltillo, 1848, *Gregg* 466, 484.

ARIZONA: Long H Ranch to St. John's, 1903, *Griffiths* 5193; Beaver Creek, 1883, *Rusby* 355.

TEXAS: Near Colorado, 1900, *Eggert*.

NEW MEXICO: Mesilla Valley, 1900, *Wooton*; Mesilla Valley, 1907, *Wooton & Standley* 3893; Albuquerque, 1894, *Herrick*; Santa Fe, 1847, *Fendler* 634; 20 miles south of Roswell, 1900, *Earle* 321; Gray, 1898, *Skehan* 102; Santa Fe, 1898, *Cockerell*; Santa Fe, 1881, *Engelmann*; south of Las Cruces, 1906, *Standley*; Delaware Creek, 1893, *Nealley* (in part).

3. **Wedelia incarnata** (L.) Kuntze, Rev. Gen. Pl. 533. 1891.

Allionia incarnata L. Syst. ed. 10. 890. 1759.

Although I have separated several varieties from this species, the specimens included here would probably bear still further division. The greatest trouble in making separations is found in the occurrence of numerous intergrading forms. Forms are found which connect all of these varieties with the species.

It is almost impossible to find two specimens which match each other in every important detail.

Specimens examined:

TEXAS: El Paso, 1884, *Jones* 3776; Mexican Boundary Survey 1116; Upper Llano, 1885, *Reverchon* 1585; Barstow, 1902, *Tracy* 8346; along Devils River, 1900, *Eggert;* near Big Springs, 1900, *Eggert;* 1849, *Wright* 597.

NEW MEXICO: Organ Mountains, 1897, *Wooton* 145; Burro Mountains, 1903, *Metcalfe* 724; near Cliff, 1903, *Metcalfe* 149; below Highrolls, 1905, Wooton, a form with white flowers that seems to be not uncommon; near Lake Arthur, 1905, *Wooton;* Delaware Creek, 1893, *Nealley* 8.

MEXICO: Near Chihuahua, 1886, *Pringle* 1062: Saltillo, 1898, *Palmer* 81.

ARIZONA: Santa Rita Forest Reserve, 1903, *Griffiths* 5903; Tucson, 1894, *Toumey.*

COLORADO: Canyon City, 1873, *Greene* 6.

BOLIVIA: Bolivian Plateau, 1891, *Bang* 928.

The species is said to extend into South America as far as Argentina and Chile.

3a. **Wedelia incarnata anodonta** Standley, subsp. nov.

This subspecies is distinguished by the form of the fruit whose wings have smooth margins, not toothed as in all other species and varieties. Otherwise the plant is like the species. The plants with this kind of fruit are somewhat variable, and it is possible that two forms have been included in the specimens listed under this one subspecies.

Type in the herbarium of the Field Museum of Natural History, no. 155550, collected on "plains of western New Mexico," July, 1880, Rusby 355.

Other specimens examined:

NEW MEXICO: Valverde, north of the Jornado del Muerto, 1846, *Wislizenus* 54: Albuquerque, 1846, *Wislizenus* 13.

ARIZONA: Yucca, 1884, *Jones;* Beaver Creek, 1883, *Rusby* 286.

The Arizona plants are rather larger and more robust than those from New Mexico.

3b. **Wedelia incarnata villosa** Standley, subsp. nov.

Perennial from a thick, woody root; stems branched mostly from the base, stout, villous throughout, straw-colored; leaf blades elliptical, acutish or obtuse, 34 mm. long and 18 mm. wide or less, rounded or oblique at the base, short-villous on both surfaces, especially on the veins; petioles mostly about one-half as long as the blades; peduncles 2 cm. long or less, slender, villous, few; bracts about 7 mm. long, ovate, not saccate, acutish; stamens about as long as the perianth or slightly exserted; fruit straw-colored, about 4.5 mm. long, with 3 rather conspicuous ventral nerves, and with 2 or 3 irregular, low, and blunt teeth on each wing.

The variety is distinguished by its villous stems and leaves and its large flowers, whose stamens are often exserted. Type in the herbarium of Field Museum of Natural History, collected on "mesas and foothills" in Arizona, May 22, 1881, Pringle; cotype in the herbarium of the Missouri Botanical Garden.

Other specimens examined:

ARIZONA: Fenced area, Santa Rita Forest Reserve, 1903, *Griffiths* 4405, 4784; near Fort Huachuca, 1894, *Wilcox* 265, 147; Fort Grant, *B. H. Dutcher* 16, 17, 18; Santa Catalina Mountains, 1880, *Lemmon;* Tubac

to Sopori, 1903, *Griffiths* 6135; near Clifton, 1880, *Greene*; Fort Whipple, 1865, *Coues & Palmer* 467, 281; Castle Creek, 1892, *Toumey* 471a; Babuquivari Valley, 1903, *Griffiths* 3967.

CHIHUAHUA: Mexican Boundary Line near White Water, 1892, *Mearns* 368, 361.

COLORADO: Soda Spring Ledge, Canyon City, 1874, *Brandegee* 806.

3c. **Wedelia incarnata nudata** Standley, subsp. nov.

Perennial from a thick, woody root; stems slender, with scattered, short, soft, more or less viscid hairs; internodes long, especially the upper ones; leaf blades oval or elliptical, 26 mm. long and 14 mm. wide or less, obtuse, rather densely puberulent on both surfaces, rounded or oblique at the base; the upper blades much smaller, more acute, and with shorter petioles; petioles one-half as long as the blades or shorter; pedunceles 10 mm. or less in length; bracts 4 mm. long or less, elliptical, acutish; flowers 6 mm. or less in length, the stamens included; fruit straw-colored, 3 mm. long, with a prominent ventral nerve, the lateral ones faint or wanting, the wings with 2 or 3 low, rather obtuse, incurved teeth.

Nearest subspecies *villosa*, but its stems less pubescent, the internodes longer, and the stem less leafy above, the flowers and leaves smaller. Type in the herbarium of the University of California, collected in Coyote Canyon, western border of the Colorado Desert, in the Lower Sonoran Zone, at an altitude of about 1,540 meters, 1902, *Hall* 2799.

Other specimens examined:

CALIFORNIA: Palm Canyon, 1901, *Hall* 1872.

NEVADA: Moapa, 1905, *Kennedy* 1110; Muddy Valley, 1906, *Kennedy & Goodding*.

The following should probably be placed here, although they have rather larger leaves and fruit and their flowers are slightly larger. In general appearance, habits, etc., they resemble most this variety.

UTAH: St. George, 1902, *Goodding* 809; St. George, 1875, *Palmer*; Toquerville, 1894, *Jones* 6087; La Verken, 1894, *Jones* 5191.

ARIZONA: Northeast of Holbrook, 1901, *Ward*.

5. ALLIONIA Loefl.

Allionia Loefl. Iter Hisp. 181. 1758.

Vitmania Turra ex Cav. Ic. 3: 53. 1794, not *Vitmania* Vahl. 1794.

Oxybaphus L'Her. Willd. Sp. Pl. 1: 185. 1797.

Calyxhymenia Ortega, Nov. Rar. Pl. Hort. Matr. 5. 1797.

Calymenia Pers. Syn. 1: 36. 1805.

Mirabilis Heimerl in Engl. & Prantl, Pflanzenfam. 3[1h]: 24. 1894, in part, not L.

Perennial herbs, glabrous or pubescent, with the branches of the stem and inflorescence opposite or alternate; leaves opposite, rather fleshy, entire, petioled or sessile; flowers 1 to 5 in each involucre, white, pink, purplish red, or crimson, surrounded by a gamophyllous, 5-lobed involucre which is enlarged and membranous in fruit; perianth campanulate or infundibuliform, often oblique, with an erect or spreading limb; stamens 2 to 5, unequal, filaments very slender, united at the base; fruit club-shaped, 5-angled or 5-ribbed, pubescent or glabrous.

The genus was based upon a plant which was later named *Allionia violacea* L. Vitmania and Oxybaphus were founded on *A. viscosa*; Calyxhymenia upon *A. glabrifolia*; and Calymenia upon six species, all true Allionias, without the designation of any one of them as the type.

The genus Allionia contains about 20 species besides those cited here. It is best represented in the western and southwestern parts of the United States and in Mexico; it extends into South America as far as Chile and Peru. It is a remarkable fact that one species, *A. himalaica*, extends into the Himalaya Mountains of Asia, the only species to be found outside the western hemisphere. A number of species occur in Mexico which are not included in this paper because of the inability of the author to secure reliable material of them. A considerable number of sheets of Mexican origin were seen which were referred by their collectors to *A. violacea*, *A. glabrifolia*, and similar species, but the author was unable to determine them satisfactorily, the only material in whose identity any confidence could be placed being that in the Bernhardi Herbarium.

The various species, although they do not usually cover such wide ranges as the species of Boerhaavia, extend sometimes over rather large areas. Some species, such as *A. hirsuta* and *A. nyctaginea*, are found almost throughout the central-western part of the United States, while others, judging from the material now in the various herbaria, are confined to very small areas, areas as small as those occupied by species of Abronia. In this matter of the extent of distribution of individual species this genus stands midway between Abronia and Boerhaavia.

Allionia can be at once divided into two natural sections, one with flowers whose perianths are crimson in color and have a conspicuous tube, and the other with flowers whose perianths are purplish, pink, white, or greenish, but never scarlet, and are campanulate in form. It is possible that at some time the crimson-flowered species will be found worth separating as a new genus. They are so like the other species in habit and general appearance, however, that the writer has thought best to leave them in the genus Allionia.

There is room for some interesting field work in this genus, especially in order to determine the relation of the forms with axillary inflorescence to those with paniced or cymose inflorescence. The opinion has been expressed by various persons that some of the forms with axillary flowers may be merely depauperate or shade forms of species with more numerous flowers. *A. aggregata* bears a very striking resemblance to *A. hirsuta*, *A. decumbens* to *A. lanceolata*, and *A. bodini* to *A. linearis*. Several other similar cases could be mentioned. The possibility of *A. aggregata* and *A. hirsuta* being variations of the same plant is made more plausible by the fact that they occupy practically the same area of distribution; the same is true in the other two instances mentioned. If it should be proved that one of these pairs is related in the way suggested—that is, that the axillary-flowered plant is merely a form of another larger plant induced by peculiar environmental conditions—then such plants as *A. decumbens*, *A. aggregata*, and others should, of course, take the rank of subspecies of the species to which they are most closely related. There are a few of the forms with axillary involucres which do not seem to be closely related to other more complex forms, but perhaps this is because the plants to which they are related have not yet been collected.

KEY TO THE SPECIES.

Perianth scarlet, with a conspicuous tube; leaves linear.

Plants sparingly branched, tall and erect; involucres 3-fruited; flowers not cleistogamous ..... 1. *A. coccinea*.

Plants diffusely branched, lower; involucres mostly 1-fruited; flowers usually cleistogamous; plants more slender.

Leaves filiform ..... 2a. A. *gracillima filifolia.*

Leaves linear.

Stems glabrous except on and near the pedicels .. 2. A. *gracillima.*

Stems scabrate almost throughout ..... 2b. A. *gracillima scabridata.*

Perianth not scarlet; campanulate.

Leaves linear or narrowly linear-lanceolate.

Inflorescence paniculate or cymose.

Fruit glabrous.

Plant low and slender; leaves linear; inflorescence cymose, i. e., its branches alternate .. 3. A. *petrophila.*

Plant tall and stout; leaves wider and thicker; inflorescence paniculate, i. e., with opposite branches ..... 4. A. *glabra.*

Fruit not glabrous.

Plants tall, erect, stout; stems simple or sparingly branched; inflorescence paniculate; leaves sessile.

Stems glabrous below ..... 5. A. *linearis.*

Stems more or less hirsute below ..... 5a. A. *linearis subhispida.*

Plants lower; stems more branched and diffuse, or the inflorescence cymose.

Leaves divaricate, distinctly petioled; branches of the inflorescence merely viscid-puberulent ..... 6. A. *divaricata.*

Leaves mostly erect, sessile; branches of the inflorescence densely viscid hairy.

Plant low; leaves thick and dull green .. 7. A. *diffusa.*

Plant larger and much more branched; leaves thin and bright green ..... 8. A. *glandulifera.*

Inflorescence axillary or of few-flowered clusters at the ends of the branches.

Lobes of the involucre elliptical, rather obtuse; plants very slender, the stems simple or sparingly branched ..... 11. A. *pinetorum.*

Lobes of the involucre lanceolate to elliptical, acute; plants much branched.

Involucre covered with long and soft hairs; leaves more or less subpilose; fruit with thick, smooth ribs, obtuse ..... 9. A. *vaseyi.*

Involucre puberulent; leaves glabrous; fruit with narrower and less conspicuous ribs, acute ..... 10. A. *bodini.*

Leaves neither linear nor narrowly linear-lanceolate.

Inflorescence axillary.

Stems hirsute ..... 12. A. *aggregata.*

Stems not hirsute.

Stems glabrous below.

Stems slender, sparingly branched; leaves glabrous ..... 13. A. *decumbens.*

Stems stouter, much branched; leaves conspicuously ciliate ..... 14. *A. ciliata.*
Stems puberulent throughout, low, much branched.
Leaves ovate to elliptical, obtuse; bracts obtuse ..... 15. *A. pumila.*
Leaves lanceolate, acute; bracts acute ..... 16. *A. brandegei.*
Inflorescence not axillary.
All leaves except the uppermost conspicuously petioled.
Plants 1 to 2 meters tall; flowers very large; stems pubescent throughout; leaves cordate, pubescent.
One flower in each involucre; stems and leaves viscid; branches of the inflorescence opposite; petioles, even those of the upper leaves, long ..... 19. *A. viscosa.*
Two or 3 flowers in each involucre; stems and leaves puberulent but not viscid; branches of the inflorescence alternate; petioles shorter, the uppermost leaves almost sessile ..... 20. *A. rotata.*
Plants considerably lower and with much smaller flowers.
Leaves thick, fleshy, and rather rigid; stems pubescent throughout; inflorescence bracteate.
Stems soft-pubescent or puberulent throughout; leaves with long petioles .. 17. *A. pachyphylla.*
Stems hirsute; petioles shorter; leaves larger ..... 18. *A. polytricha.*
Leaves thin and soft; inflorescence seldom bracteate (so in a few species only).
Stems pubescent throughout.
Stems subhirsute below; plant rather slender; leaves lanceolate or lanceovate, rounded or cuneate at the base. 22. *A. greggii.*
Stems not subhirsute below, but puberulent or finely pubescent.
Leaves glabrous; plant tall and stout; leaves broadly ovate or oblong, truncate or rounded at the base ..... 24. *A. gigantea.*
Leaves pubescent.
Leaves ovate, cordate or rounded at the base ..... 23. *A. conata.*
Leaves lanceolate, cuneate or rounded at the base ..... 21. *A. coahuilensis.*
Stems not soft-pubescent or puberulent throughout, mostly glabrous below.
Fruit glabrous; leaves cordate-ovate inflorescence bracteate ..... 31. *A. texensis.*

Fruit not glabrous.
Involucral bracts large, usually 15 mm. or more in diameter when mature, sparingly puberulent or almost glabrous at maturity; upper leaves with evident petioles; stems almost glabrous above.
Leaves ovate, cordate at the base ..... 25. *A. nyctaginea.*
Leaves narrowly ovate to oblong, rounded or cuneate at the base, not cordate ..... 26. *A. floribunda.*
Involucral bracts smaller, when mature less than 15 mm. broad, usually not more than 10 mm., densely pubescent; upper leaves mostly sessile; stems densely pubescent above.
Inflorescence conspicuously bracteate 27. *A. latifolia.*
Inflorescence not conspicuously bracteate.
Bracts broadly ovate, obtuse, puberulent; inflorescence not forming a broad cyme; leaves oblong-lanceolate, rounded at the base, blunt-pointed ..... 28. *A. oblongifolia.*
Bracts elliptical or narrowly ovate, densely hairy; inflorescence mostly broadly cymose.
Stamens 5; stem subhirsute almost throughout; leaves deltoid-ovate to broadly lanceolate ..... 29. *A. pratensis.*
Stamens 5; stem subhirsute below; leaves lanceolate, acute, rounded, or tapering at the base; bracts usually with abundant black hairs ... 30. *A. melanotricha.*
Leaves sessile or with very short and inconspicuous petioles.
Inflorescence with numerous reduced, bract-like leaves ..... 32. *A. bracteata.*
Inflorescence usually not bracteate.
Stems more or less pubescent below.
Fruit glabrous ..... 37. *A. carletoni.*
Fruit not glabrous.
Stems more or less hirsute.
Stems hirsute throughout; leaves also hirsute, especially on the lower surface, lanceolate; plant very stout ... 33. *A. hirsuta.*
Stems hirsute only about the nodes; leaves glabrous and narrower; plant more slender ..... 34. *A. pilosa.*

Stems not at all hirsute.	
Stems densely soft-pubescent throughout	35. *A. chersophila.*
Stems rough-puberulent.	
Plant stout; leaves linear-lanceolate, 75 mm. long and 17 mm. wide or less; lobes of the involucre elliptical or ovate, obtuse	42a. *A. pseudaggregata subhirsuta.*
Plant smaller and more slender; leaves linear-lanceolate, 27 mm. long and 5 mm. wide or less; lobes of the involucre lanceolate or elliptical, acute	36. *A. trichodonta.*
Stems glabrous below.	
Fruit glabrous	38. *A. exaltata.*
Fruit not glabrous.	
Lower leaves ovate, rounded at the base	39. *A. sessilifolia.*
Lower leaves lanceolate or linear-lanceolate, narrowed at the base.	
Branches of the inflorescence alternate, forming a cyme; leaves thin, tapering at both ends, more or less pubescent	42. *A. pseudaggregata*
Branches of the inflorescence alternate, forming a panicle.	
Perianth white; leaf blades thin, acute, or acuminate	41. *A. albida.*
Perianth pink; leaf blades thick, blunt-pointed.	
Involucre 3-flowered and 3-fruited	40. *A. lanceolata.*
Involucre 1-flowered and 1-fruited	40a. *A. lanceolata uniflora.*

1. **Allionia coccinea** (Torr.) Standley.

Oxybaphus coccineus Torr. Bot. Mex. Bound. 169. 1859.

Mirabilis coccinea Benth. & Hook. Gen. Pl. 3: 3. 1880.

Allionia linearis coccinea Jones, Contr. Western Bot. **10**: 51. 1902.

Specimens examined:

NEW MEXICO: Copper mines, *Wright* 1723, type collection; Kingston, 1904, *Metcalfe* 1379; Mangas Springs, 1903, *Metcalfe* 91; Mogollon Creek, 1903, *Metcalfe* 229; Rio Apache, 1892, *Wooton;* 5 miles west of Silver City, 1906, *Wooton;* Silver City, 1880, *Greene;* Burro Mountains, 1880, *Rusby* 354; Eagle Peak, 1900, *Wooton;* Mexican Boundary Survey 1115.

ARIZONA: Bradshaw Mountains, 1892, *Toumey* 482; Putnams, 1890, *Jones;* Prescott, 1894, *Toumey;* Nogales, 1892, *Brandegee;* mouth of Blue River, 1905, *Hough;* Fort Huachuca, 1894, *Wilcox* 207; Fort Rucker, 1879, *R. T. Budd;* Marsatzal Mountains, 1867, *Doctor Smart* 227; Lowell, 1884, *Parish;* Hassayampa Creek, 1865, *Coues & Palmer* 274, 374; Santa Rita Mountains, 1881, *Pringle;* Fort Apache, 1903, *Mayerhoff* 117.

MEXICO: San José Mountains, Sonora, 1893, *Mearns* 1757.

2. **Allionia gracillima** Standley, sp. nov.

Stems 20 to 50 cm. long, from a slender woody root, very slender, much branched, dichotomous, frequently 4 branches from a single node, the branches rather densely interlacing, the plant erect or decumbent, the stems glabrous throughout, more or less glaucous, especially near the nodes; leaf blades thin, linear, acute, bright green, sessile, 10 cm. or less in length; involucres single in the axils of the leaves on filiform pedicels, which are 6 mm. or less in length, the pedicels glabrous or with a few minute, appressed hairs; flowers apparently all cleistogamous; involucres cleft almost to the base, the lobes narrowly elliptical, acutish, finely pubescent, about 4 mm. high; fruit 5.5 mm. or less in length, acutish above, slightly narrowed below with 5 very prominent and thick, obtuse ribs, finely hispidulous.

I first saw this plant in the herbarium of the University of Arizona, but hesitated to describe it, thinking it merely an abnormal form. Later, on examination of the excellent series of specimens of the plant collected by Mr. Blumer, it could be seen that the plant was distinct from its nearest ally, *A. coccinea*. From that species it differs in its more slender and much branched stem, less erect habit, cleistogamous flowers, and the usually single fruit in the involucre; the method of inflorescence, too, is very different.

Type in the herbarium of the New Mexico Agricultural College, collected in the Chiricahua Mountains, Arizona, 1907, *J. C. Blumer* 1769, near Paradise, at an altitude of 1540 to 1880 meters. Also collected at Oracle, Arizona, 1905, *Thornber*.

2a. **Allionia gracillima filifolia** Standley, subsp. nov.

This differs from the species in having smaller and thicker filiform leaves. It also appears to be a smaller plant. The leaves of the species, although narrow, are not filiform but flat.

Type in the herbarium of the New Mexico Agricultural College, collected at Mangas Springs, New Mexico, August 17, 1902, *Wooton*.

2b. **Allionia gracillima scabridata** (Heimerl) Standley.

Mirabilis coccinea scabridata Heimerl, Ann. Cons. et Jard. Genev. 5: 186, 1901.

In the herbarium of the University of Arizona there is a specimen collected in the Santa Rita Mountains, Arizona, 1903, *Thornber* 252, that answers well to the description of Doctor Heimerl's variety, in having its stem and leaves covered with a fine appressed pubescence almost throughout. The type was collected in the Santa Rita Mountains by Pringle. If this plant is the same as the type, and I have little doubt that it is, it is more closely related to *A. gracillima* than to *A. coccinea*, differing from the former chiefly in its pubescence and rather wider leaves.

3. **Allionia petrophila** Standley, sp. nov.

Perennial from a thick root, 50 to 60 cm. high; branches erect, strict; stems sparingly branched, very slender, glabrous except the branches of the inflorescence, which are finely and sparingly puberulent, pale or glaucous; leaf blades linear, 75 mm. long or less, of medium texture, glabrous, acutish, sessile; inflorescence dichotomously cymose, the cymes narrow, few-flowered; involucres on pedicels about 5 mm. long and densely soft-pubescent; involucres about 10 mm. in diameter, the lobes broadly ovate, obtuse, densely soft-pubescent, the lobes as long as the tube or shorter; fruit brown, 4 mm. long, rather obtuse above or acutish, narrowed below, with 5 very thick, tuberculate ribs, the narrow spaces between the ribs tuberculate, glabrous.

Readily distinguished by its glabrous, tuberculate fruit and strict, slender habit. Type in the herbarium of the University of California (sheet 101176), collected on rocky hills near Chihuahua, Mexico, September, 1886, *Pringle* 840.

4. **Allionia glabra** (S. Wats.) Kuntze, Rev. Gen. Pl. 533. 1891.
Oxybaphus glaber S. Wats. Am. Nat. **7**: 301. 1873.

On account of its glabrous fruit and stems this is a very distinct species. The involucres are usually 1-flowered. The type material consisted of merely a few panicles in fruit broken from the ends of the stems, but there is little doubt about the identity of the plant.

Type locality, Kanab, Utah.

Specimens examined:

UTAH: Southern Utah, 1872, *Wm. Thompson* 303.
ARIZONA: Northeastern Arizona, 1896, *Hough* 53.
NEW MEXICO: Mesilla Valley, 1907, *Wooton & Standley* 3895; Mesilla Valley, 1890, *Wooton*; Arroyo Ranch near Roswell, 1903 *Griffiths* 5683; Albuquerque, 1894, *Herrick*; Brockman's Ranch, 1900, *Wooton*.
TEXAS: No locality given, *Harard*.

5. **Allionia linearis** Pursh, Fl. Am. Sept. **2**: 728. 1814.
Calymenia angustifolia Nutt. Gen. N. A. Pl. **1**: 26. 1818.
Oxybaphus angustifolius Sweet, Hort. Brit. **1**: 334. 1826.
Oxybaphus angustifolius linearis Choisy in DC. Prod. **13**^{2}: 433. 1849.
Mirabilis angustifolia MacM. Metasperm. Minn. Val. 216. 1892.
Allionia bushii Britton, Bull. Torr. Club **22**: 223. 1895.
Mirabilis linearis Heimerl, Ann. Cons. et Jard. Genev. **5**: 186. 1901.

This is an exceedingly variable species, and one that is difficult to study from herbarium material. Such material usually does not show the color of the flowers, nor, what is of more importance, the habit of the plant. As it is defined here it is probably a composite species, and some of the specimens should perhaps even be placed in some of the closely related species. Some of the plants are noteworthy because of their bracted inflorescence which has slender and much jointed branches. Whether this form is worthy of separation I have been unable to determine.

Specimens examined in part:

ARIZONA: Base of San Francisco Mountains, 1884, *Lemmon*; mesa west of Buckskin Mountains, 1894, *Jones* 6063b; San Francisco Mountains, 1889, *Knowlton* 178; Walnut Canyon near Flagstaff, 1891, *MacDougal*.
NEW MEXICO: Organ Mountain foothills, 1894, *Wooton*; White Mountains, 1897, *Wooton* 77; Mangas Springs, 1901, *Metcalfe*; Dog Spring, Dog Mountains, 1893, *Mearns* 2421; Sierra Grande, 1903, *Howell* 223; Crawfords, 1906, *Wooton*; Zuni Reservation, 1904, *Wooton* 2830; Raton, 1899, *Cockerell*; Rio Frisco, 1900, *Wooton*; mountains north of Santa Rita, 1900, *Wooton*; Socorro, 1881, *Vasey*; Chiz, 1904, *Wooton* 2828; Roswell, 1900, *Earle* 365; Capitan Mountains, 1900, *Earle* 495; Gila Hot Springs, 1900, *Wooton*.
COLORADO: Colorado Springs, 1892, *C. S. Sheldon* 563; Grand Junction, 1894, *Jones* 5476; Platte River, *Denver*, 1878, *Jones* 668; Durango, 1896, *Tweedy* 591; Fort Collins, 1898, 2150; near Boulder, 1902, *Tweedy* 5208, 5209; Canyon City, 1873, *Brandegee* 437; New Windsor, 1904, *Osterhout*, 2926.
WYOMING: Wheatland, 1894, *A. Nelson* 379; North Fork of the Laramie River near Prayers Crossing, 1899, *Schuchert*.

SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 314a, 313; Hot Springs, 1892, *Rydberg* 958; French Creek, 1892, *Rydberg*, 957; White River, 1892, *Wilcox*; Spring Creek Basin, 1891, *T. A. Williams*.

NEBRASKA: Minden, *H. Hapeman*; Beaver Creek, 1893, *F. E. Clements* 2665; Kearney, 1889, *J. H. Holmes*; Kearney, 1899, *Pammel*; Republican Valley, 1893, *W. A. Lapbourn* 56.

KANSAS: Garden City, 1890, *B. B. Smyth* 193; Riley County, 1895, *J. B. Norton* 421; Caldwell, 1890, *Smyth* 269; Osborne City, 1894, *Shear* 98; Fort Riley, 1892, *Gayle*.

MISSOURI: Wayne, 1900, *Bush* 825 (this is cited by Doctor Rydberg as *A. bracteata*, but it does not seem to be that species, for its leaves are much narrower and thicker and the aspect of the plant is very different).

ILLINOIS: Romeo, 1898, *Umbach*.

OKLAHOMA: Amadarko, 1891, *C. S. Sheldon* 178; Huntsville, 1896, *Laura A. Blankinship*; Limestone Gap, 1877, *Butler*.

TEXAS: Pedernales, *Jermy* 513; 1849, *Wright* 606; Colorado, 1902, *Tracy* 8072; Estelline, 1903, *Rererchon* 3687a; Big Springs, 1902, *Tracy* 8345; San Antonio, *E. H. Wilkinson* 143.

Mr. K. K. Mackenzie writes me that *A. bushii* Britton, which he has seen in its type locality, Jackson County, Missouri, is an artificial form of *A. linearis*, which grows rather commonly along the railroad tracks. When this is cut down by the section men small, depauperate shoots spring up from the stubs that are left, and one of these was described as *A. bushii*.

The following collections could be referred here, if anyone cares to maintain this form as a variety:

MISSOURI: Jackson County, 1893, *Bush*.

KANSAS: Ulysses, 1893, *C. H. Thompson* 58; Kearney County, 1897, *Hitchcock* 421a; Tribune, 1892, *Minnie Reed*.

OKLAHOMA: Near Alva, 1896, *Ward* 70; Sapulpa, 1894, *Bush* 472.

5a. **Allionia linearis subhispida** (Heimerl) Standley.

Mirabilis linearis subhispida Heimerl, Ann. Cons. et Jard. Genev. 5: 186, 1901.

This is distinguished from the species by its stem which is more or less hirsute throughout, the pubescence extending to the leaves. It seems to be a smaller plant, too, and is probably a good species, but the author has seen no very good material.

Specimens examined:

NEW MEXICO: Capitan Mountains, 1900, *Earle* 383, type collection; south of San Rafael, 1906, *Wooton*; Atarque, 1906, *Wooton*; Gray, 1898, *Skehan* 100; Magdalena, 1897, *Herrick* 658.

6. **Allionia divaricata** Rydb. Bull. Torr. Club 29: 601. 1902.

From *A. linearis* this is distinguished chiefly by its long, thin, acuminate leaves, which are also wider, and by the prominent petioles; from *A. diffusa* by the less pubescent pedunceles, taller and less branched stem, and the petioled leaves; from *A. glandulifera* by its less branched habit, narrower and petioled leaves, and less abundant and different pubescence. The species is also more or less closely related to *A. melanotricha*.

Specimens examined:

COLORADO: Durango, 1898, *Baker*, *Earle & Tracy* 512a, type collection; Colorado Springs, 1896, *Knowlton* 34; near Florissant, 1905, *Ramaley* 1372; Sapinero, 1898, *H. N. Wheeler* 567; Arkansas River Valley, 1873, *Wolf* 811; Minnehaha, 1901, *Clements* 112; Berwind, 1900, *Jennie M. Archibald*; Sierra Mojada, 1877, *Brandegee*; Manitou, 1885, *Pritchey*; Fort Collins, 1896, *Baker*.

UTAH: Salt Lake City, 1880, *Jones* 1865; Marysvale, 1894, *Jones* 5004c.

NEW MEXICO: Glorieta, 1881, *Vasey*; Santa Fe Canyon, 1897, *Heller* 3848; Chusca, 1883, *C. C. Marsh*; West Fork of the Gila, 1900, *Wooton*; Sandia Mountains, 1898, *Herrick* 1012.

ARIZONA: San Francisco Mountains, 1889, *Knowlton* 11; Flagstaff, 1884, *Jones* 4057; Bill Williams Mountain, 1883, *Rusby* 792; south of Bakers Butte, 1892, *Toumey* 486; San Francisco Mountains, 1884, *Lemmon*; Leroux Spring, 1901, *Leiberg* 5845.

7. Allionia diffusa Heller, Minn. Bot. Stud. **2**: 33. 1898.

This is a plant that is very difficult to understand and determine from herbarium material. A considerable number of the specimens below referred here may be wrongly determined on this account. The plant is distinguished from *A. linearis* chiefly by its diffuse habit, a character difficult to show in dried specimens.

NEW MEXICO: Ten miles west of Santa Fe, 1897, *Heller* 3740, type collection; Mangas Springs, 1902, *Wooton*; Eagle Creek, White Mountains, 1899, *Turner* 283; Little Mountain, near Las Cruces, 1902, *Metcalfe*; Kingston, 1904, *Metcalfe* 1349; near Carrizozo, 1901, *Wooton*; Albuquerque, 1900, *Winnie Howard* 13; White Mountains, 1897, *Wooton* 240; Sierra Grande, 1903, *A. H. Howell* 232; Santa Fe, 1881, *Engelmann*.

COLORADO: Denver, 1881, *Ward*; eastern Colorado, 1904, *W. S. Cooper* 294; Fort Collins, 1895, *J. H. Coleen* 2147; near Boulder, 1901, *Ramaley* 801; Trinidad, 1892, *Eastwood*; Piedra, 1899, *Baker*.

TEXAS: Limpia Canyon, 1889, *Nealley* 617.

ARIZONA: Plains near Flagstaff, 1900, *Purpus* 8072; Cedar Mountains, 1902, *Purpus*; Tanners Canyon, Huachuca Mountains, 1903, *F. V. Holzner* 567.

WYOMING: Valley of South Stinking Water, 1893, *Rose* 132.

8. Allionia glandulifera A. Nelson, Bot. Gaz. **34**: 364. 1902.

Various authorities have stated that this is the same as *A. diffusa*. It certainly resembles that species very closely, but I do not believe that it can be the same. *A. glandulifera* is a larger, rather more branched plant of a much brighter green color. It also seems to be more pubescent and glandular.

Specimens examined:

WYOMING: Head of Woods Creek, Albany County, 1900, *A. Nelson* 8048; plains between Sheridan and Buffalo, 1900, *Tweedy* 5557; Cottonwood Canyon, 1895, *A. Nelson* 1590; Laramie, 1900, *A. Nelson* 7637; Wheatland, 1894, *A. Nelson* 379; Sheridan Experiment Farm, 1895, *J. L. Lewis*, 47.

MONTANA: Sand Coulee, 1885, *R. S. Williams*.

INDEFINITE REGIONS: Near mouth of the Cheyenne River, Upper Missouri, 1859, *Geyer* 67; Yellowstone, 1853–54, *Hayden*; head of the Little Missouri, 1859, *Hayden*; sandy bed of Cheyenne River, 1859, *Hayden*.

9. Allionia vaseyi Standley, sp. nov.

Stems low, about 20 cm. high, spreading, much branched, the branching dichotomous, glabrous below or minutely roughened, more or less soft-pubescent above near the ends of the branches; leaf blades linear, sessile, thick and fleshy, slightly or somewhat pilose on the lower surfaces; involucres axillary or a few clustered at the ends of the branches, short-pedicelled, the pedicels being shorter than the involucres, about 10 mm. wide and 7 mm. high, the lobes elliptical or even lanceolate, acute, covered by rather long, soft, matted hairs;

fruit about 4.5 mm. long, obtuse above, considerably narrowed below, with wide, smooth ribs, the narrow spaces between the ribs tuberculate, puberulent.

The differently formed fruit, pubescent leaves, and more pubescent involucres separate this plant from *A. bodini*. Type in the herbarium of Field Museum of Natural History (no. 161591), collected at El Paso, Tex., 1881, *Vasey*.

10. **Allionia bodini** (Holzinger) Morong, Mem. Torr. Club 5: 354. 1894.
Oxybaphus bodini Holzinger, Contr. Nat. Herb. 1: 287. 1893.

Specimens examined:

COLORADO: Pueblo, 1890, *Bodin* 236, type; Fort Collins, 1895, *J. H. Cowen* 2129; Canyon City, 1873, *Brandegee* 324; New Windsor, 1905, *Osterhout* 190.
SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 314.
UTAH: Rabbit Valley, 1875, *Ward* 565; near Price, 1894, *Jones* 460a.
TEXAS: 1849, *Wright*.
KANSAS: Seward County, 1888, *H. W. Norris* 103.
ARIZONA: Base of the San Francisco Mountains, 1884, *Lemmon*.
WYOMING: Between Sheridan and Buffalo, 1900, *Tweedy* 5536.

11. **Allionia pinetorum** Standley, sp. nov.

Perennial from a thick, fleshy root about 18 mm. thick or less; stems few from each root, rarely more than 2.35 cm. or less in height, very slender, simple or very sparingly branched, glabrous below, very minutely soft-puberulent above; leaves sessile, narrowly linear, thin, 65 mm. long and 3 mm. wide or less, sharp-pointed, glabrous, divariate or ascending; inflorescence axillary or of small, loose, terminal, few-flowered cymes; involucres on pubescent pedicels 8 mm. long or less; upper leaves sometimes reduced to bracts; involucres 8 mm. wide and 6 mm. high or less, the lobes elliptical or oblong, obtuse, rather densely soft-puberulent; flowers apparently all cleistogamous; fruit 3.5 mm. long, inconspicuously 5-angled, very minutely and sparingly hispidulous.

This is perhaps as closely related to *A. bodini* as to any species, but it is a much more slender, less branched plant, its leaves narrower and thinner. Type collected at Gilmore's Ranch, on Eagle Creek, White Mountains, New Mexico, August, 1907, *Wooton & Standley* 3896, growing on a rather dry hillside with a southern exposure, under pine trees; altitude about 2,270 meters. Type in the herbarium of the New Mexico Agricultural College.

12. **Allionia aggregata** (Ortega) Spreng. Syst. 1: 384. 1825.
Calyxhymenia aggregata Ortega, Nov. Rar. Pl. 8: *pl. 11*. 1798.
Oxybaphus aggregatus Vahl, Enum. 2: 41. 1806, in part.

Specimens examined:

WYOMING: Whalen Canyon, 1894, *A. Nelson* 4014.
NORTH DAKOTA: Lisbon, 1891.
MISSOURI: No locality given, 1883, *Bush*.
NEBRASKA: Fort Clark, 1855, *Hayden*.

One sheet collected by Wright, 1851–52, no number, in the National Herbarium belongs here.

13. **Allionia decumbens** (Nutt.) Spreng. Syst. 1: 384. 1825.
Mirabilis aggregata Cav. Ic. 5: 22. *437*. 1799.
Oxybaphus aggregatus Vahl, Enum. 2: 41. 1806, in part.
Calymenia decumbens Nutt. Gen. N. A. Pl. 1: 26. 1818.
Oxybaphus decumbens Sweet, Hort. Brit. 1: 334. 1826.

Oxybaphus angustifolius decumbens Choisy in DC. Prod. 13²: 443. 1849.

Type locality, "On high, bare, gravelly hills near Fort Mandan on the Missouri."

Specimens examined:

MISSOURI: Little Blue Tank, Jackson County, *Bush* 183; Independence, 1894, *Bush* 486; Swan, 1898, *Bush* 237; Independence, 1882, *Bush* 3; Allenton, 1875, *Letterman*; Potosi, 1861, *F. Peck*; Jackson County, 1892, *Bush* 2097.

TEXAS: Bexar County, *Jermy* 125.

NORTH DAKOTA: Medora, 1891, *H. L. Bolley* 1311.

COLORADO: Canyon City, 1873, *Brandegee* 700.

14. **Allionia ciliata** Standley, sp. nov.

Oxybaphus aggregatus Torr. Bot. Mex. Bound. 168. 1858, not Vahl.

Plant low, 20 cm. high, erect, abundantly dichotomous-branched, especially near the base; stems angled, at least when dry, glabrous below, with a few scattered, weak hairs above; leaf blades linear-lanceolate, thin, blunt-pointed, rounded, cuneate, or attenuate at the base, the margins very irregular and with a few conspicuous long, soft, white hairs, a few such hairs scattered over the surfaces of the leaves as well; petioles 7 mm. long or less, with a few hairs like those on the blades; inflorescence axillary or a few of the involucres clustered at the ends of the branches; involucres short-pediceled, the pedicels rather densely long-pubescent, not at all viscid; involucres about 10 mm. wide and 8 or 9 mm. high, the lobes about as long as the tube, acutish, sparingly puberulent or glabrous, ciliolate-margined; fruit 4 mm. long, brown, rather obtuse above, slightly narrowed below, 5-ribbed, the ribs thick and more or less tuberculate, the narrow spaces between them also tuberculate, glabrous.

The plant in habit suggests *A. brandegei* or *A. pumila*, but its almost glabrous stem and different pubescence at once distinguish it. Type U. S. National Herbarium no. 22690, cotype in the herbarium of the Missouri Botanical Garden; collected at Smith's Run, western Texas, 1851–52, *Wright* 1717.

The specific name above adopted was used by Professor Heimerl in herbarium under Mirabilis.

15. **Allionia pumila** Standley, sp. nov.

Plant low, about 12 cm. high, much branched from a thick, woody root, the stems sparingly branched; stems rather slender, densely soft-pubescent; leaf blades ovate or oblong, small, 25 mm. long and 16 mm. wide or less, obtuse or rounded at the apex, rounded or mostly somewhat attenuate at the base, rather thick but soft, finely puberulent on both surfaces, yellowish-green; petioles slender, pubescent, mostly as long as the blades or longer, some of the uppermost a little shorter; involucres solitary in the axils of the leaves, drooping on short, densely pubescent pedicels; bracts ovate, obtuse, densely soft-pubescent, 10 mm. or less in diameter, about 5 to 6 mm. high; fruit not seen.

A very distinct species on account of its low, dense habit, finely pubescent stems, and long petioles. It is as closely related to *A. aggregata* as to any species, but is different in habit and pubescence. Doctor Heimerl in the National Herbarium has labeled it *A. pilosa* (A. Gray) (*A. comata* Small), but the latter is a much larger plant with quite different inflorescence. Type U. S. National Herbarium no. 22757, collected at Kingman, Arizona, June, 1884, *J. G. Lemmon & Mrs. Lemmon*. Also collected at Castle Creek, Arizona, 1892, *Toumey* 484.

16. **Allionia brandegei** Standley, sp. nov.

Perennial from a very thick and woody root; stems many from each root, 18 cm. high or less, erect or spreading, viscid-pubescent throughout, densely so above; stems mostly simple, sometimes sparingly branched; leaf blades lanceolate, 35 mm. long and 14 mm. wide or less, thick, densely viscid-puberulent on both surfaces, attenuate toward the apex, cuneate or attenuate at the base; petioles one-half as long as the blades or usually less, those of the uppermost blades very short, densely viscid-pubescent; involucres few, axillary, not more than 1 at any single node, about 13 mm. in diameter and 10 mm. high, the bracts ovate or triangular-ovate, acute, longer than the tube, densely puberulent within and without, thick; fruit 6 mm. long, dark olive, acutish, with 4 or 5 low, more or less tuberculate ribs, the spaces between the ribs also tuberculate, very sparingly puberulent, some of the fruits even glabrous; flowers not seen but probably cleistogamous.

This is most like *A. pumila*, but its leaves are thicker and more densely pubescent and of a different shape, the petioles shorter, and the lobes of the involucre more acute. Type in the herbarium of the University of California (no. 10164), collected in the Providence Mountains, California, June 2, 1902, *Brandegee*. Purpus's 5905 from Highland Peak, Nevada, seems to be a glabrate form of this; aside from its less abundant pubescence it does not seem to differ, and is probably merely an older plant.

17. **Allionia pachyphylla** Standley, sp. nov.

Low, 30 cm. high or less, from a woody root; stems stout, much branched, with short internodes, low and more or less spreading; stems with abundant, rather hispid pubescence throughout; leaf blades ovate, obtuse, truncate, or subcordate at the base or sometimes attenuate, thick, more or less puberulent on both surfaces, paler beneath; petioles of the lowest leaves almost as long as the blades, becoming shorter above, the uppermost leaves almost sessile, the petioles stout; inflorescence subcymose, of few branches, the branches with conspicuous, broadly ovate, thick bracts, densely pubescent; involucres on short, densely pubescent pedicels, about 1 cm. in diameter, their lobes ovate and densely pubescent; fruit 5 mm. long, acutish above, prominently 5-ribbed, very finely puberulent.

A very distinct species referred to *A. pilosa* (Gray), from which it is quite different in habit; its leaves, too, are much thicker, and the fruit more acute. Type U. S. National Herbarium no. 211717, collected in Arizona at the Grand Canyon, 1892, *Toumey* 485; cotype in the herbarium of the University of Arizona.

Other specimens seen:

ARIZONA: Red Canyon Trail, Grand Canyon, 1901, *Ward;* Grand Canyon, 1892, *Wooton;* Camp Verde, 1891, *MacDougal.*

18. **Allionia polytricha** Standley, sp. nov.

Erect from a rather thick and woody root; stems sparingly branched, stout, hirsute below, the branches of the inflorescence soft-pubescent; leaf blades ovate, the uppermost rather narrowly so, thick, glabrous or sparingly ptilose, obtuse or rounded at the apex, rounded or truncate at the base, large, 7 cm. long and 5 cm. wide or less; petioles stout, those of the lowest leaves one-third as long as the blades, the uppermost leaves sessile; inflorescence sparingly dichotomous-branched, the branches with numerous bract-like, much reduced, thick, puberulent leaves; involucres short-pediceled or almost sessile, about 10 mm. wide, the bracts thick, broadly ovate, obtuse, 6 mm. high, more or less

densely soft-pubescent; fruit clavate, minutely strigose, rather obtuse above, 4 or 5 mm. long.

This is not likely to be confused with any species except *A. pachyphylla*. It is distinguished from that species by its larger leaves and hirsute pubescence; the stem, too, is less branched. Type in the herbarium of the University of California (no. 101182) collected at Canyon City, Colo., August 13, 1872, *Brandegee* 437. In the same herbarium there is a second specimen collected in the same locality, July 28, 1873, *Brandegee*, 702.

19. Allionia viscosa (Cav.) Kuntze, Rev. Gen. Pl. 533. 1891.

Mirabilis viscosa Cav. Ic. Pl. 1: 13. 1791.
Calyxhymenia viscosa Ortega, Nov. Rar. Pl. Hort. Matr. 1: 6. 1797.
Calymenia viscosa Pers. Syn. 1: 36. 1805.
Vitmania viscosa Turra; Steud. Nom. 140. 1821, as synonym.
Oxybaphus viscosus L'Her.; Choisy in DC. Prod. 13²: 430. 1849.

Specimens examined:

MEXICO: Near Tehuacan, Puebla, *Pringle* 8600; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1435; near Tula, Hidalgo, 1902, *Pringle;* Tehuacan, 1841, *Liebmann.*

20. Allionia rotata Standley, sp. nov.

Plant probably tall (there are only the ends of branches upon the sheets); stems sparingly puberulent throughout but not viscid, almost glabrous below, sparingly branched, the branching mostly dichotomous; leaf blades ovate, obtuse, cordate at the base, glabrous or the uppermost more or less puberulent; petioles very short, the uppermost leaves sessile; inflorescence subcymose, its branches slender and covered with much reduced, bract-like leaves; involucres on slender pedicels 7 mm. long or less, when mature circular in outline or scarcely lobed, sparingly soft-puberulent, about 25 mm. in diameter, ciliolate; fruit 4 mm. long, much narrowed below, obtuse above, 5-ribbed, prominently transversely ridged or tuberculate, glabrous or minutely puberulent.

From *A. viscosa* the plant is distinguished by its less pubescent and not viscid stems and leaves, shorter petioles, alternate branching, and more tuberculate fruit. The plant has also 2 or 3 flowers and fruits in each involucre while *A. viscosa* has uniformly only one. Type in the herbarium of the Missouri Botanical Garden, collected at Azufrora near Saltillo, Mexico, September 22, 1848, *Gregg* 511.

21. Allionia coahuilensis Standley, sp. nov.

Stems stout, erect, about 1 meter high, pale below, darker above, with more or less abundant, short, soft pubescence below which becomes more dense above; leaf blades lanceolate, 50 mm. long and 17 mm. wide or less, cuneate or rounded at the base, blunt-pointed, of medium thickness, densely soft-pubescent on both surfaces, the margins irregular, all leaves except those of the inflorescence with conspicuous petioles 20 mm. long or less; inflorescence paniculate, its branches stout, opposite, very densely viscid-pubescent throughout, the hairs rather long and spreading; branches of the inflorescence with conspicuous, much-reduced, bract-like leaves, these 5 mm. long or less, ovate, densely viscid-pubescent; involucres 12 mm. wide or less and about 8 mm. high, glandular-villous, on short glandular-villous, often bracted pedicels; lobes of the involucre broadly ovate or orbicular, broadly obtuse, short; fruit 4 mm. long, obtuse above, slightly narrowed below, with 5 smooth, rather prominent ribs, the spaces between them transversely rugulose and hirtellous.

This somewhat resembles *A. pseudaggregata*, but is a larger plant, with pubescent stems and more densely pubescent inflorescence, the pubescence being also of a different character; the leaves, too, are prominently petioled, while those of *A. pseudaggregata* are mostly sessile, and the inflorescence is paniculate rather than dichotomously branched as it is in the latter species. Type in the herbarium of the University of California, collected at Saltillo, Coahuila, Mexico, 1898, *Palmer* 158.

22. **Allionia greggii** Standley, sp. nov.

Stems erect, rather slender, more or less subhirsute below, densely glandular-pubescent above, the branching dichotomous; leaf blades lanceolate or lance-ovate, mostly blunt-pointed but some of them acutish, rounded or cuneate at the base, glabrous; petioles one-half as long as the blades, sparingly subhirsute, the uppermost leaves sessile; inflorescence congested, subcymose; involucres short-pediceled, the lobes ovate, acute, densely covered with matted hairs, 3-flowered; fruit 4 mm. long, with 5 thick but low ribs, not tuberculate, sparingly puberulent.

The smooth and puberulent fruit, obtuse and narrower leaves which are not cordate at the base, and 3-flowered involucres separate this from *A. glabrifolia*. From *A. pseudaggregata* it is readily distinguished by the blunt, petioled leaves and more pubescent stem. Type in the herbarium of the Missouri Botanical Garden, collected at San Antonio, near Saltillo, Mexico, September 1, 1848, *Gregg* 394b, 348, 394.

23. **Allionia comata** Small, Fl. Southeast. U. S. 407, 1903.

Oxybaphus nyctagineus pilosus A. Gray, Bot. Mex. Bound. 174, 1859, not *Allionia pilosa* Nutt.

Specimens examined:

TEXAS?: *Wright* 1718, type collection.

NEW MEXICO: Silver City, 1880, *Greene*, *Rusby* 353; Magdalena, 1897, *Herrick* 657.

ARIZONA: Prescott, 1894, *Toumey*; Santa Rita Mountains, 1880, *Engelmann*.

24. **Allionia gigantea** Standley, sp. nov.

Stems erect, simple below or sparingly branched, very stout and tall, probably considerably over 1 meter in height, softly appressed-puberulent throughout; leaf blades thick, the lower ones large, 10.5 cm. long and 8 cm. wide or less, broadly ovate, obtuse, truncate at the base, almost sessile; the upper leaves oblong, 8.5 cm. long and 4.5 cm. broad or less, obtuse, broadly cuneate or rounded at the base, prominently veined, short-petioled, the uppermost ones sessile; inflorescence paniculate, its branches opposite; involucres on pedicels 10 mm. long or less, 10 mm. wide, and about 7 mm. high, the lobes broadly ovate, obtuse, densely and finely puberulent; flowers about 10 mm. long, the stamens slightly exserted; fruit 5 mm. long, 5-ribbed, the ribs tuberculate, the spaces between them puberulent, acutish above, somewhat narrowed below.

The large size, thick and peculiarly shaped leaves, small involucres, and pubescent stem separate this plant from *A. floribunda* and *A. nyctaginea*, to which it is most closely related. Type and duplicate in the herbarium of the Missouri Botanical Garden, collected in Texas, on sands at Buzzards Spring, August 1, 1902, *Reverchon*. It was also collected by the same collector on sands at Handley, October 3, 1902.

Tracy's 8342 from Weatherford, 1902, seems to be the same plant at a more mature stage: its involucres are larger, about 16 mm. wide and 10 mm. high. The plant is rather smaller, but it has the peculiar leaves and pubescent stems of the type.

25. **Allionia nyctaginea** Michx. Fl. Bor. Am. 1: 100. 1807.

Calymenia nyctaginea Nutt. Gen. N. A. Pl. 26. 1818.

Oxybaphus nyctagineus Sweet. Hort. Brit. 1: 224. 1825.

Mirabilis nyctaginea MacM. Metasperm. Minn. Val. 217. 1892.

Doctor Heimerl[a] places also as a synonym of this species *O. cervantesii grandifolius* Choisy in DC. Prod. 13²: 433.

Type locality, "Ad ripas fluminis Tennessee."

Specimens examined in part:

COLORADO: New Windsor, 1906, *Osterhout* 3454; Boulder, 1905, *Ramaley* 1103; Boulder, 1902, *Tweedy* 5215, 5214; Canyon City, 1873, *Brandegee* 701; Fort Collins, 1896, *Crandall* 2131.

WYOMING: Badger, 1901, *E. Nelson* 687; Green Mountain, 1896, *A. Nelson* 2224; Fairbanks, 1894, *A. Nelson* 3072; Laramie Peak, 1864, *R. B. Hetz.*

MONTANA: Clear Creek, 18 miles above Glendive, 1883, *Ward;* Calais, 1900, *Blankinship.*

NORTH DAKOTA: Leeds, 1902, *Lunell.*

SOUTH DAKOTA: Hot Springs, 1892, *Rydberg* 953.

NEBRASKA: Gage County, 1882, *W. C. Knight;* Lancaster County, 1882, *Knight;* Sheridan County, 1886, *J. B. Hatcher;* Newcastle, 1893, *F. Clements* 2607; near Mullen, 1893, *Rydberg* 1496; Lincoln, 1887, *H. J. Webber;* Franklin, 1893, *W. A. Laybourn* 19.

IOWA: Tama, 1907, *Conard* 678; Decatur County, 1903, *J. P. Anderson;* near Council Bluffs, 1839, *Geyer* 65; Fayette County, 1893, *B. Fink* 571; Iowa City, *A. S. Hitchcock.*

MINNESOTA: Nicollet, 1892, *C. A. Ballard;* Minneapolis Falls, 1891, *Sandberg* 945; Hennepin County, 1889, *Sandberg;* Winona, 1888, *Holzinger;* Minneapolis, 1891, *Redfield;* Bemidji, 1902, *C. J. Brand* 593.

WISCONSIN: Kilbourn, 1895, *H. P. Chandler;* Madison, 1889, *Trelease.*

ILLINOIS: Peoria, 1894, *F. E. McDonald;* Princeville, 1897, *V. H. Chase;* Chicago, 1898, *N. L. T. Nelson;* Naperville, 1897, *Umbach;* Oquawka, 1873, *H. N. Patterson;* River Forest, 1896, *A. Chase;* Lisle, 1898, *Umbach;* Cahokia Mound, 1878, *Ward;* Oak Park, 1887, *G. L. Thayer;* Beardstown, *Geyer;* Athens, 1863, *E. Hall;* Fountaindale, *Bebb;* Hinsdale, 1902, *E. C. Smith* 653; Berwyn, 1907, *W. W. Calkins* 192.

INDIANA: Roby, 1907, *O. E. Lansing* 2674.

TENNESSEE: Nashville, 1878, *Gattinger.*

TEXAS: Terrell, 1904, *F. J. Tyler;* Dallas County, 1876, *Reverchon* 789; Cedar Spring, 1902, *Reverchon.*

OKLAHOMA: Woodward County, 1900, *P. J. White;* on the False Washita, between Fort Cobb and Fort Arbuckle, 1868, *Palmer* 273.

KANSAS: Riley County, 1895, *J. B. Norton* 420; Osborne City, 1894, *C. L. Shear* 44; Manhattan, 1892, *Norton;* Manhattan, 1887, *Kellerman.*

MISSOURI: St. Louis, *Glatfelter;* Sheffield, 1899, *Bush* 306; Jefferson Barracks, 1890; Cooley's Lake, 1894, *Cameron Mann.*

MASSACHUSETTS: Cambridge, escaped near the Botanic Garden, 1878, *Kellerman.*

In the herbarium of the Missouri Botanical Garden there is a sheet of this species with an old label "*Oxybaphus nyctaginia* Nuttall. *Tennassee ad ripas.*" It is barely possible that this may be one of the specimens from which the plant was first described, for this is the locality given with the original description.

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[a]Ann. Cons. et Jard. Geney. 5: 181. 1901.

26. **Allionia floribunda** (Choisy) Kuntze, Rev. Gen. Pl. 533. 1891.

Allionia orata Pursh, Fl. Am. Sept. 1: 97. 1814, not *Oxybaphus oratus* Vahl. 1806.

Oxybaphus floribundus Choisy in DC. Prod. 13²: 433. 1849.

Allionia nyctaginea orata Morong, Mem. Torr. Club 5: 146. 1894.

Doctor Heimerl[a] also gives the following as synonyms of this species:

Calyxhymenia paniculata Desf. Cat. Hort. Par. III. 390. 1829.

Oxybaphus glabrifolius minor Choisy in DC. Prod. 13²: 431. 1849.

Allionia cucullata Mey.; Fisch. Mey. & Avé-Lall. Ind. Sem. Hort. Petrop. 9. 1844; Animadv. 8: 55.

Oxybaphus cucullatus Choisy, loc. cit. 434.

It is questionable whether this should be maintained as a species or reduced to a variety of *A. nyctaginea;* both treatments have been given it by various authors. The northern plant, the typical form, seems to vary from *A. nyctaginea* principally in the shape of the leaves, certainly not a very good specific difference. In Texas, however, shading gradually into the northern form, there is a plant which is very different from *A. nyctaginea.* Not only are its leaves different in shape, but the plant is much more slender in every part, and there are other differences. This plant, I think, certainly deserves specific rank, and it is so closely related to *A. floribunda* that I have thought it better to include it here under that name rather than give it a new name.

Specimens examined:

OKLAHOMA: Terlton, 1896, *Ward* 34; Sapulpa, 1894, *Bush* 469.

TEXAS: Comanche Plains, 1853, *Bigelow;* Austin, 1872, *E. Hall* 531; Kerrville, 1894, *Heller* 1757; Bonham, *Mrs. J. M. Milligan;* New Braunfels, 1850, *Wright;* Lampasas, *Joor;* Bexar County, *Jermy* 79; Gillespie County, *Jermy* 77.

MINNESOTA: Saint Cloud, 1892, *F. W. Devaet.*

COLORADO: New Windsor, 1897, *Osterhout;* Denver, 1872, *Redfield.*

WYOMING: Plumbago Canyon, 1899, *Schuchert.*

SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 316.

IOWA: DeWitt, 1898, *Pammel.*

MISSOURI: Sulphur Springs, Jefferson County, 1898, *Trelease* 1163; Carroll County, 1890, *Bush* 2087; Clarke County, 1892, *Bush* 2084; road from St. Louis to Waterloo, 1844, *Engelmann.*

ALABAMA: Blount County, 1884, *J. D. Smith.*

NEBRASKA: Lincoln, 1887, *H. J. Webber.*

27. **Allionia latifolia** (A. Gray) Standley.

Oxybaphus nyctagineus latifolius A. Gray, Bot. Mex. Bound. 174. 1859.

A species distinguished by its bracteate inflorescence from the other members of the group to which it belongs.

Specimens examined:

TEXAS: 1849, Wright 603, type collection; Mexican Boundary Survey 1112, probably Texan.

28. **Allionia oblongifolia** (A. Gray) Small, Fl. Southeast. U. S. 407. 1903.

Oxybaphus nyctagineus oblongifolius A. Gray, Bot. Mex. Bound. 174. 1859.

Mirabilis oblongifolia Heimerl, Ann. Cons. et Jard. Genev. 5: 181. 1901.

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[a]Ann. Cons. et Jard. Genev. 5: 181. 1901.

This is very closely related to *A. floribunda* and perhaps hardly separable from it. Doctor Heimerl confused another and different plant with the type of Doctor Gray's variety.

Specimens examined:

TEXAS: 1849, *Wright* 604, type collection; Houston, 1842, *Lindheimer*.

29. **Allionia pratensis** Standley, sp. nov.

Root perennial, long and slender; stems much branched from near the base, sparingly dichotomous above, erect or ascending, about 40 cm. high, more or less densely subhispid or subpilose throughout, the uppermost branches densely so, the hairs more scattered below; leaf blades deltoid-ovate to broadly lanceolate, 4.5 cm. long, 3 cm. wide or less, obtuse or the uppermost acute, the lower ones glabrous, the upper more or less pubescent; petioles as long as the blades or longer, the uppermost blades sessile; inflorescence cymose, rather dense, its branches densely puberulent; involucres on pedicels 10 mm. long or less, about 9 mm. wide and 7 mm. high or less, the lobes elliptical or ovate, obtuse or acutish, densely covered with rather long, soft, pale hairs, the free portion as long as the tube or longer; perianth about 12 mm. long and 17 mm. wide, rose-purple; stamens 5, exserted; fruit 4 mm. long, obtuse, 5-ribbed, the ribs low and almost smooth, the spaces between them smooth and minutely hispidulous.

Although rather closely related to *A. melanotricha*, this plant seems amply distinct. Its flowers are broader, the stamens more numerous, the pubescence much more abundant, the petioles longer, the leaves broader and more numerous, the plant lower and lacking the black hairs found upon the involucres of the latter species. Type in the herbarium of the New Mexico Agricultural College, collected at Barfoot Park, in the Chiricahua Mountains, Arizona, 1907, *Blumer* 1384.

30. **Allionia melanotricha** Standley, sp. nov.

Oxybaphus nyctagineus cerrantesii A. Gray, Bot. Mex. Bound. 174. 1859, in part at least; not *O. cerrantesii* Lag.

Stems erect, abundantly dichotomous-branched, about 60 cm. high, glabrous except the branches of the inflorescence, these rather closely covered with moderately stiff, rather spreading viscid pubescence; leaf blades lanceolate, 8 cm. long and 3 cm. wide or less, bright yellowish-green, attenuate at the apex, broadly cuneate or rounded at the base, glabrous except the sparingly ciliolate margins; petioles one-half as long as the blades or shorter, those of the uppermost leaves very short; inflorescence cymose; involucres numerous on short, densely pubescent pedicels, not more than 8 mm. broad and 6 mm. high, densely covered with short, soft hairs, these light-colored along the margins of the lobes but black elsewhere, the lobes oblong, rounded at the apex, twice as long as the tube; flowers about 16 mm. long and 12 mm. wide, bright rose-purple; stamens 3, exserted; fruit about 3 mm. long, with 4 or 5 narrow, tuberculate ribs, the smooth surfaces between them sparingly puberulent.

Doctor Heimerl in his notes which are attached to the sheets in the National Herbarium has called this *A. oblongifolia*, but the specimens of the type collection of that species in the National Herbarium and the Missouri Botanical Garden are of very different plants. The two differ in the form of the leaves, in their pubescence and their inflorescence, and in the size of their involucres. This is the plant called by Doctor Gray *Oxybaphus nyctagineus cerrantesii*, but it is different from *A. cerrantesii* and certainly not very closely related to *A. nyctaginea*. Type in the herbarium of the New Mexico Agricultural College,

collected at Barfoot Park, in the Chiracahua Mountains, Arizona, 1907, *Blumer* 1385; altitude about 2,425 meters.

With regard to this and the preceding species, Mr. Blumer writes: "Nos. 147 and 148 are perfectly distinct in the field, though collected within a stone's throw of each other—you need have no hesitancy about that. The new one (*A. pratensis*) is a cespitose plant and the flowers open wider. That the flowers are larger and the leaves very different you can see by the specimens. In all of my Barfoot Park specimens I made it a point, if possible, to represent in my gathering the range of variation of the species, and I remember that in this case there was no suggestion of intergrades."

The following should probably be included here, although they have broader leaves, frequently with cordate bases:

ARIZONA: Canyon east side of San Luis Mountains, 1893, *Mearns* 2199; base of San Luis Mountains, 1893, *Mearns* 2153; Fort Huachuca, 1894, *Wilcox* 400, 298; Rincon Mountains, 1891, *Nealley* 146.

MEXICO: San José Mountains, Sonora, 1893, *Mearns* 1761; Coahuila or Nuevo Leon, 1880, *Palmer* 1111; Colonia Garcia, Chihuahua, 1899, *Townsend & Barber* 244.

NEW MEXICO: Pecos, 1904, *Mrs. Florence Bartlett;* Kingston, 1904, *Metcalfe* 1260; Beulah, 1899, *Cockerell;* Chama, 1899, *Baker* 303; Mogollon Creek, 1903, *Metcalfe* 664; Organ Mountains, 1897, *Tinsley;* White Mountains, 1897, *Wooton* 221; White Mountain Peak, 1901, *Wooton;* Little Creek, White Mountains, 1899, *Turner* 102; Capitan Mountains, 1900, *Earle* 195; Upper Rio Pecos, 1898, *Malthy & Coghill* 164; Cold Spring Canyon, Sacramento Mountains, 1899, *Wooton.*

31. **Allionia texensis** (Coulter) Small, Fl. Southeast. U. S. 406. 1903.

Oxybaphus glabrifolius Torr. Bot. Mex. Bound. 168. 1859, not Vahl.

Allionia corymbosa texensis Coulter, Contr. Nat. Herb. **2**: 351. 1894.

Specimen examined:

TEXAS: *Wright* 605, type collection.

32. **Allionia bracteata** Rydb. Bull. Torr. Club **29**: 690. 1902.

This, as defined by Doctor Rydberg, seems to be a composite species and would probably bear division into two or more. I have seen nothing that exactly matches the type collection.

Specimens examined:

MISSOURI: Malden, 1894, *Bush* 459, type collection; Poplar Bluff, 1897, *Savage & Stull* 932; Springfield, 1892, *F. W. Derart* 35; Malden, 1893, *Bush;* McDonald County, 1893, *Bush.*

OKLAHOMA: Osage Nation, 1895, *Kinmons;* on the False Washita between Fort Cobb and Fort Arbuckle, 1868, *Palmer* 272; Cherokee Outlet, 1891, *Carleton* 501.

ALABAMA: Selma, 1888, *McCarthy.*

TEXAS: Dallas, 1879, *Reverchon* 787; Dallas, 1880, *Reverchon* 790; Fort Worth, 1891, *Bodin* 237; Palestine, 1884, *Joor.*

TENNESSEE: Nashville, *Gattinger.*

33. **Allionia hirsuta** Pursh, Fl. Am. Sept. **2**: 728. 1814.

Calpmenia hirsuta Nutt. Gen. N. A. Pl. 26. 1818.

Oxybaphus hirsutus Sweet, Hort. Brit. **1**: 334. 1825.

Mirabilis hirsuta MacM. Metasperm. Minn. Val. 217. 1892.

Specimens examined:

NEW MEXICO: Raton Mountains, 1903, *Griffiths* 5458.

COLORADO: Colorado Springs, 1884, *Letterman* 214; Wet Mountain Valley, 1873, *Brandegee* 699; near Boulder, 1902, *Tweedy* 5212; near Golden, 1878, *Jones* 677; Manitou Springs, 1881, *Engelmann*; Manitou, 1891, *Trelease*.

WYOMING: Pine Bluffs, 1897, *A. Nelson* 3617; Pikes Peak, 1901, *A. Nelson* 8622.

NORTH DAKOTA: Maza, 1900, *J. Kildahl* 3.

SOUTH DAKOTA: Custer, 1892, *Rydberg* 954; near Fort Meade, 1887, *Forwood* 315; Big Stone, 1892, *T. A. Williams*; Brookings County, 1904, *A. G. Johnson*.

NEBRASKA: Near Mullen, 1893, *Rydberg* 1433; forks of Middle Loup River, 1893, *Rydberg* 1810; Ainsworth, 1893, *F. E. Clements* 2022; forks of Dismal River, 1893, *Rydberg* 1509; Cherry County, 1892, *Smith & Pound* 143; War Bonnet, 1890, *T. A. Williams*.

MINNESOTA: Near Minneapolis, 1891, *G. B. Aiton*.

OKLAHOMA: Fort Sill, 1891, *C. S. Sheldon* 245; Greer County, 1901, *P. J. White*.

33a. **Allionia hirsuta coloradensis** Standley, subsp. nov.

Stems erect, stout, pilose throughout, sparingly branched, the branches opposite; leaf blades lanceolate-oblong, 8 cm. long and 2.7 cm. wide or less, some of the uppermost blades ovate, mostly obtuse or rounded at the apex, rounded at the base, the lower ones with short but distinct petioles, the upper sessile, soft-pubescent or pilose on both surfaces or sometimes almost glabrous, thin and soft, the leaves spreading; inflorescence panicled, its branches opposite and soft-pubescent, leafy, the reduced leaves oblong and rounded at each end, the branches with many glandular hairs among the pubescence; involucres on pedicels 10 mm. long or less, about 12 mm. in diameter and 7 mm. high, the lobes ovate, obtuse, soft-pubescent; flowers 10 mm. long, rose-purple; stamens 3, scarcely exserted, the style long-exserted; fruit 4 mm. long, rather obtuse, 5-ribbed, the ribs smooth but the spaces between them strongly tuberculate, sparingly and minutely hispidulous.

Type in the herbarium of the Missouri Botanical Garden, collected at Manitou, Colo., August 20, 1885, *Fritchey* 28. Readily distinguished from the species by the soft, divaricate leaves which are not acute and not as much wider at the base as those of the species, by the soft pubescence, and more leafy inflorescence.

Other specimens examined:

COLORADO: Manitou, 1901, *Clements* 36; *Hall & Harbour* 483.

34. **Allionia pilosa** (Nutt.) Rydb. Bull. Torr. Club **29**: 690. 1902.

Calyptenia pilosa Nutt. Gen. N. A. Pl. **1**: 26. 1818.

Oxybaphus pilosus Sweet, Hort. Brit. **1**: 334. 1825.

Oxybaphus hirsutus integrifolius Choisy in DC. Prod. **13**^{2}: 433. 1849.

Type locality, "Near the Missouri, around the Arikaree village, etc."

Specimens examined:

SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 315, in part; Pearl Creek, Beadle County, 1894, *Thornber*; Rochford, 1892, *Rydberg* 955.

NORTH DAKOTA: Near Dunseith, 1907, *Lunell*; Pleasant Lake, 1904, *Lunell*; Butte, 1904, *Lunell*; Walhalla, 1902, *L. R. Waldron*; Hillsboro, 1891, *A. B. Lee* 396; Minot, 1902, *Lunell*.

COLORADO: Canyon City, 1872, *Brandegee* 440; New Windsor, 1897, *Osterhout*; New Windsor, 1904, *Osterhout* 2024.

MINNESOTA: Battle Lake, *E. P. Sheldon*; Hennepin County, 1890, *Sandberg*; Minneapolis, 1892, *Sandberg*; Glen, 1891, *E. P. Sheldon*; Cannon River, 1861, *T. J. Hale*.

WYOMING: Cheyenne, 1901, *A. Nelson* 8592.

ILLINOIS: Hyde Park, Chicago, 1899, *A. Chase* 1173.

IOWA: Armstrong, 1897, *Cratty & Pammel* 614; Harrison County, *Hitchcock* 14; Ames, 1892, *Geo. Carver*.

WISCONSIN: Lake Pepin, 1861, *T. J. Hale*; St. Croix, 1861, *Hale*.

MANITOBA: 1898, *E. S. Thompson*.

Allionia hirsuta rotundifolia Lunell [a] seems to be a form of this species. It appears to be a depauperate state, produced, probably, in the same way as *A. bushii*.

35. **Allionia chersophila** Standley, sp. nov.

Stems erect, tall, 1 meter high or even more at times, stout, simple below or sparingly branched, densely soft-pubescent throughout, not glandular above; leaves linear-lanceolate, rather thick, sessile, blunt-pointed, tapering to the base, more or less soft-puberulent on both surfaces, especially beneath; inflorescence ample, paniculate, branches opposite; involucres on pedicels 10 mm. long or less, 15 mm. broad, and 10 mm. high or less, the lobes broadly ovate, obtuse, sometimes mucronate, densely soft-pubescent; fruit 5 mm. long, narrow, acute, narrowed below, with 5 conspicuous ribs, these almost smooth, the spaces between them finely tuberculate, minutely hispidulous.

This is perhaps as closely related to *A. pilosa* as to any species, but is readily separated by its denser and softer short pubescence and stouter habit. Type in the herbarium of the University of Wyoming, cotype in that of Mr. K. K. Mackenzie; collected in barrens at Lees Summit, Jackson County, Missouri, September 9, 1901, *Mackenzie* 421; also collected in Jackson County, 1891, by Mr. B. F. Bush, who says that the plant is rare.

Other specimens examined:

MISSOURI: Barrens west of Lees Summit, 1899, *Mackenzie*; dry prairie along railroad north of Lees Summit, 1900, *Mackenzie*; barrens west of Lees Summit, 1899, *Mackenzie*.

KANSAS: "In rocky places," Miami County, 1882, *Oyster*.

36. **Allionia trichodonta** Standley, sp. nov.

Stems erect or ascending, sparingly branched, the branches alternate, slender, rather sparingly puberulent throughout or almost glabrous below; leaf blades linear or linear-lanceolate, 45 mm. long and 7 mm. wide or less, of medium thickness, attenuate to the apex and to the base, sessile, the margins wavy and ciliolate, with a few long, weak hairs on both surfaces; inflorescence narrowly cymose, its branches densely short-villous; involucres almost sessile or sometimes pediceled in the axils of the lower leaves, 11 mm. in diameter or less, densely short-villous, the pubescence having a silky appearance, especially on the margins of the lobes, these elliptical or lanceolate, acute or acutish; flowers not seen; fruit 4 mm. long, rather obtuse above, slightly narrowed below, with 5 very thick, smooth ribs, so thick that there are scarcely any spaces between them, minutely hispidulous.

Distinguished from *A. coahuilensis* and *A. pseudaggregata*, its nearest allies, by its narrower leaves and bracts and the thicker ribs of the fruit; from *A. coahuilensis* by its alternate branching, and from *A. pseudaggregata* by its more pubescent stems. Type in the herbarium of the University of California (no. 101379), collected at Ixmiquilpan, Hidalgo, Mexico, 1905, *Purpus*.

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[a] Bull. of the Leeds [N. Dak.] Herb. no. 2, 6, 1908.

37. **Allionia carletoni** Standley, sp. nov.

Plant about 1 meter high; stems simple below or more or less branched, stout, whitish, soft-pubescent throughout; leaf blades lanceolate, very thick, acutish, somewhat wavy-margined, conspicuously veined, rounded or cuneate at the base, 7 cm. long and 3 cm. wide or less, puberulent on both surfaces, almost or quite sessile; inflorescence paniculate, the branches mostly opposite, stout, open; involucres about 15 mm. in diameter, the lobes rounded or obtuse and short, with rather copious soft pubescence, ciliolate; involucres on pedicels about 10 mm. long, the pedicels subtended by very small and inconspicuous bracts; fruit 5 mm. long, acutish above, narrowed below, with 5 prominent smooth ribs, the spaces between the ribs each with a single vertical row of tubercles; fruit glabrous.

Easily distinguished by the glabrous fruit and the fine, short pubescence of the stems. Type U. S. National Herbarium no. 22755, collected in Barber County, Kansas, June 21, 1891, *Carleton* 256; also collected in Oklahoma, Neutral Strip, 1891, *Carleton* 361.

The specific name was adopted from Doctor Heimerl in herbarium under Mirabilis.

38. **Allionia exaltata** Standley, sp. nov.

Plant about 1.5 meters high from a rather thick, woody root; stem little branched below, glabrous throughout, glaucous, stout below, but slender above; leaf blades rather narrowly lanceolate, 70 mm. long and 18 mm. wide or less, acutish, attenuate at the base to a very short, thick petiole, or sessile, more or less wavy-margined, glabrous; inflorescence very openly paniculate, its branches slender and opposite; involucres on pedicels mostly about 10 mm. long, mostly glabrous or with a very few minute hairs; involucres 15 mm. in diameter, their lobes broadly ovate and rounded, glabrous or with a few minute hairs when young; fruit obtuse or acutish above, narrowed below, rugulose between the ribs, prominently 5-angled, glabrous.

This is a more slender plant than *A. carletoni*, and is probably ordinarily taller. It is readily separated from that species by its glabrous stem and leaves, the latter also being narrower. Type U. S. National Herbarium no. 22699, collected in the Cimarron Valley, Cherokee Outlet, Oklahoma, June, 1891, *Carleton* 223; also collected on the Cimarron River, Oklahoma, 1889, *Mark White* 163.

39. **Allionia sessilifolia** Osterhout, Bull. Torr. Club **32**: 611. 1905.

Specimens examined:

COLORADO: Canyon of Thompson River, Larimer County, 1905, *Osterhout* 3079.

40. **Allionia lanceolata** Rydb. Bull. Torr. Club **29**: 691. 1902.

Specimens examined:

COLORADO: Moraine Park, 1897, *Osterhout;* between Sunshine and Ward, 1902, *Tweedy* 5211; Fort Collins, 1897, *Crandall*, 2125.

WYOMING: Plumbago Canyon, 1899, *C. Schuchert.*

MISSOURI: Dodson, 1900, *Mackenzie;* St. Louis County, *Bush* 2090.

The following forms connect the species with the variety described below:

ARKANSAS: Hot Springs, *F. L. Harvey* 66.

OKLAHOMA: Lincoln County, 1895, *Blankinship;* Vinita, 1894, *Bush* 473.

40a. **Allionia lanceolata uniflora** (Heimerl) Standley.

Mirabilis albida uniflora Heimerl, Ann. Cons. et Jard. Genev. **5**: 182. 1901.

From the species this differs in its stouter habit, thicker and more erect leaves, 1-fruited involucres (there are sometimes 3 flowers in the involucre, but only one matures), and the form of the fruit. The fruit of the species is merely faintly angled, acutish above, minutely hispidulous, and not very prominently tuberculate, while that of subspecies *uniflora* is larger, with 5 prominent and thick ribs, strongly transversely ridged or tuberculate between the ribs, and more densely and more prominently hispidulous as well as more obtuse above.

Specimens examined:

KANSAS: Belvidere, 1897, *Ward*, type collection.

OKLAHOMA: Limestone Gap, 1877, *Butler* 2; Osage Nation, 1895, *Kimmons*; Indian Territory, 1891, *C. S. Sheldon* 226.

TEXAS: Terrell, 1904, *E. J. Tyler*; Corpus Christi Bay, 1894, *Heller* 1545; Baird, 1882, *Letterman* 129; Industry, 1894, *H. Wurzlow* 27; 1844, *Lindheimer* 293; Dallas, 1877, *Reverchon* 787; Houston, 1842, *Lindheimer*; Texas, *Buckley*; Gillespie County, *Jermy*.

41. **Allionia albida** Walt. Fl. Car. 84. 1788.

Calymenia albida Nutt. Gen. N. A. Pl. 26, 1818.

Oxybaphus albidus Sweet, Hort. Brit. 2: 429. 1825.

Mirabilis albida Heimerl, Ann. Cons. et Jard. Genev. 5: 182. 1901.

The only specimens that I have seen of this species were from South Carolina and the adjoining States.

42. **Allionia pseudaggregata** (Heimerl) Standley.

Mirabilis pseudaggregata Heimerl, Ann. Cons. et Jard. Genev. 5: 183. 1901.

Specimens examined:

MEXICO: Near Chihuahua, 1886, *Pringle* 793, type collection.

TEXAS: Chenate Mountains, 1889, *Nealley* 528; near J. Davis's Ranch, 1883, *Harard* 66.

42a. **Allionia pseudaggregata subhirsuta** (Heimerl) Standley.

Mirabilis pseudaggregata subhirsuta Heimerl, Ann. Cons. et Jard. Genev. 5: 184. 1901.

This differs from the type collection in having the stems and leaves more hirsute throughout. If the plant which I have placed here is the same as that upon which the variety was founded it is probably a good species.

Specimens examined:

MEXICO: Durango, 1896, *Palmer* 267.

The disposition of the following names is still unsettled:

OXYBAPHUS LINEARIFOLIUS S. Wats. Proc. Amer. Acad. 17: 375. 1882.

I have not been able to examine any authoritative material of this species. It may be *A. diviricata* or perhaps some plant more closely related to *A. linearis*.

OXYBAPHUS ANGUSTIFOLIUS VISCIDUS Eastw. Proc. Cal. Acad. Sci. II. 6: 313. 1896.

Allionia viscida Cockerell, Proc. Acad. Phila. 1904: 108. 1904.

I have seen no reliable material of this species; it may be *A. diviricata*.

6. ALLIONIELLA Rydb.

Allioniella Rydb. Bull. Torr. Club 29: 687. 1902.

Low, much branched herbs with ascending or procumbent branches; leaves opposite, entire, petioled, viscid; flowers loosely paniculed, 3 in each involucre;

involucres rotate and somewhat enlarged when mature, 5-lobed; perianth short funnelform, almost campanulate, with 3 distinct stamens; fruit ellipsoidal, smooth or very obscurely tubercled, glabrous.

1. **Allioniella oxybaphoides** (A. Gray) Rydb. Bull. Torr. Club **29**: 687. 1902.
Quamoclidion oxybaphoides A. Gray, Am. Journ. Sci. II. **15**: 320. 1853.
Mirabilis oxybaphoides A. Gray, Bot. Mex. Bound. 173. 1859.
Oxybaphus wrightii Hemsl. Biol. Centr. Am. **3**: 3. 1882.
Allionia oxybaphoides Kuntze, Rev. Gen. Pl. 533. 1891.
Type locality, east of El Paso (Texas).

Specimens examined:

NEW MEXICO: Organ Mountains, 1897, *Wooton* 587; Bear Mountain, near Silver City, 1903, *Metcalfe* 696; Gray, 1898, *Skehan* 103; Kingston, 1904, *Metcalfe* 1459; 10 miles west of Santa Fe, 1897, *Heller;* Santa Fe, 1881, *Engelmann;* Santa Fe Creek Valley, 1847, *Fendler* 746.

ARIZONA: Mesa west of Buckskin Mountains, 1894, *Jones* 6060; near Partridge Spring, 1901, *Leiberg* 5904.

COLORADO: Trail Glen, 1901, *F. Clements* 60; Manitou Springs, 1881, *Engelmann;* Grape Creek Valley near Canyon City, 1881, *Engelmann;* Williams Canyon, 1875, *Patterson;* Webster Canyon, 1872, *Redfield* 554; Canyon City, 1873, *Greene.*

UTAH: Dirty Devil River below Rabbit Valley, 1875, *Ward* 417.

1a. **Allioniella oxybaphoides glabrata** (Heimerl) Standley.

Mirabilis oxybaphoides glabrata Heimerl, Ann. Cons. et Jard. Genev. **5**: 180. 1901.

From the type this variety differs slightly, perhaps even too slightly to warrant its separation as a variety, in having the stem glabrous below and only slightly puberulent above. The following collections may perhaps be placed here:

NEW MEXICO: Capitan Mountains, 1900, *Earle* 399, type collection; Gallinas Mountains, 1904, *Wooton* 2823.

COLORADO: Buena Vista, 1897, *Crandall* 2119.

TEXAS: Gaudine, 1881, *Harard.*

ARIZONA: Northeastern Arizona, 1896, *Hough* 91.

7. QUAMOCLIDION Choisy.

Quamoclidion Choisy in DC. Prod. 13^2: 420. 1849.

Perennial herbs, erect, branched, glabrous or pubescent; leaves opposite, entire, thick, petioled or sessile; flowers mostly large, several together surrounded by a gamophyllous, calyx-like involucre; perianth showy, corolla-like, with a tube of medium length, which is expanded into a wide or rather narrow, erect, or spreading limb; stamens 5, exserted; fruit hard, smooth, ellipsoidal to almost spherical, glabrous.

The genus was founded by Choisy upon two species: The first, which is to be taken as the type, he called *Q. nyctagineum*, of which *Mirabilis triflora* Benth. was said to be a synonym; the second species was called *Q. angulatum*, and was referred doubtfully to the genus. Doctor Rydberg, in his treatment of the Rocky Mountain Allioniaceae, placed *Oxybaphus laevis* Benth. in the genus, a plant which differs so widely from the type species in several respects that it has been placed in a new genus in this work.

KEY TO THE SPECIES.

Perianth 25 mm. long or less, with a very narrow limb..... 1. *Q. triflorum.*
Perianth much larger, with a broad limb.
  Fruit rather strongly 5-angled, more or less tuberculate, usually abruptly narrowed at the base..... 2. *Q. greenei.*
  Fruit not angled, smooth, not abruptly narrowed at the base.
    Fruit dark brown to black; stems mostly glabrous below..... 3. *Q. multiflorum.*
    Fruit light brown, marked by 10 dark, vertical lines; stems usually pubescent throughout..... 4. *Q. froebelii.*

1. **Quamoclidion triflorum** (Benth.) Standley.

Mirabilis triflora Benth. Pl. Hartweg. 23. 1839.
Quamoclidion nyctagineum Choisy in DC. Prod. 13²: 429. 1849.
Type locality, Mexico.

Specimens examined:

LOWER CALIFORNIA: Triumfo, 1890, *Brandegee* 479; Pescadero, 1902, *Brandegee;* Todos Santos, 1890, *Brandegee.*

2. **Quamoclidion greenei** (S. Wats.) Standley.

Mirabilis greenei S. Wats. Proc. Am. Acad. **12**: 253. 1876.
Type locality, "On mountain sides about Yreka, California."

Specimens examined:

CALIFORNIA: Hornbrook, 1889, *Howell* 1386; near the Klamath River, 1889, *Howell.*

3. **Quamoclidion multiflorum** Torr.; A. Gray, Am. Journ. Sci. II, **15**: 321. 1853.

Oxybaphus multiflorus Torr. Ann. Lyc. N. Y. **2**: 237. 1828.
Nyctaginia ? torreyana Choisy in DC. Prod. 13²: 430. 1849.
Mirabilis multiflora A. Gray, Bot. Mex. Bound. 173. 1859.
Type locality, "About the forks of the Platte."

The plant was described by Choisy under Nyctaginia, because he was led to believe from Torrey's description that it had separate bracts.

Specimens examined:

COLORADO: Canyon City, 1872, *Brandegee* 439; Pueblo, 1873, *Greene;* La Veta, 1897, *Crandall;* Canyon City, 1890, *Bodin;* Arkansas Canyon, 1872, *Redfield* 552; Rio de Las Animas, 1846, *Fendler* 740; Huerfano, 1867, *Parry* 181; Canyon City, 1881, *Engelmann.*

ARIZONA: Grand Canyon, *Millspaugh* 94; Flagstaff, 1908, *MacDougal* 289; Galluno Mountains, 1894, *Toumey;* near Grand Canyon, 1901, *Purpus* 8183; Holbrook, 1896, *Myrtle Zuck* 9; Fort Whipple, 1864, *Coues;* Camp Verde, 1891, *Toumey;* Copper Basin, 1892, *Toumey* 178; Oracle, 1905, *Thornber;* Cochise, 1900, *Griffiths.*

TEXAS: Hueco Tanks, 1885, *Mulford* 104; Pena, 1889, *Nealley* 488; Texas, 1881, *Havard.*

NEW MEXICO: Patterson, 1900, *Wooton;* near Silver City, 1880, *Rusby;* banks of the Rio Grande 19 miles west of Santa Fe, 1897, *Heller* 3627; Aztec, 1895, *H. H. Griffin;* Gray, 1898, *Skehan* 38; Las Cruces, 1897, *Wooton* 80; Mesilla Valley, 1890, *Wooton;* Las Vegas, 1899, *Cockerell;* Santa Fe, 1898, *Cockerell;* Little Creek, White Mountains, 1899, *Turner* 107; Animas Creek, 1904, *Metcalfe* 1138; Cross L Ranch, Cimarron Canyon, 1903, *Griffiths* 5540; Santa Rita, 1895, *Mulford* 68; Dona Ana, 1846, *Wizlizenus* 85; Ocate Creek, Santa Fe Road, 1846,

Wislizenus 501; Coppermines and El Paso, *Wright* 1703; 1853–54, *Bigelow*; 1869, *Palmer*; McCarthy Station, 1889, *Manson & Hopkins*; Glorieta, 1881, *Vasey*.

3a. **Quamoclidion multiflorum glandulosum** Standley, subsp. nov.

Stems stout, rather abundantly glandular-puberulent throughout; leaf blades ovate, thick, acutish, rounded or subcordate at the base; petioles about one-third as long as the blades, glandular-puberulent; pedunceles stout, densely glandular-puberulent, 2 cm. long or less; bracts about 2 cm. long, the free portion a little longer than the tube, obtuse or acutish, densely glandular-puberulent; flowers 4 cm. long or less; leaves a rather light yellowish-green.

This subspecies is distinguished by its yellowish-green, puberulent leaves, glandular stem, and puberulent, obtuse bracts. Type in the National Herbarium, cotype in the Missouri Botanical Garden, collected in Colorado on a dry mesa at Grand Junction, May 28, 1894, *Crandall* 423, altitude 1375 meters. There is no mature fruit on either of these specimens, but a plant in the Rocky Mountain Herbarium that seems to be the same, collected at Deer Run, Colorado, 1901, *C. F. Baker* 81, has fruit elliptical or oblong-elliptical in outline, about 9 mm. long, dark reddish brown in color, obscurely 10-nerved, glabrous. This last plant has rather thin and almost scarious reddish bracts.

Other specimens examined:

COLORADO: Mancos, 1890, *Eastwood*; Grand Junction, 1894, *Jones* 5476.

Baker's 304 from Rosa, New Mexico, is probably the same, although it does not match the type in all particulars.

3b. **Quamoclidion multiflorum obtusum** Standley, subsp. nov.

Stems rather slender, with short, rather viscid pubescence throughout which consists of flattened, white hairs; leaf blades very broadly ovate or almost reniform, thin, bright green, almost glabrous, broadly obtuse and apiculate at the apex, semicordate to rounded at the base, the blades somewhat decurrent upon the petiole which is half as long as the blade or shorter; bracts broadly ovate, acutish, apiculate, about 3 cm. long and 15 mm. wide, the free portion one-half as long as the tube or longer, bright green; flowers like those of the species.

Distinguished by the large and broad bracts and especially by the shape of the leaves. Type in the herbarium of the University of Wyoming, collected on rocky ledges at Kerman, Nevada, 1902, *Goodding* 653. The plant is covered with what appears to be the web of some insect, giving it a peculiar woolly appearance.

The following plants should probably be placed here, although they have thicker leaves and the leaves are not acuminate. They have dark-colored fruits, showing that they are more closely related to *Q. multiflorum* than to *Q. froebelii*. They with the subspecies *glabratum* of the latter species form a close transition between the two species.

ARIZONA: Peach Springs, 1893, *Norman C. Wilson*; Hackberry, 1884, *Jones* 4687; ? Fort Apache, 1901, *Mayerhoff* 80; ? Beaverdam, 1891, *Vernon Bailey* 1937.

UTAH: ? La Verken, 1894, *Jones* 5196t; Cedar City, 1894, *Jones* 5197; Santa Clara Valley, 1894, *Jones* 5139t.

4. **Quamoclidion froebelii** (Behr) Standley.

Oxybaphus froebelii Behr, Proc. Cal. Acad. Sci. **1**: 69. 1855.

Mirabilis multiflora pubescens S. Wats. in Brewer & Wats. Bot. Cal. **2**: 2. 1880.

Mirabilis froebelii Greene, Bull. Cal. Acad. **1**: 124. 1885.

Mirabilis multiflora froebelii Jones, Contr. Western Bot. 10: 40. 1902.

Type locality, "Culta e seminibus a J. Froebel prope Warner's Ranch lectis."

Specimens examined:

CALIFORNIA: Warner's Ranch, 1894, *R. D. Alderson*; Argus Mountains, 1897, *Purpus* 5418; Manzana, Antelope Valley, 1905, *Hall* 6259; Owen's Valley and Fort Tejon, 1862–64, *G. H. Horn*; Bakersfield, 1896, *Davy* 1889; Walkers, 1885, *Cleveland*; Coast Range, 1882, *Parish* 658; California, 1880, *Vasey* 516; Santa Ysabel, 1893, *H. W. Henshaw*; between Cuyamaca and Oriflamme Canyon, 1903, *Abrams* 3825; Providence Mountains, 1861, *Cooper*; Mill Creek Canyon, Panamint Mountains, 1891, *Coville & Funston* 761; Fort Tejon, 1857–8, *Xantus* 103.

4a. **Quamoclidion froebelii glabratum** Standley, subsp. nov.

Stems glabrous or almost so throughout, the younger branches sometimes sparingly puberulent; leaf blades broadly ovate or subreniform, 8 cm. long and as broad or less, broadly rounded at the apex or obtuse, cordate or semicordate at the base, the blades slightly decurrent on the petioles, these one-third as long as the blades or less; pedunces about 3 cm. long, stout; bracts 3 cm. long, acutish or obtuse, sometimes mucronate, broad, glabrous; flowers about 5 cm. long; fruit broadly elliptical or oval in outline, about 8 mm. long and 6 mm. wide, light reddish brown marked by 10 black, vertical lines.

The subspecies is separated from the species by its different pubescence and more obtuse leaves. Type in the herbarium of the University of California, collected in the Providence Mountains, California, May 25, 1902, *Brandegee*.

Other specimens examined:

CALIFORNIA: San Felipe, 1894, *Brandegee*; Vandeventer Flat, San Jacinto Mountains, 1901, *Hall* 2162.

NEVADA: Pahroc Range, 1898, *Purpus* 6300.

8. HESPERONIA Standley.

Hesperonia Standley, gen. nov.

Mirabilis of various authors, in part, not L.

Quamoclidion Rydb. Bull. Torr. Club 29: 686, in part; not Choisy.

Perennial herbs; leaves opposite, thick, entire, petioled or sessile; inflorescence axillary or terminal; involucres campanulate, composed of 5 bracts which are united by their bases for about half their length, not enlarged in fruit; flowers 1 in each involucre; perianth campanulate, white or purplish red; stamens usually 5, distinct; fruit ellipsoidal or spherical, not angled or ribbed, smooth or sometimes very faintly tuberculate, glabrous.

The plants of this proposed genus have been variously placed in Mirabilis, Quamoclidion, and Oxybaphus, to all of which the genus is closely related. But besides differing considerably from all those genera in general appearance, Hesperonia is separated from Allionia and Mirabilis by the form of the fruit, differs decidedly from Mirabilis and Quamoclidion in the shape of the perianth, and is separated at once from Quamoclidion by the number of flowers in the involucre.

Type species, *Mirabilis californica* A. Gray.

KEY TO THE SPECIES.

Fruit spherical, not noticeably longer than thick.

Fruit dark brown, not conspicuously vertically lined; leaves thick and rather fleshy; stems and leaves scabrate; branches comparatively slender . . . . . 1. *H. cedrosensis*.

Fruit dull olive with 10 conspicuous, paler, transverse lines.
Stems rough-pubescent, more or less viscid, not villous---------- 2. *H. aspera.*
Stems villous, not viscid---------- 2a. *H. aspera villosa.*

Fruit not spherical, conspicuously longer than thick.
Plants very large and stout; leaves 5 cm. long or less; blades short-petioled or almost sessile; stems stout, rough and glandular-pubescent; lobes of the involucre narrowly lanceolate---------- 3. *H. tenuiloba.*

Plants much smaller and stems much more slender; leaves not more than half the size of the above.
Plants perfectly glabrous throughout, or some of the young leaves, perhaps, with a few scattering hairs; leaves thin, ovate, acute; stems slender, the branches not spreading---------- 4. *H. laevis.*

Plants not glabrous throughout, the pubescence sometimes scant but some always present on the stems.
Stems villous, slender, with long internodes; leaves rounded or obtuse at the apex---------- 8b. *H. glutinosa gracilis.*

Stems not villous.
Leaves very small, mostly about 1 cm. long; stems slender and much branched, woody at the base---------- 7a. *H. californica microphylla.*

Leaves larger; stems less branched and with longer internodes.

Flowers purplish red.
Fruit almost 8 mm. long, narrow; leaves thin, obtuse, cordate or rounded at the base; stems woody below; flowers few, conspicuously pedicelled; lobes of the involucre lanceolate, 7 mm. long---------- 5. *H. oligantha.*

Fruit about 4 mm. long.
Flowers about 12 mm. long; fruit narrowed toward the base and apex, inconspicuously striate, dark brown---------- 7. *H. californica.*

Flowers about 2 cm. long; fruit dark brown, not at all striate; stems finely pubescent especially above---------- 6. *H. polyphylla.*

Flowers mostly white.
Fruit mostly narrowed at both ends, leaves reniform or broadly ovate; stems and leaves with abundant, glutinous, rather long pubescence ..... 8. *H. glutinosa*,
Fruit not narrowed at the ends, but rounded, brown or dull green; stems sparingly pubescent, the leaves almost glabrous ..... 8a. *H. glutinosa retrorsa*.

1. Hesperonia cedrosensis Standley, sp. nov.

Stems stout, apparently dichotomously branching, more or less scorpioid, covered with a pubescence consisting of scattered, flattened, whitish hairs; internodes shorter than in *H. laevis;* leaf blades narrowly triangular or subhastate, 30 mm. or less in length and 18 mm. wide or less, more or less wavy-margined, acute at the apex, mostly truncate to subcordate at the base, thick, with a few scattered, flattened hairs on both surfaces; petioles very short, some of the uppermost blades almost sessile; flowers sessile or on very short peduncles, sometimes subtended by bract-like leaves, solitary or sometimes clustered; bracts 7 mm. long or less, the free portion shorter than the tube, rather narrowly triangular, acute, densely scabrous; flowers about 12 mm. long; stamens included; fruit subspherical, rather larger than that of *H. californica*, dark brown in color marked by 10 lighter vertical lines.

Type in the herbarium of the University of California; collected on Cedros Island, California, April 3, 1897, *Brandegee.* The same is in the National Herbarium, collected at the same locality in 1889 by Palmer. A plant distinguished by its subglobose fruit and scabrous pubescence.

Here belong, probably, the following collections:

CALIFORNIA: San Clemente Island, 1903, *Mrs. Blanche Trask* 193; same locality, 1902, *Mrs. Blanche Trask* 14; same locality, 1894, *Brandegee.*

2. Hesperonia aspera (Greene) Standley.

Mirabilis aspera Greene, Erythea 4: 67. 1896.

Stems stout, dichotomously branched, roughly retrorse-pubescent, leaf blades ovate, subcordate, thick, rough-puberulent, 25 mm. long and 18 mm. wide or less, obtuse or the uppermost ones subacute; petioles very short, some of the blades almost sessile; inflorescence dichotomously branched, dense; flowers on stout peduncles about 5 mm. long; bracts thick, narrowly to broadly ovate, 6 to 7 mm. long, the free portion about as long as the tube, the involucre about 6 mm. in diameter when distended by the fruit; flowers about 1 cm. long; fruit globose or subglobose, about 5 mm. in diameter, dull olive-green marked by 10 lighter vertical lines.

This species is distinguished by its thick, obtuse, almost sessile, rather narrow leaves, stout stems, rough pubescence, spherical or subspherical fruit of peculiar color, and its thick bracts.

Specimens examined:

CALIFORNIA: Mohave Desert, 1895, *Parish* 3757, type; Mohave Desert, 1886, *Parish* 2078; Mohave Desert, 1892, *Parish;* Pipe Canyon, San Bernardino Mountains, 1894, *Parish* 3183.

2a. Hesperonia aspera villosa Standley, subsp. nov.

Different from the type in having the stems clad with an abundant soft villous instead of a harsh and glutinous pubescence, the leaves more or less villous and obtuse or broadly rounded at the apex, and the flowers large, with exserted stamens.

Specimens examined:

CALIFORNIA: Mohave Desert, 1901, *Parish* 4940, type; Providence Mountains, 1902, *Brandegee;* Argus Mountains, 1891, *Coville & Funston* 741.

3. Hesperonia tenuiloba (S. Wats.) Standley.

Mirabilis tenuiloba S. Wats. Proc. Am. Acad. 17: 375. 1882.

Readily recognized by its robust habit, large leaves and stems, and narrow bracts.

Specimens examined:

CALIFORNIA: Coyoté Wells, Colorado Desert, 1905, *Brandegee;* Palm Creek, 1895, *Brandegee;* Mountain Spring, San Diego County, 1894, *L. Schoenfeldt* 3070; same locality, 1894, *Mearns* 3017.

LOWER CALIFORNIA: Signal Mountain, Colorado Desert, 1901, *Brandegee.*

In the national herbarium there are two sheets of a Hesperonia labeled *Mirabilis tenuiloba*, collected in the Colorado Desert, 1889, by W. G. Wright. This is the type locality and the collector is the same as the collector of the type. I am not certain, however, that these belong to the type collection. The plant is hardly separable from *H. californica* except that it has narrower bracts. If this is *H. tenuiloba*, and it answers to the brief original description about as well as the plants I have listed under that name, the others should have a new name, for they are certainly not the same as these plants of Mr. Wright's.

4. Hesperonia laevis (Benth.) Standley.

Oxybaphus laevis Benth. Bot. Voy. Sulph. 44. 1844.

Mirabilis laevis Curran, Proc. Cal. Acad. Sci. II. 1: 235. 1889.

In the herbarium of the University of California there is a specimen of what I take to be this species, collected at the type locality, Magdalena Bay, Lower California, by Doctor Lung, U. S. N., no. 28. The plant has no fruit, but otherwise the characters can be determined fairly well, although the specimen is not of the best.

Branches dichotomous, straight, perfectly glabrous, rather slender, with long internodes; leaf blades ovate, somewhat sinuate-margined, rather thin, acutish; leaves 30 mm. long and 20 mm. wide or less, the uppermost considerably smaller; petioles almost as long as the blades in the lowest leaves, the uppermost blades almost sessile; leaves glabrous; flowers single in the axils of the leaves or apparently clustered at times at the ends of the branches; bracts mostly 10 mm. long, the free portion as long as the tube or longer, the segments lanceolate, acute, glabrous, or with a very few minute, appressed hairs; flowers about 16 mm. long.

The type was described as glabrous, and it seems quite probable that this is the same plant as the one collected at the same place during the voyage of the Sulphur. It is the only quite glabrous plant that I have seen in the genus.

5. Hesperonia oligantha Standley, sp. nov.

Stems branching from a woody base, the lower branches suffrutescent; stems slender, very closely and sparingly puberulent or almost glabrous; internodes 25 to 50 mm. long; leaf blades ovate, subcordate at the base or rounded or rarely somewhat narrowed, thin, sparingly puberulent, with prominent lateral veins, the lower leaves obtuse, the upper ones acute; petioles one-third as long

as the blades; flowers on peduncles almost as long as the involucre; bracts lanceolate, acute, the free portion as long as the tube, finely and densely puberulent, the whole about 9 mm. long; flowers about 12 mm. long, the stamens long-exserted; fruit cylindrical; acutish at both ends, dark brown, smooth, 7 or 8 mm. long, and almost 3 mm. thick.

From *H. polyphylla* this differs in its obtuse lower leaves, which are sometimes cordate at the base, thinner blades, less pubescent stem, longer and narrower fruit, and fewer flowers; from *H. tenuiloba*, in its more slender stems, obtuse lower leaves, thinner blades, and longer and narrower fruit. Type in the herbarium of the University of California, collected at Calmalli, Lower California, 1898, *Purpus* 82.

6. **Hesperonia polyphylla** Standley, sp. nov.

Perennial; much branched from a woody base, the lower branches suffrutescent; stems stout, glabrous below, finely short-pubescent above, not viscid, the nodes swollen and conspicuous, the internodes short: leaf blades ovate, acute, rounded at the base, glabrous or the younger ones sparingly puberulent, thick and fleshy, the lateral veins inconspicuous; blades small, less than 20 mm. long and about 10 mm. wide; petioles not more than one-third as long as the blades, stout; most of the flowers on peduncles which are about as long as the involucre; bracts lanceolate or ovate-lanceolate, the free portion about as long as the tube, the whole about 9 mm. long, thick and puberulent; flowers about 2 cm. long and almost as wide; the stamens included: fruit oblong in outline, broadly obtuse at both ends, smooth, brown, about 4 mm. long and almost 3 mm. wide.

From *H. tenuiloba* this differs in the smaller size of the plant, shorter internodes, more leafy appearance of the plant, smaller and thicker leaves which are not cordate at the base, and the broader segments of the involucre. The internodes near the ends of the branches are very short, so that the branches are densely leafy; there is a flower in almost every axil and at least one at each node, so that the flowers appear numerous. Type in the herbarium of the University of California, collected at San Borga, Lower California, May 6, 1889, *Brandegee*. On the same sheet is what appears to be the same plant, collected at Los Angeles Bay, Gulf of California, 1887, *Palmer* 600.

7. **Hesperonia californica** (A. Gray) Standley.

Oxybaphus glabrifolius crassifolius Choisy in DC. Prod. 13^2: 431. 1849.
Oxybaphus glabrifolius Torr. Pac. R. Rep. 4: 131. 1857, not Vahl.
Mirabilis californica A. Gray, Bot. Mex. Bound. 173. 1859.
Oxybaphus californicus Benth. & Hook. Gen. Pl. 3: 4. 1880.
Quamoclidion lacre Rydb. Bull. Torr. Club 29: 687. 1902.

Specimens examined, in part:

CALIFORNIA: Vicinity of San Bernardino, 1896, *Parish* 4159; Pasadena, 1882, *Jones* 3020; Riverside, 1903, *Hall* 3807; Griffith Park, 1903, *Braunton* 795; southwestern California, 1901, *Grant* 3721; Matilija Canyon, 1866, *Peckham;* Santa Barbara, 1861, *Brewer* 364; Riverside, 1889, *W. S. Boyd;* Mexican Boundary Survey 1111; mountains east of San Diego, 1850, *Parry;* Santa Ysabel, 1893, *Henshaw;* Santa Catalina Island, 1895, *Trask;* Santa Lucia Mountains, 1898, *Plaskett;* near Mentone, 1898, *Leiberg* 3289; San Diego, 1896, *Brandegee;* Cottonwood Creek, San Diego County, 1905, *Brandegee;* Santa Monica Experiment Station, 1897, *J. H. Barber* 49; San Diego, 1891, *S. W. Dunn;* San Luis Obispo County, *R. W. Summers;* Claremont, 1897, *H. P. Chandler;* San Diego, 1904, *N. K. Berg;* Playa del Rey, 1902, *Abrams* 2504; foothills of the San Bernardino Mountains, 1885, *Parish* 659; Del Mar, 1895, *Belle S. Angier* 117; Wilmington, 1882, *Pringle.*

The following plants differ from the typical form in being almost glabrous:

CALIFORNIA: San Diego, 1902, *Brandegee* 826; Santa Inez Mountains, 1888, *Brandegee;* Santa Barbara, 1902, *Elmer* 3764; Elysian Hills, Los Angeles County, 1902, *Braunton* 162; Los Angeles, 1904, *Grant* 791.

A plant in the herbarium of Nevada State University collected at Highlands, San Bernardino County, California, 1904, by N. K. Berg, is an interesting form with long-petioled leaves which are rounded and cordate at the base and sometimes reniform in outline, and with stout, suffrutescent stem.

7a. Hesperonia californica microphylla Standley, subsp. nov.

Much branched from a woody base, the lower branches woody and whitish, glabrous, the internodes short, the nodes large and swollen; leaf blades irregularly ovate or deltoid-ovate, obtuse or acutish, mostly semicordate at the base, thick, 15 mm. long and 8 mm. wide or usually less; petioles about half as long as the blades; branches of the inflorescence slender, not much branched, 2 or sometimes more flowers at each node, the flowers on short pedicels which are sparingly scabrate; flowers about 11 mm. long; stamens included; bracts 4 or 5 mm. long, the free portion rather narrowly triangular, acute, a little longer than the tube or as long; fruit elliptical in outline, 4 mm. or less in length, dark brown.

Type in the herbarium of the University of California (no. 101214), collected by Brandegee on San Martin Island, Lower California, March 12, 1897. Also collected by the same collector at Ensenada, Lower California, April 26, 1893. The small leaves and flowers, whitish stems, and dense habit distinguish the subspecies.

8. Hesperonia glutinosa (A. Nelson) Standley.

Mirabilis glutinosa A. Nelson, Proc. Biol. Soc. Wash. 17: 92. 1904.

Specimens examined:

NEVADA: Karshaw, Meadow Valley Wash, 1902, *Goodding* 967, type; Humboldt County, 1865, *Torrey;* Virginia Mountains, 1867, *Watson* 963.

8a. Hesperonia glutinosa retrorsa (Heller) Standley.

Mirabilis retrorsa Heller, Muhlenbergia 2: 193. 1906.

I can not see how this can be separated from *H. glutinosa* except as a subspecies. It differs from that species in having narrower and more acute leaves and less abundantly pubescent stem; but aside from these minor differences I can see little to separate the two plants.

Specimens examined:

CALIFORNIA: Near Southern Belle Mine, Mono County, 1906, *Heller* 8336, type; near Victorville, 1905, *Hall* 6206; Sierra Nevada Mountains, 1875, *Lemmon;* Colorado Desert, 1905, *Brandegee;* Antelope Valley, 1896, *Davy* 2294.

NEVADA: Reno, 1895, *F. G. Hillman;* Pah Ute Mountains, 1868, *Watson* 963; Pyramid Lake, 1903, *G. H. True* 758; Truckee Pass, Virginia Mountains, 1903, *Kennedy* 727; Truckee Pass, 1907, *Kennedy* 1595; Mica Spring, 1894, *Jones* 5045a.

The following are doubtfully referred here:

CALIFORNIA: San Felipe Canyon, Colorado Desert, 1901, *Brandegee;* east slope of Walker Pass, 1891, *Coville & Funston* 1018; Ralston Desert, 1891, *Coville & Funston* 1996.

8b. Hesperonia glutinosa gracilis Standley, subsp. nov.

Stems very slender, more or less villous throughout, especially above, not viscid or inconspicuously so, not much branched except near the base; inter-

nodes very long, 13 cm. or less; leaf blades irregularly ovate, 35 mm. long and 37 mm. wide or less, rather thin, obtuse or broadly rounded at the apex, semicordate or rounded at the base, more or less puberulent on both surfaces, except the oldest blades, which are sometimes quite glabrous; petioles about one-third as long as the blades, villous; inflorescence slender, few-flowered, the separate flowers almost sessile; bracts 5 or 6 mm. long, lanceolate or narrowly triangular, the free portion rather longer than the tube; perianth about 8 mm. long; fruits subelliptical, narrowed at both ends, brown marked with transverse darker marks.

Type U. S. National Herbarium (no. 212108), collected in Sabino Canyon, Arizona, 1892, *Toumey* 471c. The plant is distinguished by its villous pubescence and slender stems.

Other specimens examined:

ARIZONA: Tempe, 1896, *Toumey*, not as villous as the type; Arizona, 1876, *Palmer*, 644, not typical, but with the villous pubescence; Hardyville, 1868, *C. A. Almondinger.*

CALIFORNIA: Colton, 1881, *Vasey*, placed here because of its pubescence; San Felipe Creek below Bonner, 1900, *Brandegee.*

NEW MEXICO: No locality, 1881, *Vasey.*

The label states that the last-cited plant is from New Mexico, but it is probably incorrect. No specimen of any species of the genus has been found in New Mexico at any other time so far as the author is able to learn.

Here probably belongs *Mirabilis bigelovii* A. Gray. See page 369.

9. MIRABILIS L.

Mirabilis L. Sp. Pl. 1: 177. 1753.

Nyctago Juss. Gen. 90. 1789.

Perennial herbs, glabrous or pubescent, with large, thickened roots; leaves opposite, their blades entire, petioled or sessile; flowers solitary in a gamophyllous, 5-lobed, calyx-like involucre; perianth colored, corolla-like, showy, with a long slender tube and a broadly spreading limb; stamens mostly 5, unequal, with slender, filiform filaments which are united at the base; fruit leathery, obscurely 5-angled or 5-ribbed, narrowed to the base, smooth or somewhat tuberculate, glabrous or pubescent.

Type species, *Mirabilis jalapa* L.

A number of species have been described besides those mentioned here, most of them coming from Mexico, Central America, and northern South America.

KEY TO THE SPECIES.

Stamens long-exserted, twice as long as the perianth; perianth white, tinged with pink; lobes of the involucre obtuse ..... 1. *M. exserta.*

Stamens exserted, but considerably less than twice as long as the perianth; lobes of the involucre mostly acute.

Perianth 3 to 5 cm. long, red, yellow, or rarely white; tube funnelform ..... 2. *M. jalapa.*

Perianth 10 to 15 cm. long, white; tube long-tubular.

Stems densely glandular above; leaves glandular on both surfaces, the upper ones sessile ..... 3. *M. longiflora.*

Stems almost glabrous above, not glandular; leaves glabrous, all of them petioled, although the upper petioles may be very short; tube of the perianth more slender ..... 4. *M. wrightiana.*

1. **Mirabilis exserta** Brandeg. Proc. Cal. Acad. Sci. II. 3: 165. 1891.

Specimens examined:

LOWER CALIFORNIA: Sierra de San Francisquito, 1890, *Brandegee* 480, type; La Chuparosa, 1899, *Brandegee*.

2. **Mirabilis jalapa** L. Sp. Pl. 177. 1753.

Type locality, "In India utraque."

Stems glabrous, or slightly puberulent above; leaves ovate, rather narrowly so, rather acuminate, semicordate or truncate at the base, sometimes abruptly narrowed to the petiole, this very short in the upper leaves; bracts lanceolate, acute, ciliolate, more or less puberulent, the free portion about as long as the tube; flowers about 4 cm. long, the tube expanding gradually toward the limb, which is about 3 cm. wide; fruit about 10 mm. long and 5 or 6 mm. thick, ovoid, dark brown, 5-angled, glabrous, tuberculate between the angles; tubes of the perianths slightly pubescent; stamens exserted.

Specimens examined:

FLORIDA: Northeast of Key West, 1904, *Lansing* 2448; Jacksonville, 1899, *Curtiss* 6541.

MEXICO: Durango, 1896, *Palmer* 631; Saltillo, 1848, *Gregg* 231.

PARAGUAY: 1888–90, *Morong* 622.

COLOMBIA: Santa Marta, 1898–1901, *H. H. Smith* 1324.

CUBA: Cieneguito, 1895, *Combs* 286.

2a. **Mirabilis jalapa volcanica** Standley, subsp. nov.

Stems rather slender, strongly angled when dry, with rather soft pubescence throughout; leaf blades ovate or narrowly ovate, rather acuminate at the apex, subcordate or rounded at the base, with prominent pubescent veins, 35 to 70 mm. long and 25 to 45 mm. wide; petioles 1 cm. long or less; inflorescence subcymose, the flowers clustered; bracts lanceolate to narrowly triangular, the free portion about as long as the tube; flowers about 5 cm. long and 3 cm. broad, the tube slender, red; stamens not much exserted; fruit 8 mm. long and 4 or 5 mm. thick, narrowly ovoid, with 5 indistinct ridges, not angled, smooth between the ridges and not tuberculate or only faintly so, pubescent with short, fine, soft, whitish hairs; tube of the perianth almost or quite glabrous; young leaves not ciliolate, but the bracts sometimes sparingly so; bracts usually sparingly puberulent.

This differs from the species in its pubescent and smoother fruit and more pubescent stem. Type in herbarium of Field Museum of Natural History; cotypes at Missouri Botanical Garden and the University of California; collected at pedregal (lava beds), Valley of Mexico, altitude 2,240 meters, August 19, 1896, *Pringle* 6433. Also collected at Durango, 1896, *Palmer* 630, 631.

2b. **Mirabilis jalapa gracilis** Standley, subsp. nov.

Stems very slender, glabrous except for scattered, almost imperceptible cinereous pubescence on the youngest branches; leaf blades thin, narrowly ovate or broadly lanceolate, long-attenuate, narrowed toward the base into a slender petiole 10 to 35 mm. long; leaf blades 55 to 80 mm. long and 20 to 45 mm. wide; petioles glabrous; bracts linear-lanceolate, acute, free part about as long as the tube, the whole 15 mm. long or less; flowers 2 or 3 at the ends of the branches, conspicuously peduncled, their tubes slender and glabrous; fruit narrowly ovoid, acutish below, 8 mm. long and 4.5 mm. thick, 5-angled and strongly tuberculate, pubescent with abundant short, yellowish, soft hairs.

This differs from the species in its narrower, thinner leaves, which are attenuate at the base, longer petioles, more slender stems, and pubescent fruit; from subspecies *volcanica* in its different leaves, longer petioles, tuberculate fruit, and more slender stems. Type in the herbarium of the University of California; collected at Culiacan, Sinaloa, Mexico, September 17, 1904, *Brandegee.*

2c. **Mirabilis jalapa lindheimeri** Standley, subsp. nov.

Stems rather slender, glabrous; leaf blades broadly deltoid-ovate to ovate, thin, short-acuminate or acute, truncate, rounded, or narrowed at the base, the blades always slightly decurrent upon the glabrous, slender petioles, which are usually half as long as the blades or longer; involucres in clusters of about 3, or sometimes solitary, mostly pediceled; bracts lanceolate-ovate, minutely puberulent, not usually ciliolate, the free portion about as long as the tube; flowers about 5.5 cm. long; limb about 2.5 cm. wide, with prominent rounded lobes, the tube almost or quite glabrous; stamens about as long as the perianth; fruit about 10 mm. long and 5 mm. thick, ovoid, with 5 inconspicuous, broad ribs, not angled, smooth, not tuberculate, pubescent with fine, short, soft, yellowish, appressed hairs.

This can at once be distinguished by its broad leaves. Its pubescent fruit separates it from the species, and its longer petioles and glabrous stem from subspecies *volcanica.* Type in the herbarium of the Missouri Botanical Garden, collected at New Braunfels, Tex., June, 1846, *Lindheimer.*

Other specimens examined:

TEXAS: Comale Creek, *Lindheimer* 470; New Braunfels, 1851, *Lindheimer* 567; San Antonio, *E. H. Wilkinson* 134; San Antonio, 1900, *Bush* 1209; Canyon Blanco, Uvalde County, 1886, *Reverchon* 1586; Houston, 1877, *Ward.*

2d. **Mirabilis jalapa ciliata** Standley, subsp. nov.

Stems slender, abundantly furnished with fine, soft pubescence which is almost villous, the pubescence especially abundant on the young stems; leaf blades ovate, subacuminate, oblique at the base, about 11 cm. long and 6 cm. wide or less, thin, glabrous above, more or less puberulent below, all conspicuously ciliate along the margins, the hairs soft and tawny; petioles short, 25 mm. long or less; flowers sessile or short-pediceled; bracts 12 mm. long or less, ovate, short-acuminate, ciliolate; flowers about 55 mm. long, their tubes rather thick, the limb about 30 mm. broad; fruit (immature) in shape like that of *M. jalapa,* tuberculate, finely pubescent.

The most striking characteristic of the plant is found in the ciliate leaves and bracts. Type in the herbarium of the Missouri Botanical Garden, collected in the Oaxaca Valley, Oaxaca, Mexico, altitude 1,550 meters, October 1, 1894, *C. L. Smith* 791.

3. **Mirabilis longiflora** L. Vet. Akad. Handl. Stockh. 176. *pl. 6. f. 1.* 1755.

Specimens examined:

MEXICO: Cuernavaca, 1896, *Pringle* 6377; Gallejo Spring, Chihuahua, 1846, *Wislizenus* 122; Ixtaccihuatl, 1903, *Purpus* 49.

TEXAS: Chenate Mountains, *Havard;* Eagle Pass, 1881, *Havard;* Limpia Canyon, 1889, *Nealley* 618; 1849, *Wright* 595.

ARIZONA: Beaver Creek near Camp Verde, 1891, *MacDougal;* Prescott, 1896, *Kunze;* south of Tucson, 1892, *Toumey* 395; Fort Whipple, 1869, *Palmer.*

4. **Mirabilis wrightiana** A. Gray; Britton & Kearney, Trans. N. Y. Acad. Sci. 14: 28. 1894.

Specimens examined:

NEW MEXICO: Kingston, 1904, *Metcalfe* 1187; Eagle Creek, White Mountains, 1899, *Turner* 80; Chiz, 1904, *Wooton* 2829; Gila Hot Springs, 1900, *Wooton;* Mogollon Mountains, 1881, *Rusby* 350; Middle Fork of the Gila, 1903, *Metcalfe* 432; Grant County, 1880, *Greene;* near Silver City, 1880, *Greene;* base of San Luis Mountains, 1893, *Mearns* 2155; Dog Spring, Dog Mountains, 1893, *Mearns* 2359; Animas Valley, 1893, *Mearns* 2499; Santa Rita, 1895, *Mulford* 717.

ARIZONA: Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* Bowie, 1884, *Jones;* Fort Apache, 1901, *Mayerhoff* 44; Fort Lowell, 1903, *Thornber* 90; Santa Rita Mountains, 1880, *Engelmann;* Fort Huachuca, 1894, *Wilcox* 209, 408; Cottonwood, 1874, *Rothrock* 359; Camp Wallace, 1867, *Doctor Smart* 423; Fort Whipple, 1865, *Coues & Palmer* 15.

TEXAS: El Paso, *Wright* 1702.

MEXICO: Guadalupe Canyon, Sonora, 1893, *E. C. Merton* 2052; Canyon above Palomas, Saltillo, 1848, *Gregg* 331.

MIRABILIS BIGELOVII A. Gray, Proc. Am. Acad. 21: 413. 1886. I have seen no reliable material of this species and can not determine it certainly without seeing the type. It is probably *Hesperonia glutinosa gracilis* or some other form of *H. glutinosa.*

10. ACLEISANTHES A. Gray.

Acleisanthes A. Gray, Am. Journ. Sci. II. 15: 259. 1853.
Pentacrophys A. Gray, loc. cit.

Perennial herbs or shrubby plants; leaves opposite, rather thick, the blades unequal, petioled, entire; flowers axillary or terminal, each subtended by 1 to 3 small, narrow bracts; perianth white, corolla-like, with a long slender tube and spreading, 5-lobed limb; stamens 2 to 5, unequal, sometimes exserted, with very slender filaments, these united at the base; fruit rather narrowly ellipsoidal, 5-angled or 5-ribbed.

KEY TO THE SPECIES.

Ribs ending above in conspicuous knobs or glands.
  Leaves obtuse; glands at the summit of the ribs; bracts one-half as long as the fruit ..... 1. *A. wrightii.*
  Leaves acute; glands in depressions below the knobs at the tops of the ribs; bracts as long as the fruit or longer ..... 2. *A. acutifolia.*
Ribs not ending above in conspicuous knobs or glands.
  Opposite leaves strongly unequal ..... 3. *A. anisophylla.*
  Opposite leaves not strongly unequal.
    Leaves acuminate, lanceolate; plants mostly glabrous ..... 4. *A. longiflora.*
    Leaves not acuminate.
      Leaves ovate, mucronate, thick and fleshy ..... 5. *A. crassifolia.*
      Leaves reniform-cordate, obtuse or rather obtuse.
        Leaves thin, rather large; flowers conspicuously pedicelled ..... 6. *A. obtusa.*
        Leaves thick and considerably smaller; flowers sessile ..... 7. *A. greggii.*

1. **Acleisanthes wrightii** (A. Gray) Benth. & Hook.; Hemsl. Biol. Centr. Am. 3: 6. 1882.

Pentacrophys wrightii A. Gray, Am. Journ. Sci. II. 15: 261. 1853.

Doctor Gray says that the flowers have 2 stamens, but those I examined had 5.

Specimens examined:

TEXAS: San Pedro, Pecos, and Limpio, *Wright* 1713, type collection.

2. **Acleisanthes acutifolia** Standley, sp. nov.

Perennial from a woody base; stems rather slender with minute and scattering pubescence composed of short, appressed, blunt, white hairs and, scattered among them, a few short, gland-tipped hairs; leaf blades lanceolate or elliptical, 4.5 cm. or less in length and 18 mm. or less wide, acute, narrowed to the base and somewhat decurrent upon the petioles, which are one-third or less as long as the blades, the margins wavy, both surfaces very sparingly puberulent; flowers short-pediceled, the pedicels about 3 mm. long; involucral bracts 3, linear, as long as the fruit or longer; flowers funnelform, 4 cm. long or more, rather densely puberulent without, the limb about 18 mm. wide; stamens 5, exserted; some of the flowers cleistogamous, their undeveloped perianths with 5 small stamens; fruit 7 to 8 mm. long, oblong, with 5 thick, smooth ribs separated by very shallow and inconspicuous depressions; ribs ending in small, knoblike bodies detached from the ribs proper by shallow depressions, the latter containing small glands.

The acute leaves with narrowed bases and short petioles will separate this plant from *A. wrightii*, with which it has been confused; it is also distinguished by its different fruits, pedicels, and bracts. In *A. wrightii* the glands are located at the very ends of the ribs instead of in depressions below their summits, as in this species. Type in the National Herbarium (no. 155669), collected at Maxon's Spring, Texas, by Havard. Also collected in the Santa Eulalia Mountains, Chihuahua, 1885, *Pringle* 671 (plant with rather shorter perianths and shorter pedicels than the type).

This is no. 1127 of the Mexican Boundary Survey and is figured in the Report of the Mexican Boundary Survey, plate 47, figures B, B_2, and B_3. Figure B_1 is *A. wrightii*.

3. **Acleisanthes anisophylla** A. Gray, Am. Journ. Sci. II. 15: 261. 1853.

Specimens examined:

TEXAS: Rio San Pedro, *Wright* 1706, type collection; *Wright* 598.

4. **Acleisanthes longiflora** A. Gray, Am. Journ. Sci. II. 15: 261. 1853.

Specimens examined:

TEXAS: *Wright* 599, type collection; *Wright* 1704; on the Llano under mesquite bushes on prairies, 1847, *Lindheimer* 670; 20 miles west of New Braunfels, 1846, *Lindheimer* 289; Coleman County, 1882, *Reverchon* 1346; Kimble County, 1885, *Reverchon*; prairies near Stanton, 1900, *Eggert*; near Laredo, 1899, *Mackenzie* 26; Laredo, 1879, *Palmer* 1115; near Laredo, 1901, *Eggert*; Sierra Blanca, 1895, *Mulford* 290; San Angelo, 1903, *Reverchon*; San Antonio, *E. H. Wilkinson* 126; San Antonio, 1901, *Bush* 865; Devils River, Valverde County, 1900, *Eggert*; Midland, 1902, *Tracy* 8312; plains west of Pecos, 1902, *Tracy*; Fort Clark, 1893, *Mearns* 1420, 1441; Mexican Boundary Survey 1123; Cibolo Canyon, 1881, *Havard*; Bexar County, *Jermy* 124; San Diego, 1885, *M. B. Croft* 6838; Knickerbocker Ranch, Tom Green County, 1880, *Tweedy* 35; Roma, 1889, *Nealley* 302; Ballinger, 1889, *Nealley* 370.

MEXICO: Parras, Coahuila, 1905, *Purpus* 1056; near Chihuahua, 1885, *Pringle* 101; Saltillo, 1848, *Gregg* 88; Buena Vista, 1847, *Gregg* 355.

NEW MEXICO: Delaware Creek, 1893, *Nealley* 12.

CALIFORNIA: Marie Mountains, Colorado Desert, eastern Riverside County, 1906, *E. E. Schellenger.*

The California specimen, received at a late day from Prof. H. M. Hall, of the University of California, extends the range of the species considerably to the northwest.

Attached to his no. 355 in the herbarium of the Missouri Botanical Garden is the following interesting note by Doctor Gregg regarding this plant: "*Yerba santa* (or *yerba de la rabia*); the root in a decoction is used for cholera, fevers, etc. Said to have acquired the name of *yerba santa* (holy herb) in 1814 on account of its wonderful virtues in curing a plague of that year."

4a. **Acleisanthes longiflora hirtella** Standley, subsp. nov.

Stems hirtellous throughout; leaves like those of the species, but broader and not attenuate, more or less puberulent on both surfaces, thick; otherwise like the species; "flowers white," the perianth more puberulent than in the species.

Type in the herbarium of the Missouri Botanical Garden collected near Saltillo, Coahuila, Mexico, September 20, 1848, *Gregg* 463. Gregg's 725 from "highlands near Patos" is probably the same; it has, however, very small leaves, and the collector says of it "flowers scarlet; a small shrub."

5. **Acleisanthes crassifolia** A. Gray, Am. Journ. Sci. II. **15**: 260. 1853.

Type locality, "High prairies of San Felipe Creek, W. Texas."

Specimens examined:

TEXAS: *Wright* 599, type collection; Van Horn, 1900, *Eggert.*

6. **Acleisanthes obtusa** (Choisy) Standley.

Nyctaginia obtusa Choisy in DC. Prod. **13**^{2}: 429. 1849.

Acleisanthes berlandieri A. Gray, Am. Journ. Sci. II. **15**: 260. 1853.

Doctor Gray in his description of *A. berlandieri* suspected that his species might be the same as the plant published by Choisy in the genus Nyctaginia. I have seen a specimen of the type collection of *N. obtusa* in the Engelmann Herbarium which leaves no room for doubt regarding the matter.

Specimens examined:

TEXAS: *Berlandier* 2007, type collection; San Fernando (Creek?), 1835, *Berlandier* 3044; between Rio Frio and Nueces, *Berlandier* 3203; Corpus Christi, 1860; Eagle Pass, *Havard;* Uvalde, 1880, *Palmer* 1117; Mexican Boundary Survey 1125; Roma, 1889, *Nealley* 228; San Antonio, 1882, *Letterman* 124; Dilley, 1905, *Reverchon;* Laredo, 1882, *Letterman.*

7. **Acleisanthes greggii** Standley, sp. nov.

Perennial; stems stout, liguescent, dichotomously much-branched, glabrous below, minutely puberulent above and on the younger branches; internodes short, 1 to 2 cm. long; leaf blades ovate, cordate or truncate at the base, very thick, 15 mm. long or usually less, glabrous, paler below, rather obtuse; petioles stout, one-half as long as the blades; flowers sessile, about 3 cm. long, tubes slender, limb 15 mm. wide, "white and pinkish purple within;" stamens 5, much exserted; flowers single or sometimes 2 or 3 together, each subtended by 2 or 3 thick, subulate bracts; fruit in the type not fully developed, but 5 mm. long and strongly 5-angled.

This Mexican plant differs from the Texan species, *A. obtusa*, in its smaller and thicker leaves, more branched and stouter stem, stouter petioles, and sessile flowers. Type in the herbarium of the Missouri Botanical Garden, collected at Monterey, Mexico, June 22, 1848, *Gregg* 157.

ACLEISANTHES NUMMULARIA Jones, Contr. Western Bot. **10**: 43. 1902. This, the only other species of the genus, was named from specimens collected near El Paso, Texas, but I have not been able to see specimens of the species.

11. HERMIDIUM S. Wats.

Hermidium S. Wats. Bot. King Explor. 286. 1871.

Perennial herbs, glabrous, erect; leaves opposite, entire, short-petioled, thick and fleshy; flowers at the ends of the branches or axillary, on short peduncles, 3 flowers on each peduncle, each flower pediceled and subtended by a large, ovate, leaf-like bract; calyx campanulate, purplish, slightly lobed; stamens 5 to 7, about as long as the perianth; fruit subspherical, smooth, glabrous.

A monotypic genus. The plant very closely resembles *Quamoclidion multiflorum* except in its involucral bracts, which are not united to form a calyx-like involucre, and in the shape of the perianth.

1. Hermidium alipes S. Wats. Bot. King Explor. 286. 1871.

Specimens examined:

NEVADA: Humboldt Valley, 1860, *S. Watson* 960, type collection; Palmetto Range, 1898, *Purpus* 5862; Wadsworth, 1902, *J. C. Jacobs* 458; Candelaria, *Shockley* 31.

CALIFORNIA: Panamint Canyon, 1897 *Jones;* Sierra Mountains, 1875, *Lemmon;* near Laws, 1906, *Heller* 8230.

UTAH: Willow Springs, 1891, *Jones.*

12. SENKENBERGIA Schauer.

Senkenbergia Schauer, Linnæa **19**: 711. 1847.
Lindenia Mart & Gal. Bull. Acad. Brux. 10^2: 357. 1843, not Benth. 1842.
Tinantia Mart & Gal. loc. cit. 11^1: 240. 1844, not Schiedw. 1839.
Boerhaavia of various authors in part, not L.

Perennial, erect herbs, glabrous or puberulent; leaves opposite, thick and fleshy, entire, petioled; flowers in bracted racemes; calyx red, funnelform, with a short, narrow tube, which expands gradually into the broad limb; fruit asymmetrical, gibbous, glaucous, 10-ribbed.

KEY TO THE SPECIES.

Steam and leaves glabrous; racemes solitary, not subtended by bract-like leaves	1. *S. gypsophiloides.*
Stem and leaves more or less puberulent; racemes of flowers panicled, the separate racemes subtended by bract-like leaves	2. *S. crassifolia.*

1. Senkenbergia gypsophiloides (Mart. & Gal.) Benth. & Hook. Gen. Pl. 3: 6. 1880.

Lindenia gypsophiloides Mart. & Gal. Bull. Acad. Brux. 10^2: 357. 1843.
Tinantia gypsophiloides Mart. & Gal. loc. cit. 11^1: 240. 1844.
Senkenbergia annulata Schauer, Linnæa **19**: 711. 1847.
Boerhaavia gibbosa Pavon; Choisy in DC. Prod. 13^2: 457. 1849.
Boerhaavia gypsophiloides Coulter, Contr. Nat. Herb. **2**: 354. 1894.

Specimens examined:

NEW MEXICO: La Luz Canyon, 1901, *Wooton;* Organ Mountains, 1893, *Wooton;* Organ Mountains, 1881, *Vasey;* Carlsbad, 1902, *Tracy.*

TEXAS: Devil's River, Valverde County, 1900, *Eggert;* El Paso, 1884, *Jones* 4216; Junction City, *Reverchon* 1584; Big Springs, 1900, *Eggert;* 1849, *Wright* 613; Bone Spring, 1889, *Nealley* 455.

MEXICO: Near Chihuahua, 1885, *Pringle* 693; Saltillo, 1898, *Palmer* 171; Tehuacan, Puebla, 1905, *Purpus* 1331; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1438; Chihuahua, 1886, *Pringle* 987; between Monterey and Cerralvo, 1847, *Wislizenus* 340; 1848–49, *Gregg.*

2. **Senkenbergia crassifolia** Standley, sp. nov.

Perennial, 60 to 100 cm. high; stem rough-puberulent below, glabrous or glandular-viscid above; leaf blades thick, ovate, obtuse, broadly cuneate or truncate at the base, puberulent on both surfaces, 20 to 30 mm. long and 15 to 20 mm. wide; petioles puberulent, as long as the blades or a little shorter; flowers (not seen) in racemes, these in diffuse panicles, each raceme with very small bract-like leaves at the base, each flower subtended by a soon deciduous lanceolate bract; fruit reflexed on the very short pedicels, about 7 mm. long, gibbous, truncate above, tapering below, obscurely 10-nerved.

This species is near *S. gypsophiloides*, but differs in the panicled inflorescence with racemes subtended by bract-like leaves, and in the pubescent stems and broader and more thickly puberulent leaves. Type in the herbarium of the University of California, collected at Saltillo, Coahuila, Mexico, 1898, *Palmer* 172.

13. COMMICARPUS Standley.

Commicarpus Standley, gen. nov.

Boerhaavia L., in part.

Perennial plants with long and slender, climbing or reclining stems; leaves thin, mostly ovate-cordate, with conspicuous petioles, entire, opposite; flowers in umbels on moderately long pedicels; perianth short-funnelform, with a very short tube below the broad limb; flowers small; stamens exserted; fruit rather obscurely 10-ribbed, clavate, with numerous, rather large, mucilaginous glands scattered over its surface.

The plants included here have always passed as Boerhaavias, but they differ widely from the plants of that genus in the habit of the plant, form of the fruit, and shape of the perianth. *Boerhaavia scandens* and several related species were included by Doctor Heimerl[a] in the section Adenophorae of the genus Boerhaavia.

Type species, *Boerhaavia scandens* L.

The name alludes to the viscid fruit.

KEY TO THE SPECIES.

Pedicels glabrous; glands scattered irregularly over the fruit__ 1. *C. scandens.*
Pedicels pubescent; glands arranged in horizontal rows about the fruit_____ 2. *C. brandegei.*

1. **Commicarpus scandens** (L.) Standley.

Boerhaavia scandens L. Sp. Pl. 3. 1753.

Boerhaavia grahami A. Gray, Am. Journ. Sci. II. 15: 323. 1853.

Type locality, "In Jamaica ad urbem jago de la vega."

[a] Engler & Prantl, Pflanzenfam. 3[1b]: 26.

Specimens examined:

WEST INDIES: Near Ponce, Porto Rico, 1902, *Heller* 6090; Nassau, Bahamas, 1903, *Curtiss* 16; Kingston, Jamaica 1890, *A. S. Hitchcock;* El Cobre, Cuba, 1902, *Pollard & Palmer.*

COLUMBIA: Santa Marta, 1898–01, *H. H. Smith*, 571.

MEXICO: Guaymas, Sonora, 1887, *Palmer* 146; Hermosillo, 1892, *Brandegee;* Altata, Sinaloa, 1904, *Brandegee;* Culiacan, Sinaloa, 1904, *Brandegee;* San Gregorio, Baja California, 1890, *Brandegee* 483; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1437; Guaymas, 1897, *Maltby* 192; San Luis Potosi, 1878, *Parry & Palmer* 772; rocky hills of the Sonoita, Sonora, 1851–52, *Wright* 1715; Oaxaca Valley, Oaxaca, 1894, *C. L. Smith* 859; Villa Union, Sinaloa. 1895, *F. H. Lamb* 388; Santa Cruz, Sonora, 1852, *Thurber* 2305.

ARIZONA: Tucson, 1894, *Toumey;* Santa Catalina Mountains, 1885, *Pringle;* Santa Catalina Mountains, 1883, *Lemmon;* Camp Grant, 1867, *Palmer* 212; Lowell, 1884, *Parish;* head of the Cienega, 1874, *Rothrock* 590.

TEXAS: Bofecillos, 1881, *Havard.*

2. **Commicarpus brandegei** Standley, nom. nov.

Boerhaavia elongata Brandeg. Proc. Cal. Acad. II. 2:199, 1889, not Salisb. Prod. 56. 1796.

This closely resembles *C. scandens* in general appearance. The flowers, however, are much larger, 8 to 10 mm. in diameter and much longer than the small ovary; the pedicels are pubescent instead of glabrous; the leaves are distinctly mucronate or apiculate, and the fruit has mucilaginous glands which form horizontal bands about it instead of being scattered irregularly as in *C. scandens.*

Specimens examined:

BAJA CALIFORNIA: San Pablo, 1889, *Brandegee,* type; Jesus Maria, 1889, *Brandegee;* Arroyo Salado, 1901, *Purpus* 243.

2a. **Commicarpus brandegei glabrior** Standley, subsp. nov.

In general appearance and in the form of the perianths this plant resembles the species. The stem, however, and especially the pedicels, are more slender; the pedicels are glabrous instead of pubescent, and the leaves are broadly lanceolate and apiculate.

Type in the herbarium of the University of California (no. 101287), collected at San José del Cabo, Baja California, September 29, 1893, *Brandegee.*

14. ANULOCAULIS Standley.

Anulocaulis Standley, gen. nov.

Boerhaavia of various authors, in part, not L.

Perennial herbs, stout and erect; stems glabrous, but the middle of each internode usually provided with a reddish ring which exudes a mucilaginous fluid; leaves with very thick, rigid, rather fleshy blades, opposite, margins frequently lacerate, petioled; flowers in small clusters, these variously arranged, sessile or pediceled, sometimes subumbellate, the clusters subtended by a few small bracts; perianth funnelform with a prominent tube; fruit turbinate or biturbinate, rather obscurely 10-ribbed.

There is no good reason why plants which differ so markedly as these from typical Boerhaavias should be included in the genus Boerhaavia. Such treatment is certainly not conducive to generic unity. The plants included in the new genus may be separated at once by their distinct general appearance, due especially to their large, thick leaves, the shape of the perianth which has a

distinct tube instead of being campanulate, and the 10-ribbed fruit of different shape.

Doctor Heimerl[a] placed *Boerhaavia leiosolena* and *B. eriosolena* in a separate section of the genus, which he named Solenanthae. He remarks that these two plants differ very much from the other species of the genus, but he did not see fit to separate them more definitely.

Type species, *Boerhaavia eriosolena* A. Gray.

KEY TO THE SPECIES.

Fruit obconical in outline, depressed above_____ 1. *A. eriosolenus.*
Fruit biturbinate.
Flowers 5 to 9 mm. long; leaves conspicuously glandular-dotted _____ 2. *A. annulatus.*
Flowers 20 mm. long; leaves not glandular-dotted_____ 3. *A. leiosolenus.*

1. Anulocaulis eriosolenus (A. Gray) Standley.

Boerhaavia eriosolena A. Gray, Am. Journ. Sci. II. **15**: 322. 1853.

Specimens examined:

MEXICO: Azufrora near Saltillo, 1848, *Gregg* 512, type collection; Viesca, Coahuila, 1905, *Purpus* 1053; Torreon, Coahuila, 1903, *Purpus.*

TEXAS: Bluffs of the Rio Grande, 1883, *Havard* 58; Mexican Boundary Survey 1138.

2. Anulocaulis annulatus (Coville) Standley.

Boerhaavia annulata Coville, Contr. Nat. Herb. **4**: 177. 1893.

Specimens examined:

CALIFORNIA: Furnace Creek Canyon, Funeral Mountains, 1891, *Coville & Funston* 577, type; Panamint Canyon, 1897, *Jones.*

3. Anulocaulis leiosolenus (Torr.) Standley.

Boerhaavia leiosolena Torr. Bot. Mex. Bound. 172. 1858.

Specimens examined:

TEXAS: Mexican Boundary Survey 1139, type collection; Dallas Creek, 1881, *Havard;* Tornillo Creek, 1883, *Havard.*

NEVADA: Muddy Creek, 1898, *Purpus* 6155.

15. BOERHAAVIA L.

Boerhaavia L. Sp. Pl. 3. 1753.

Annual or perennial herbs, slender, glabrous or pubescent, often with glandular rings about the internodes; leaves opposite, the blades unequal, entire, petioled or sessile; flowers small, variously arranged, each usually subtended by 1 or 2 minute bracts, on jointed pedicels; perianth campanulate, 5-lobed; stamens 1 to 5, exserted or included, with very slender filaments which are united at the base; fruit club-shaped to obpyramidal, 3 to 5-ribbed, 3 to 5-angled, or sometimes with 3 to 5 low, thick, not membranous wings.

Type species, *Boerhaavia erecta* L.

The genus has probably a wider distribution than any other of the genera of the Allioniaceae. It includes about fifty species besides those mentioned here. They occur through the southern part of the United States, through Mexico, the West Indies, a large part of South America, and the islands of the Pacific, including Australia, and through southern and eastern Asia, Africa, and Spain.

[a] Engler & Prantl, Pflanzenfam. 3^{1b}: 26. 1889.

The individual species differ from those of Abronia in that they often extend over relatively large areas; wide distribution seems to be characteristic of a majority of the species. *B. erecta* is a good example of such distribution.

Doctor Heimerl divided the genus (as it is defined here) into two sections, the first, Pterocarpon, containing *B. pterocarpa* (several other related species such as *B. alata* and *B. megaptera* should be included here); and the second, Micranthae, including the rest of the species. The two sections are hardly worthy of being maintained. The wings of the former section differ from the ridges of the second merely in degree and it would be difficult to tell to which some of the species should be referred. The genus as it is defined here is composed of closely related species and is the most satisfactory of the large genera of the family in this respect.

KEY TO THE SPECIES.

Fruit with distinct, rather thick, not membranous wings; annuals; flowers umbellate.	
Umbels either axillary or terminal, but never paniculed	1. *B. pterocarpa.*
Umbels arranged in panicles.	
Wings of the fruit only slightly narrowed below; umbels with only 2 or 4 flowers or the flowers frequently solitary; flowers 3 mm. long	2. *B. alata.*
Wings of the fruit considerably narrowed below; umbels containing 5 or 6 flowers; flowers about 1 mm. long	3. *B. megaptera.*
Fruit not winged; the ribs sometimes almost wing-like, but very thick and coriaceous.	
Flowers 5 mm. wide or more; perennials.	
Leaves ovate or oval	21. *B. anisophylla.*
Leaves linear or narrowly lanceolate.	
Margins of the leaves strongly revolute; leaves thick; stamens mostly 5	22. *B. tenuifolia.*
Margins of the leaves not revolute or but slightly so; leaves broader and thin; stamens mostly 3; plants larger and stouter.	
Stems hispid below, glandular above	23. *B. linearifolia.*
Stems glandular-pubescent throughout.	23a. *B. linearifolia glandulosa.*
Flowers less than 5 mm. wide.	
Flowers solitary at the ends of the peduncles; perennials.	
Fruit glabrous; flowers about 1 mm. wide	19. *B. organensis.*
Fruit viscid; flowers from 3 to almost 5 mm. wide	20. *B. gracillima.*
Flowers not solitary at the ends of the branches.	
Flowers umbellate or subumbellate at the ends of the peduncles.	
Fruit glabrous; annuals.	
Fruit subtended by conspicuous, persistent, large bracts; plants glandular	9. *B. purpurascens.*

Bractlets deciduous or very small and inconspicuous; plants very sparingly if at all glandular.
Fruit with 3 or 4 broad, thick, wing-like ridges, the body strongly rugulose; leaves thick, paler below; flowers 1 mm. long, with two or three stamens_____ 4. *B. triquetra.*
Fruit with 5 lower, thick, wing-like ridges; leaves mostly thinner.
Leaves lanceolate.
Flowers 2 or 3 mm. long, solitary or 2 or 3 in a fascicle; leaves brown-dotted; wings of fruit much larger than in members of the *B. erecta* group_____ 5. *B. maculata.*
Flowers about 1.5 mm. long, sessile, collected in small heads; leaves black-dotted; wings of the fruit comparatively thin_____ 6. *B. universitatis.*
Leaves mostly ovate or elliptical, not lanceolate.
Leaves black-dotted beneath, irregularly ovate, acutish, thin; fruit mostly in compound umbels, conspicuously pediceled_____ 7. *B. erecta.*
Leaves not black-dotted beneath.
Plant tall, erect; leaves ovate, acute, wavy-margined; flowers in compound umbels_____ 7a. *B. erecta thornberi.*
Plant low, spreading or ascending; leaves mostly elliptical, obtuse, not wavy-margined; flowers in heads, or in simple but not in compound umbels_____ 8. *B. intermedia.*
Fruit glandular-viscid; perennials.
Fruit scarcely sulcate; clusters at the ends of the peduncles few-flowered; stems almost or quite glabrous; leaves thin, obtuse, usually paler beneath_____ 10. *B. paniculata.*
Fruit more prominently sulcate; clusters at the ends of the peduncles many-flowered.

Fruit obtuse; leaves of about the same color on both surfaces, broadly obtuse at the base; stems or petioles or both hirsute; panicle loosely branched.	
Fruit acutish; leaves paler below, mostly narrowed or cuneate at the base; inflorescence mostly axillary, seldom forming a much-branched panicle.	
Leaves strongly apiculate	12. *B. viscosa apiculata.*
Leaves not strongly apiculate.	
Stems glandular-pubescent; peduncles and pedicels always glandular	12. *B. viscosa.*
Stems almost glabrous, or pulverulent below	12b. *B. viscosa oligadena.*
Flowers forming slender, simple, spike-like racemes, which are usually arranged in panicles; annuals.	
Ribs 4, very acute; bracts large and persistent; fruit very obtuse or truncate above	18. *B. wrightii.*
Ribs 5; fruit never truncate above.	
Ribs of the fruit thick, smooth, obtuse, with very narrow, almost straight channels between them.	
Stamens included; stems very finely puberulent; plant spreading and much branched; leaves thin	13. *B. watsoni.*
Stamens exserted; stems more or less hirsute below, especially in young plants; flowers 2 mm. long or more, forming thicker spikes	14. *B. coulteri.*
Ribs of the fruit thin, acute, rugulose, with wide and shallow spaces between them.	
Stamens included; flowers about 1 mm. long; bracts lanceolate; plant glandular	17. *B. torreyana.*
Stamens exserted.	
Flowers 2 mm. long, conspicuously brown-nerved; stamens 1 or 2; bracts ovate, red-dotted	15. *B. spicata.*

Flowers 3 mm. long or more, white; stamens 2 or 3; bracts narrowly ovate or lanceolate ..... 16. *B. xanti.*

1. **Boerhaavia pterocarpa** S. Wats. Proc. Am. Acad. **17**: 376. 1882.
Type locality, "Apache Pass, Arizona."

Specimens examined:

ARIZONA: Tucson, 1892, *Toumey;* Tucson, 1903 and 1904, *Thornber* 259, 548.
MEXICO: Near Altar, Sonora, 1904, *Griffiths* 6887.

2. **Boerhaavia alata** S. Wats. Proc. Am. Acad. **24**: 69. 1889.

Specimens examined:

MEXICO: Guaymas, 1887, *Palmer* 332, type collection.

A sheet of Palmer's in the herbarium of the University of California and one in the National Herbarium bearing this number contain a very different plant described elsewhere as a new species.

3. **Boerhaavia megaptera** Standley, sp. nov.

Annual; erect, about 30 cm. high; branched from near the base; stems slender, sparingly short-puberulent; leaf blades 20 to 25 mm. long and 8 to 12 mm. wide, narrowly elliptical to almost linear above, of about the same color on both surfaces, rather obtuse or mostly acute at the apex, obtuse at the base; petioles about one-half as long as the blades; branches of the inflorescence alternate, forming a narrow panicle; peduncles 1 cm. long or more, each bearing an umbel of 3 to 5 pedicellate flowers; perianth about 1 mm. long or slightly longer, pinkish; fruit 3.5 mm. long and about 2.5 mm. wide, with 5 thin, broad wings, these only slightly narrowed toward the base and above rounded slightly above the body of the fruit; body and wings glabrous and smooth, not at all rugulose.

The only species with which this is likely to be confused is *B. alata*, from which it may be distinguished by its fruit being acute below, while that of the latter species is only slightly narrowed; by the fact, also, that the fruit is collected in fascicles of 5 or 6 and is on shorter pedicels, and that the flowers of the new species are much smaller. The fruit of the plant might almost place it in Selinocarpus, but the wings, although large, are not membranous as in that genus; the habit and flowers, too, show at once that it is a Boerhaavia rather than a Selinocarpus, for which it has been mistaken. Type in the herbarium of the University of Arizona, collected by Prof. J. J. Thornber on Flattop Mountain, Tucson Mountains, altitude 850 meters, September 8, 1903, no. 162.

4. **Boerhaavia triquetra** S. Wats. Proc. Am. Acad. **24**: 69. 1889.

Specimens examined:

MEXICO: Los Angeles Bay, Lower California, 1887, *Palmer* 521, type collection, and no. 603.

5. **Boerhaavia maculata** Standley, sp. nov.

Annual, erect; stems slender, much branched, minutely puberulent below or mostly glabrous, brown-dotted, not glutinous above; blades lanceolate, about 25 mm. long and 5 mm. wide, acute, rounded at the base, brown-dotted on both surfaces, paler below, mostly glabrous; petioles very short; inflorescence paniculate, much branched; flowers 2 or 3 mm. long, single or 2 or 3 in a fascicle, on

slender pedicels which are 6 mm. long or less; stamens included; fruit narrowly obpyramidal in outline, almost 4 mm. high, truncate above, acute below, with 5 comparatively thin, narrow, transversely wrinkled wings.

Type U. S. National Herbarium no. 22937, cotype in the herbarium of the University of California; collected at Guaymas, Sonora, Mexico, 1887, *Palmer* 332, in part. The type sheet of *B. alata* S. Wats. also bears the same number, but the plant is different, its fruit having thick, corrugated wings, while that of *B. alata* has much wider, thin, and rather membranous wings, which are but little narrowed below. From *B. triquetra* this species is distinguished by its larger fruit, its wider and more numerous wings, and the much narrower spaces between the wings.

On the sheet in the National Herbarium which contains the type is a packet containing fruit which seems not to belong to this plant, and which is probably the fruit of an undescribed species, for it does not seem to agree with that of any plant reported from Guaymas.

6. Boerhaavia universitatis Standley, sp. nov.

Annual erect, branched from near the base; stems with a short, rather pulverulent pubescence on almost every part, slender, conspicuously brown-dotted; leaf blades lanceolate, 20 to 50 mm. long and 5 to 10 mm. wide, acute, rather obtuse at the base, of about the same color on both surfaces, conspicuously black-dotted below; petioles very short; branches of the inflorescence alternate, paniculate, slender; ultimate peduncles 10 to 12 mm. long; flowers almost sessile, in umbels of about 5, whitish, 1.5 mm. long; fruit 2.5 mm. long, very narrowly obpyramidal, with 5 thin, winglike ridges which are truncate above, the body of the fruit rugulose between the wings.

This is nearest *B. intermedia*, from which it differs in its black-dotted leaves and stems, lanceolate leaves, and more distinctly winged fruit. From *B. erecta* it is distinguished by its narrower leaves, by the arrangement of the flowers in umbels, all of the pedicels being attached at the very end of the peduncle instead of at various points near its end, and by its more distinctly winged fruit. Type in the herbarium of the University of Arizona, collected by Thornber, September 2, 1903, on the campus of the university, Tucson, Arizona; altitude 740 meters.

Other specimens examined:

ARIZONA: Corralitas to El Paso, *Thurber* 732; Tucson, 1867, *Palmer* 213.

TEXAS: No locality, 1881, *Havard*; 1849, *Wright* 609. Mexican Boundary Survey 1133, in part.

7. Boerhaavia erecta L. Sp. Pl. 3. 1753.

Type locality, "In Vera Cruce."

An erect annual; stems usually reddish below, simple at the base but branched above, glabrous, or roughened below; leaf blades oblong-ovate, mostly obtuse or acutish, 30 or 40 mm. long and 25 mm. wide, rounded or broadly cuneate at the base, glabrous, paler beneath, black-dotted on the lower surface, the upper blades narrower and more acute; inflorescence dichotomously paniculate-branched; flowers about 1 mm. long, the perianth sparingly hispid; stamens exserted; fruit in clusters of 3 to 6 at the ends of the slender peduncles, the pedicels not attached at the very end of the peduncle, but at various points near the end, each fruit on a pedicel as long as itself or shorter; fruit 3 or 4 mm. long, narrow, truncate above, narrowly obpyramidal, with 5 ridges which are low but distinct, the spaces between them more or less rugulose; fruit usually green.

Specimens examined:

MEXICO: Coast south of Pescadero, Baja California, 1893, *Brandegee;* Culiacan, Sinaloa, 1904, *Brandegee;* Zacuapan, Vera Cruz, 1906, *Purpus* 1929; Yucatan, 1895, *Gaumer* 361; Yucatan, 1896, *Valdez* 91; Acapulco, 1894–95, *Palmer* 309, in part; San José del Cabo, Baja California, 1890, *Brandegee* 485; Guaymas, 1887, *Palmer* 182; Cape Region, Baja California, 1899, *Brandegee;* Monterey, 1902, *Pringle* 11139; Manzanillo, 1890, *Palmer* 907.

ARIZONA: Beaver Creek, 1883, *Rusby* 791; Plants of the Hopis, *Millspaugh* 214; Ehrenberg, 1902, *Mrs. F. Stephens;* Oracle, 1905, *Thornber.*

COLORADO: *E. Hall,* without locality, the label probably wrong.

FLORIDA: Jacksonville, 1894, *Curtiss* 5115; Eustis, 1894, *Nash* 973; Apalachicola, 1888, Chapman Herbarium 1638b; Myers, 1900, *Hitchcock;* South Jacksonville, 1895, *Lightpipe* 414; Sarasota Bay, 1890, *J. H. Simpson* 89; Key West, 1874, *Palmer* 455.

ALABAMA: Auburn, 1897, *Earl & Baker.*

MISSISSIPPI: 1880, *Langlois;* Biloxi, 1900, *Tracy* 6891; Ocean Springs, 1895, *Skehan.*

GEORGIA: Albany, 1895, *Small.*

SOUTH CAROLINA: Aiken, 1869, H. R[avenel]. (National Herbarium).

ARKANSAS: Fulton, 1900, *Bush* 1060.

LOUISIANA: *Hale,* without locality; Lake Charles, 1899, *Mackenzie* 501.

TEXAS: Bracken, Comal County, 1903, *Groth* 157; Dallas, 1879, *Reverchon;* Galveston Island, 1901, *Tracy* 7663; Waco, *L. Pace* 38; Dallas, 1899, *Eggert;* Graniteville, 1899, *Eggert;* Palestine, 1899, *Eggert;* White Hall, Grimes County, 1888, *Pammel;* Dallas County, 1877, *Reverchon* 792; Columbia, 1900, *Bush* 1457; San Antonio, 1898, *E. H. Wilkinson* 198; Houston, 1899, *Bush* 258; near San Antonio, 1900, *Eggert;* Rusk County, *Vinzent* 67; Austin, *J. F. Joor;* Bexar County, *Jermy* 57, 112; Hempstead, 1894, *Thurow* 7.

NICARAGUA: Asseradores Island, Chinandega, 1903, *Baker* 2134.

VENEZUELA: Island of Margarita, 1901, *Miller & Johnston.*

COLOMBIA: Santa Marta, 1898–1901, *H. H. Smith.*

GUATEMALA: Puerto Barrios, 1905, *Pittier* 381; Moran, Departmento Amatitlan, 1905, *Kellerman* 4535.

WEST INDIES: Martinique, 1892, *Duss* 2175; Guadeloupe, 1892, *Duss* 2175; St. Croix, Danish West Indies, 1896, *Ricksecker* 401; Coamo Springs, Porto Rico, 1902, *Heller* 6107.

7a. **Boerhaavia erecta thornberi** (Jones) Standley.

Boerhaavia thornberi Jones, Contr. Western Bot. **12**: 72. 1908.

This is scarcely separable from *B. erecta,* as a species at least. The plant is erect and rather more slender than the species, and its leaves are without black dots beneath. Aside from these minor differences there seems to be little variation from typical *B. erecta.*

Specimens examined:

ARIZONA: Tucson, 1903, *Thornber* 10, type; Tucson, 1903, *Thornber* 339; Fort Huachuca, 1894, *Wilcox* 321; Beaver Creek, 1883, *Rusby;* Rincon Mountains, 1891, *Nealley* 145.

MEXICO: Guadalupe Canyon, Sonora, 1893, *E. C. Merton* 2045.

Wright 1724, 1720 in National Herbarium.

Metcalfe's 787 from Mangas Springs, New Mexico, is probably a slender and depauperate form of this variety; another plant from the same locality, 1897, J. G. Smith 26, is even more depauperate and has brown-dotted leaves, thus connecting the variety directly with *B. erecta*.

8. **Boerhaavia intermedia** Jones, Contr. Western Bot. **10**: 41. 1902.

Specimens examined:

TEXAS: El Paso, 1883, *Jones* 4173, type collection; Chenate Mountains, 1889, *Nealley* 257; canyon west of Tarlinga, 1883, *Havard;* Presidio, *Trelease* 358a.

MEXICO: Hills near Chihuahua, 1886, *Pringle.*

NEW MEXICO: Organ Mountains, 1895, *Wooton;* Mesilla Valley, 1907, *Standley;* plains of the Rio Gila, 1880, *Greene* 278.

ARIZONA: Tempe, 1901, *Kearney* 135; foothills of the Santa Catalina Mountains, 1881, *Pringle;* ?Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* Tucson Mountains, 1903, *Thornber* 161; ?Antelope, 1902, *Purpus* 83.

CALIFORNIA: Southwestern part of the Colorado Desert, San Diego County, 1890, *Orcutt* 2090.

9. **Boerhaavia purpurascens** A. Gray, Am. Journ. Sci. II. **15**: 321. 1853.

Specimens examined:

NEW MEXICO: Copper Mines, 1851–52, *Wright* 1725, type collection; Carlisle, 1902, *Wooton;* Mogollon Mountains, 1880, *Rusby* 352; banks of the Gila, *Greene;* Mogollon Mountains, 1881, *Rusby* 7018; east fork of the Rio Gila, 1900, *Wooton.*

ARIZONA: Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* Fort Whipple, 1865, *Coues & Palmer* 433; Fort Huachuca, 1894, *Wilcox.*

MEXICO: Near Chihuahua, 1887, *Palmer* 1582; ?Copradia, 1904, *Brandegee;* Guadalupe Canyon, Sonora, 1893, *E. C. Merton* 2044.

10. **Boerhaavia paniculata** L. C. Rich. Act. Soc. Hist. Nat. Par. 1: 105. 1792.

Specimens examined:

FLORIDA: Eustis, 1894, *Nash* 974; Key West, 1874, *Palmer;* Punta Rossa, 1900, *Hitchcock* 284; Soldiers Key, 1904, *Britton* 333; Eustis, 1894, *Hitchcock;* Key West, 1904, *Lansing* 2078; Newport, Key Largo, 1898, *Pollard, Collins & Morris* 176; Miami, 1877, *Garber;* Sanibel Island, 1901, *Tracy* 7664.

WEST INDIES: Cieneguito, Cuba, 1895, *Rob Combs* 104; Santiago, Cuba, 1902, *Palmer* 370; Nueva Gerona, Isla de Pinos, 1904, *Curtiss* 359; Jamaica, 1892, *Lloyd* 1099; Martinique, *Duss* 2174; Guadeloupe, 1892, *Duss* 2174.

VENEZUELA: Island of Margarita, 1901, *Miller & Johnston* 203.

NORTH CAROLINA: "In oriente Carolina Septentrionali, locis navalibus," 1885, *G. McCarthy* 169.

11. **Boerhaavia hirsuta** Willd. Phyt. 1. 1794.

Specimens examined:

FLORIDA: Manatee County, 1887, *J. I. Rothrock.*

WEST INDIES: El Cobre, Cuba, 1902, *Pollard & Palmer* 395; Santiago de las Vegas, Cuba, 1904, *Wilson* 1147; ?Coamo circa Salinas, Porto Rico, *Sintenis* 3293; Grand Cayman, 1891, *Hitchcock;* Bassin, Danish West Indies, 1897, *Mrs. J. J. Ricksecker.*

NEW MEXICO: Gila Valley, 1880, *Greene*.

TEXAS: Brownsville, 1895, *Townsend* 29; Victoria, 1900, *Eggert;* 1844, *Lindheimer* 294.

ARIZONA: 1881, *Pringle;* Little Meadows, 1902, *Mrs. F. Stephens;* Santa Catalina Mountains, 1894, *Toumey;* Tucson, 1892, *Toumey* 473.

CALIFORNIA: ? Middle Tule River, 1897, *Purpus* 5009; base of San Jacinto Mountains, 1881, *Parish* 590; San Jacinto Plains, 1892, *Hasse*.

MEXICO: Torreon, Coahuila, 1898, *Palmer* 487; Durango, 1896, *Palmer* 299; Palm Valley, Lower California, 1883, *Orcutt;* Socorro Island, 1903, *Barkelew* 205; San Gregorio, Lower California, 1889, *Brandegee;* Patrocinia, Lower California, 1889, *Brandegee;* Comondu, Lower California, 1889, *Brandegee;* Hermosillo, Sonora, 1892, *Brandegee;* ? Yucatan, 1895, *Gaumer* 309; San José del Cabo, Lower California, 1897, *Anthony* 356; near San Pablo, 1847, *Gregg* 542.

12. **Boerhaavia viscosa** Lag. & Rodr. Anal. Ciene. Nat. **4**: 256. 1801.

Specimens examined:

MEXICO: Durango, 1896, *Palmer* 300; Valley of Cuantla, Morelos, 1901, *Pringle* 9308; Acaponeta, Tepic, 1895, *F. H. Lamb* 528; near Chuichupa, Chihuahua, 1899, *Barber & Townsend* 408; Oaxaca Valley, Oaxaca, 1894, *C. L. Smith* 774; San José del Cabo, Lower California, 1890, *Brandegee* 486; Oaxaca, 1900, *C. C. Deam;* near Yautepec, Morelos, 1904, *Pringle* 13177; environs de Mexico, *Berlandier* 577; Acapulco, 1894–95, *Palmer* 308; near City of Mexico, 1849, *Gregg* 615.

NEW MEXICO: ? Florida Mountains, 1895, *Mulford* 1094.

12a. **Boerhaavia viscosa apiculata** Standley, subsp. nov.

Perennial, ascending; stems slender, minutely and sparsely puberulent throughout, slightly glandular above, the stem appearing glabrous to the naked eye; internodes long, 8 to 12 cm.; leaf blades broadly ovate, obtuse at the apex and conspicuously apiculate, broadly rounded at the base; petioles about one-half as long as the blades; branches of the inflorescence very slender, forming a narrow, mostly alternately branched panicle; fruit like that of the species.

Type collected at Copradia, near Culiacan, Sinaloa, Mexico, October 20, 1904, *Brandegee* (in the herbarium of the University of California).

12b. **Boerhaavia viscosa oligadena** Heimerl, Ann. Cons. et. Jard. Genev. **5**: 189. 1901.

Boerhaavia ramulosa Jones, Contr. Western Bot. **10**: 40. 1902.

This differs from *B. viscosa* in the following particulars: The stems are not glandular below but have a short, scattered, appressed, almost pulverulent pubescence; the petioles and the branches of the inflorescence, especially the pedicels, have a short, close, glandular pubescence. The variety is founded on two sheets, one collected in the Organ Mountains, New Mexico, 1897, *Wooton* 421; the other collected on Perico Island, Florida, 1900, *Tracy* 6654. The two plants, although widely separated geographically, appear to be the same in all essential characters.

Specimens examined:

FLORIDA: Tampa, 1895, *Nash* 2466; Sarasota, 1876, *Garber;* Caloosa, 1878, *Garber;* southern Florida, Chapman Herbarium; Marco, 1900, *Hitchcock* 283; Florida, 1842–49, *F. Rugel* 286; Perico Island (see notes above).

PORTO RICO: Two miles west of Ponce, 1902, *Heller* 6220.

TEXAS: Corpus Christi, 1894, *Heller* 1792; San Antonio, *E. H. Wilkinson* 129a; Austin, 1872, *E. Hall* 532; Austin, 1884, *Joor;* San Antonio, 1900, *Eggert;* Waco, 1904, *L. Pace;* Laredo, 1899, *Mackenzie* 47; El Paso, 1885, *Jones*, type collection of *B. ramulosa.*

NEW MEXICO: Mangas Springs, 1903, *Metcalfe* 808; Byer's Spring, 1895, *Mulford* 1035; Organ Mountains, 1894, and several other dates, *Wooton;* south end of the Black Range, 1904, *Metcalfe;* Organ Mountains (see notes above).

ARIZONA: Santa Cruz Valley near Tucson, 1881, *Pringle;* Galluno Mountains, 1894, *Toumey;* Tucson, 1880, *Engelmann;* foothills of the Tucson Mountains, 1901, *Thornber;* Tucson, 1892, *Toumey;* Fort Chittenden to Patagonia, 1903, *Griffiths* 6120; Mexican boundary line south of Bisbee, 1892, *Mearns* 938; Santa Catalina Mountains, 1883, *Lemmon;* Fort Huachuca, 1891, *Wilcox.*

13. **Boerhaavia watsoni** Standley, sp. nov.

Boerhaavia spicata palmeri S. Wats. Proc. Am. Acad. **24:** 70. 1889, not *B. palmeri* S. Wats. loc. cit.

Specimens examined:

MEXICO: Guaymas, 1887, *Palmer* 141, type collection; Sonora, *Thurber* 992.

CALIFORNIA: Santa Catalina Mission, 1889, *Orcutt.*

These Arizona collections are of rather doubtful determination; they seem to have the small flowers, included stamens, and slender spikes of *B. watsoni,* yet their localities should place them rather with *B. coulteri:*

ARIZONA: Tucson, 1896, *Toumey;* Oak Creek, 1903, *Purpus* 8243; Wilmot, 1903, *Thornber* 137; Tucson, *Thornber* 338; Cochise, 1900, *Griffiths* 1911; Camp Verde, 1891, *Toumey;* Fort Verde, 1891, *MacDougal;* Arizona, 1889, *Vasey.*

The following are referred here because of their fruit; they are considerably more viscid than the type:

ARIZONA: Small range reserve near Tucson, 1903, *Griffiths* 6161; fenced area, Santa Rita Forest Reserve, 1903, *Griffiths* 5088.

14. **Boerhaavia coulteri** (Hook.) S. Wats. Proc. Am. Acad. **24:** 70. 1889.

Senkenbergia coulteri Hook. f. in Benth. & Hook. Gen. Pl. **3:** 6. 1880.

The following should probably be included in this species according to Doctor Watson's interpretation; they differ only slightly from his description of the type, which I have not seen:

ARIZONA: Foothills of the Santa Catalina Mountains, 1881, *Pringle;* Rincon Mountains, 1894, *Toumey;* Mexican Boundary Survey, *Schott.*

15. **Boerhaavia spicata** Choisy in DC. Prod. **13**[2]: 456. 1849.

Type locality, Mexico.

Of this species, so well discussed by Doctor Watson,[a] who had seen a portion of the type material, I have seen only one sheet of whose identity it is possible to feel at all certain, one collected at Culiacan, Sinaloa, Mexico, August 20, 1904, *Brandegee.*

16. **Boerhaavia xanti** S. Wats. Proc. Am. Acad. **24:** 69. 1889.

Type locality, "Cape Saint Lucas" (Mexico).

Specimens examined:

MEXICO: Guaymas, 1887, *Palmer* 681; San José del Cabo, Lower California, 1890, *Brandegee* 484; Binorama (Cape Region, Lower California), 1899, *Brandegee.*

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[a] Proc. Am. Acad. **24:** 70. 1889.

17. Boerhaavia torreyana (S. Wats.) Standley.

Boerhaavia spicata torreyana S. Wats. Proc. Am. Acad. **24**: 70. 1889.

No type locality was mentioned in the original description and no type specimen. The range of the variety was given as "Texas, New Mexico, and Arizona." The plant is more glandular than *B. coulteri*, and is a stouter plant with thicker and glandular leaves.

Specimens examined:

NEW MEXICO: Albuquerque, 1884, *Jones* 4131; near Silver City, 1880, *Greene;* Tortugas Mountain, near Las Cruces, 1902, *Metcalfe;* Florida Mountains, 1895, *Mulford* 1007; south of the White Sands, 1897, *Wooton* 407; Deming, 1895, *Mulford* 1034; near Las Cruces, 1906, *Standley;* Chama River, 1904, *Wooton* 2824; near McCarty's Ranch, 1880, *Rusby* 357; Las Cruces, 1881, *Vasey.*

ARIZONA: Holbrook, 1896, *Myrtle Zuck;* northeastern Arizona, 1896, *Hough* 10; Fort Huachuca, 1894, *Wilcox* 290.

TEXAS: Tornillo Creek, 1883, *Havard* 63, in part; Hueco Tanks, 1895, *Mulford* 127; Presidio, *Trelease* 358.

The following sheets are doubtful, but should probably be referred here:

NEW MEXICO: Florida Mountains, 1895, *Mulford* 1115.

ARIZONA: Beaver Creek, 1183, *Rusby.*

MEXICO: Torreon, Coahuila, 1898, *Palmer* 488.

18. Boerhaavia wrightii A. Gray, Am. Journ. Sci. II. **15**: 322. 1853.

Boerhaavia bracteosa S. Wats. Proc. Am. Acad. **20**: 370. 1885.

Specimens examined:

TEXAS: *Wright* 610, type collection; El Paso to Monument 53, 1892, *F. Wagner* 987, a form with linear or narrowly lanceolate leaves; near Great Canyon of the Rio Grande, 1883, *Havard* 62, type collection of *B. bracteosa.*

NEW MEXICO: Mesa west of the Organ Mountains, 1904, *Wooton;* near Las Cruces, 1895, *Wooton.*

ARIZONA: Cienega, 1874, *Rothrock* 570; Grand Canyon, 1901, *Leiberg* 5933; Arizona, 1885, *Jones.*

NEVADA: Wheeler's Expedition 1872.

19. Boerhaavia organensis Standley, sp. nov.

Annual ?, low, 20 to 25 cm. high, branched from the base; stems minutely puberulent below, glutinous above; blades 2 cm. long or less, elliptical to lanceolate, thick, glabrous, paler below, rather obtuse at both ends, the petioles short and thick; inflorescence diffusely paniculate, the branches rather stouter than in *B. gracillima;* flowers solitary on filiform pedicels which vary in length from 1 cm. to shorter than the flower; no very good flowers on the type but those present about 1 mm. long, each subtended by a short, lanceolate bract; fruit glabrous, 3 mm. long and about 2 mm. wide, the ribs rather acute, much wider above than below, almost truncate above, the ribs rugulose.

This is nearest *B. gracillima*, from which it differs in the smaller size of the plant, less diffuse panicles, much smaller flowers, and the glabrous fruit of different form. Type in the herbarium of the New Mexico Agricultural College, collected in Filmore Canyon, Organ Mountains, New Mexico, October 23, 1904, *Wooton. B. gracillima* is common in the same locality.

20. **Boerhaavia gracillima** Heimerl, Bot. Jahrb. 11: 86. 1889.

Boerhaavia anisophylla paniculata Coulter, Contr. Nat. Herb. 2: 356. 1894.

Specimens examined:

MEXICO: Near Chihuahua, 1885, *Pringle* 665, type collection; Durango, 1896, *Palmer* 629; Sierra Madre, Chihuahua, *Townsend & Barber* 379; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1436; San José del Cabo, Lower California, 1890, *Brandegee* 487; Mountains of Cosihuiriachi, 1846, *Wislizenus* 174.

NEW MEXICO: Organ Mountains, 1904, *Wooton;* same locality, 1897, *Wooton* 462, and several other collections.

TEXAS: El Paso, 1884, *Jones* 4215; canyon near Van Horn, 1900, *Eggert;* Chenate Mountains, 1889, *Nealley* 405, type of *B. anisophylla paniculata;* Presidio de Rio Grande, Mexican Boundary Survey 1135a.

20a. **Boerhaavia gracillima decalvata** Heimerl, subsp. nov.

Plant erect, branched; stems glabrous throughout; leaf blades oval or ovate, thick, glabrous, whitish beneath, obtuse, broadly rounded at the base; flowers single on pedicels 5 mm. long, 1 or 2 bractlets at the base of each flower but soon deciduous; flowers 9 mm. broad; fruit clavate, obtuse, with 5 rather thin ribs, glabrous.

This differs from the species in its glabrous fruit and larger flowers. Type U. S. National Herbarium no. 148477, collected at Bone Spring, western Texas, 1883, *Havard* 59.

21. **Boerhaavia anisophylla** Torr. Bot. Mex. Bound. 171. 1858.

Specimens examined:

———, Mexican Boundary Survey 1135, type collection.

TEXAS: Tornillo Creek, 1883, *Havard* 63, in part.

MEXICO: Santa Eulalia Mountains, Chihuahua, 1885, *Pringle* 685; Saltillo, Coahuila, 1898, *Palmer* 156; Mesillas to Saltillo, 1848, *Gregg* 533; west of Cerralvo, 1847, *Gregg* 829.

Doctor Heimerl[a] describes a new variety of this species, *B. anisophylla micrantha* from Mexico. I have seen nothing which answers to his description.

22. **Boerhaavia tenuifolia** A. Gray; Coulter, Contr. Nat. Herb. 2: 355. 1804.

This is probably *B. linearifolia glabrata* A. Gray, Am. Journ. Sci. II. 15: 322. 1853, but it is impossible to be certain, for the reason that no type was mentioned in the original description of that variety.

Specimens examined:

TEXAS: Camp Charlotte, 1889, *Nealley* 407, type ?; mouth of the Rio Pecos, 1883, *Havard* 64; near Alamo de Cesario, 1883, *Havard* 65.

NEW MEXICO: Thirty-five miles west of Roswell, 1900, *Earle* 379.

23. **Boerhaavia linearifolia** A. Gray, Am. Journ. Sci. II. 15: 322. 1853.

I do not believe that the difference in size of flowers is a reliable means of distinguishing this from the preceding species; there does not seem to be any remarkable difference in size judging from type material of both species.

Specimens examined:

TEXAS: *Wright* 608, 1724, type collections; Kerrville, 1894, *Heller* 1849; Upper Llano, 1884, *Reverchon* 1357; Mexican Boundary Survey, 1132; Llano, 1899, *Bray* 334; Big Springs, 1902, *Tracy* 8074; Knickerbocker Ranch, Tom Green County, 1880, *Tweedy* 90.

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[a] Ann. Cons. et Jard. Genev. 5: 187.

23a. **Boerhaavia linearifolia glandulosa** Standley, subsp. nov.

Perennial from a woody root; stems prostrate, branched, spreading, glandular-pubescent below, glandular above; leaves lanceolate, thin, green on both surfaces, black-dotted below, short-petioled; flowers larger than those of *B. linearifolia* or *B. tenuifolia*, stamens 3.

Type in the herbarium of the Missouri Botanical Garden, collected in Texas by Lindheimer in 1846, no. 510, as well as several other numbers of various years' collections. Also collected in southwestern Texas by Reverchon (no. 126). This is the only form belonging to this group that I have seen with glandular hairs on the lower part of the stem; the plant, too, is larger and more robust than the species; it may be specifically distinct.

The writer has seen representatives of all of the North American species of Boerhaavia except the following:

BOERHAAVIA PALMERI S. Wats. Proc. Am. Acad. **24**: 69. 1889.
Type locality, "Dry sandy soil near Guaymas" (Mexico).
Collected 1887, *Palmer* 683.

BOERHAAVIA ALAMOSANA Rose, Contr. Nat. Herb. **1**: 110. 1891.
Type locality, "Hillside about Alamos" (Mexico).
Collected 1890, *Palmer* 714.

BOERHAAVIA SONORAE Rose, Contr. Nat. Herb. **1**: 110. 1891.
Type locality, "Along watercourses near Alamos."
Collected 1890, *Palmer* 715.

16. SELINOCARPUS A. Gray.

Selinocarpus A. Gray, Am. Journ. Sci. II. **15**: 262. 1853.

Perennial herbs or sometimes somewhat shrubby plants, ascending, erect, or prostrate; leaves opposite, often unequal, sessile or petioled, entire, thick and sometimes fleshy; flowers solitary in the axils of the leaves or clustered at the ends of the branches; bracts when present, small and inconspicuous; calyx funnelform, with a short and thick or long and slender tube which expands into a spreading limb; stamens 2 to 5, exserted; fruit with 3 to 5 prominent, membranous wings.

KEY TO THE SPECIES.

Flowers 10 mm. or less in length, with scarcely any tube.
- Leaves linear or very narrowly elliptical ..... 5. *S. angustifolius.*
- Leaves broadly ovate ..... 6. *S. chenopodioides.*

Flowers 15 mm. or more in length, with a conspicuous tube (the flowers sometimes cleistogamous).
- Leaves linear or very narrowly elliptical ..... 1. *S. palmeri.*
- Leaves neither linear nor very narrowly elliptical.
  - Leaves lanceolate, very thick and fleshy ..... 2. *S. lanceolatus.*
  - Leaves mostly ovate, not fleshy.
    - Upper leaves mostly small and bract-like, scattered; stems much branched, 30 cm. or less in height ..... 3. *S. parvifolius.*
    - Upper leaves not reduced; stems rather densely leafy, less branched, and lower. 4. *S. diffusus.*

1. Selinocarpus lanceolatus Wooton, Bull. Torr. Club **25**: 304. 1898.

Specimens examined:

NEW MEXICO: White Sands, 1897, *Wooton* 389, type; near El Rito, 1880, *Rusby* 357; White Sands, 1899, *Wooton;* near Suwanee, 1906, *Wooton.*

2. Selinocarpus palmeri Hemsl. Biol. Centr. Am. 3: 6. 1882.

The leaves of this plant are much like those of *S. angustifolius*, but are covered with a close, appressed, whitish pubescence; young branches glabrous; flowers funnelform, the perianth about 15 mm. long and 11 mm. wide, gradually widening from the base upward; stamens much exserted; leaves on the young branches linear, thick, 25 mm. long.

Specimens examined:

MEXICO: San Lorenzo de Laguna, Coahuila, 1880, *Palmer* 1119.

3. Selinocarpus parvifolius (Torr.) Standley.

Selinocarpus diffusus parvifolius Torr. Bot. Mex. Bound. 168. 1858.

Specimens examined:

TEXAS: Presidio del Norte, Mexican Boundary Survey 1105, type collection; Presidio, 1881, *Havard;* Bone Spring, and Tornillo Creek, 1883, *Havard.*

4. Selinocarpus diffusus A. Gray, Am. Journ. Sci. II. 15: 262. 1853.

Specimens examined:

TEXAS: Rock hills from the Pecos to the Limpio, *Wright* 1708, type collection; 5 miles east of Estelline, 1904, *Reverchon* 4283; Estelline, 1903, *Reverchon* 3685; Big Springs, 1902, *Tracy* 8313.

NEW MEXICO: Delaware Creek, 1893, *Nealley* 10; south of Carrizozo, 1904, *Wooton* 2821; Acoma, 1884, *Lemmon.*

The flowers of this species are often cleistogamous, but on specimens of the species proper fully developed flowers can almost always be found.

4a. Selinocarpus diffusus nevadensis Standley, subsp. nov.

Leaves ovate, 15 to 18 mm. long and about 13 mm. wide, broadly obtuse, often mucronate, rounded or truncate at the base, their margins entire and smooth, the blades thickish, puberulent or often glabrous above; flowers all cleistogamous.

This form differs from the species in its broader and more obtuse leaves with entire margins; the leaves are also a bright yellowish-green in color; the flowers seem to be always precociously fertilized. The plant is readily distinguished by its general appearance and is probably a good species, but the differences are difficult of definition.

Type U. S. National Herbarium no. 23012, collected at Overton, Lincoln County, Nevada, 1891, *Vernon Bailey* 1932.

Other specimens examined:

NEVADA: Muddy Valley, 1906, *Kennedy & Goodding* 5; Moapa, 1905, *Kennedy* 1085.

UTAH: Southern Utah, 1876, *C. E. Johnson;* southern Utah, 1877, *Palmer* 402; southern Utah, 1874, *Parry* 213.

5. Selinocarpus angustifolius Torr. Bot. Mex. Bound. 170. 1858.

Specimens examined:

TEXAS: Mexican Boundary Survey 1129, type collection; Chenate Mountains, 1899, *Nealley* 457.

MEXICO: Viesca, Coahuila, 1905, *Purpus* 1054; Mesillas near Saltillo, 1848, *Gregg* 535.

6. Selinocarpus chenopodioides A. Gray, Am. Journ. Sci. II. 15: 262. 1853.

Specimens examined:

TEXAS: Gravelly hills, El Paso, etc., *Wright* 1707, type collection; El Paso, 1881, *Vasey;* El Paso, 1885, *Pringle;* El Paso, 1884, *Jones* 4214; Chenate Mountains, 1889, *Nealley* 458; J. Davis's Ranch, 1883, *Havard.*

NEW MEXICO: Socorro, 1881, *Vasey;* Boundary Monument 6 to Monument 12, 1892, *F. Wagner* 960; near Belen, 1880, *Rusby* 356; Mesilla Valley, 1906, *Standley;* plains south of the White Sands, 1897, *Wooton* 408; Tortugas Mountain, 1902, *Wooton;* Albuquerque, 1894, *Herrick;* Organ Mountains, 1902, *Wooton;* Rio Grande 40 miles above Rincon, 1904, *Metcalfe.*

ARIZONA: Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* near Duncan, 1900, *A. Davidson.*

MEXICO: Plains near Chihuahua, 1885, *Pringle* 652; Ciudad Juarez, 1902, *Pringle* 11143.