

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF
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NEW SERIES.—LXVIII.

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of the pedicels is frequent in the genus and at least until other more convincing differences are found this plant of Friedrichsthal may be provisionally placed as

B. KELLERMANII, forma **podocephala**, forma nov., formae typicae simillima differt capitulis graciliter pedicellatis; pedicellis 3-10(-20) mm. longis erectis vel adscendentibus.—GUATEMALA: *Friedrichsthal* (K., phot. and fragm. Gr.).

II. STUDIES IN THE BORAGINACEAE.

BY I. M. JOHNSTON

1. RESTORATION OF THE GENUS HACKELIA.

As currently taken the genus *Lappula* is composed of two sharply differentiated groups. It is here proposed that the perennial and biennial species with pyramidal gynobase be segregated to form the genus *Hackelia*, while the annual species with subulate gynobase be left to constitute the genus *Lappula*. The very important characters which separate these very distinct genera may be realized by a study of the following contrast.

LAPPULA. Annual; inflorescence abundantly bracteate; pedicels erect; gynobase subulate, 5-10 times as tall as broad, about equaling the nutlets; style surpassing the nutlets; nutlets narrowly attached all along the well developed medial ventral keel.

HACKELIA. Biennial or perennial; inflorescence naked or rarely sparsely bracteate; pedicels recurved or deflexed in fruit; gynobase pyramidal, less tall than broad; style definitely surpassed by nutlets; nutlets attached by a large oblique submedial ovate or deltoid areola; ventral keel extending over only upper half of nutlet.

As usually taken *Lappula* has been an unnatural aggregate formed of two groups whose structures are so different that it seems improbable that the groups are immediately related. The species which I have referred to *Hackelia* do not find their nearest relations among the species of true *Lappula*, but rather among the species in section *Coloboma* of *Eritrichium*. Indeed so close and unmistakable are the relations between *Hackelia* and *Eritrichium* that with much justification the two genera might be merged. On the other hand *Hackelia* has been referred to *Lappula* only because the species in both genera have glochidiate bristles on the dorsal rim of the nutlets, and despite the fact that the species of the two groups differ markedly in habit and in a number of fundamental characters. As both *Lappula* and

Hackelia have in all probability evolved from the *Cynoglosseae* where glochidiate bristles are common as carpel appendages, it must be evident that the presence of barbed appendages is only of general phylogenetic significance and not a safe criterion upon which to judge immediate relationships.

Hackelia and *Lappula* differ in the manner by which the nutlets are attached to the gynobase. Among the borages this correctly has been considered of fundamental importance. In the characters of gynobase and nutlets *Hackelia* is almost exactly matched by developments in *Eritrichium* § *Coloboma*, for many species of that section approximate upon a reduced scale the characteristic habit of *Hackelia*, while furthermore some species, such as *E. strictum* Decne., *E. pectinatum* (Pall.) A.DC., etc., have the tothing on the dorsal margining of the nutlet tipped by subulate barbed prolongations.

Although approaching one another closely *Hackelia* and *Eritrichium* seem readily distinguished by habit, the former being rank-growing green biennials or perennials with broad thin leaves and stems 2-10 dm. high, whereas *Eritrichium* contains low, canescent or silvery, strongly rooted, caespitose plants with small firm leaves and stems 1-20 cm. high. The dorsal margining of the nutlets in *Hackelia* is usually broken up into flattened subulate glochidiate appendages, but in *Eritrichium* the margin is entire or merely dentate and usually without glochids. The only invariably diagnostic character by which the two genera can be separated is that found in the direction of the fruiting pedicels; in *Hackelia* the pedicels are recurved or reflexed in fruit whereas in *Eritrichium* they are always erect or nearly so. *Hackelia* centers in western North America and has outlying species in the Andes and Himalayas, and in central Europe, eastern United States, and Mexico. *Eritrichium* centers in Asia, but has an arctic series of species occurring at high latitudes or altitudes in Europe and North America.

The genus *Hackelia* was published for Opiz by Berchtold in the latter's "Oekonomisch-technische Flora Böhmens." The genus was separated from *Echinospermum* for reasons unstated, but evidently not because of the characters stressed now in resurrecting it, for although *H. deflexa* was the only species fully described under the genus, there were eight of Ledebour's species, all true *Lappulas*, referred to it in a footnote. The characteristic areola and attachment of the nutlets are described in the lengthy specific diagnosis of *H. deflexa*, but in the generic description the style and the attachment of the nutlets are described but vaguely, and in similar terms as in the

generic description of *Echinosperrum* a few pages further on. *Hackelia deflexa* (Wahl.) Opiz, being the first species given under *Hackelia* and the only one treated with any detail, it is taken as constituting the type of the genus as here redefined. The species referable to *Hackelia* are as follows:—

✓ **HACKELIA DEFLEXA** (Wahl.) Opiz in Bercht. Fl. Böhm. ii, pt. 2, 147 (1839). *Myosotis deflexa* Wahl. Vet. Acad. Handl. Stockholm, xxxi. 113, t. 4 (1810). *Echinosperrum deflexum* Lehm. Asperif. i. 120 (1818). *Rochelia deflexa* R. & S. Syst. iv. 109 (1819). *Cynoglossum deflexum* Roth, Enum. i. 589 (1827). *Lappula deflexa* Greene, Pittonia ii. 182 (1891). *Echinosperrum deflexum*, var. *americanum* Gray, Proc. Am. Acad. xvii. 224 (1882). *Lappula deflexa*, var. *americana* Greene, l. c. 183. *L. americana* Rydb. Bull. Torr. Cl. xxiv. 294 (1897).

✓ **H. virginiana** (L.), comb. nov. *Myosotis virginiana* L. Sp. Pl. 131 (1753). *Echinosperrum virginicum* Lehm. Asperif. i. 117 (1818). *Rochelia virginiana* R. & S. Syst. iv. 108 (1819). *Lappula virginiana* Greene, Pittonia ii. 182 (1891). *Cynoglossum Morisoni* A.DC. Prodr. x. 155 (1846).

✓ **H. pinetorum** (Greene), comb. nov. *Echinosperrum pinetorum* Greene in Gray, Proc. Am. Acad. xvii. 224 (1882). *Lappula pinetorum* Greene, Pittonia ii. 182 (1891). *L. pustulata* Macbr. Contr. Gray Herb. xlviii. 39 (1916). *L. heliocarpa* Brand in Fedde, Repert. xviii. 310 (1922).

3454 **H. Roylei** (Wall.), comb. nov. *Cynoglossum Roylei* Wall. in Don, Gen. Syst. iv. 356 (1838). *C. laxum* Don, l. c. *Lappula laxa* Macbr. Proc. Am. Acad. li. 543 (1916). *C. uncinatum* Royle, acc. to Benth. in Royle, Ill. 305 (1839). *C. glochidiatum* Wall. acc. to Benth. in Royle, l. c. 306. *Echinosperrum glochidiatum* A.DC. Prodr. x. 136 (1846). *Paracaryum glochidiatum* Benth. in Hook Fl. Brit. Ind. iv. 161 (1883). *L. glochidiata* Brand in Fedde, Repert. xiv. 146 (1915).

H. macrophylla (Brand), comb. nov. *Lappula macrophylla* Brand in Fedde, Repert. xiv. 147 (1915). *Cynoglossum uncinatum*, var. *laxiflora* Benth. in Royle, Ill. 305 (1839). *Echinosperrum glochidiatum*, var. *laxiflorum* A.DC. Prodr. x. 136 (1846).—From their descriptions this and the next species seem scarcely distinct from the preceding one.

H. Dielsii (Brand), comb. nov. *Lappula Dielsii* Brand in Fedde, Repert. xiv. 147 (1915).

H. revoluta (R. & P.), comb. nov. *Cynoglossum revolutum* R. & P. Fl. Peruv. ii. 6 (1799). *Lappula revoluta* Brand in Fedde, Repert.

xiv. 148 (1915). *C. ovatifolium* Griesb. Götting. Abhandl. xxiv. 271 (1879). *L. revoluta*, f. *ovatifolia* Brand, l. c. *C. parviflorum* Krause, Engler Bot. Jahrb. xxxvii. 634 (1906). *C. Fiebrigii* Krause, l. c. *L. revoluta*, f. *Fiebrigii* Brand, l. c. *C. andicolum* Krause, l. c. 635.

H. costaricensis (Brand), comb. nov. *Lappula costaricensis* Brand in Fedde, Repert. xviii. 310 (1922). *L. guatemalensis* Brand, l. c. 311.

H. mexicana (Schl. & Cham.), comb. nov. *Cynoglossum mexicanum* Schl. & Cham. Linnaea v. 114 (1830). *Echinospermum mexicanum* Hemsl. Biol. Cent.-Am. Bot. ii. 377 (1882). *Lappula mexicanum* Greene, Pittonia ii. 182 (1891).—This and the preceding are closely related to *H. revoluta* and perhaps are not specifically distinct.

✓ **H. leptophylla** (Rydb.), comb. nov. *Lappula leptophylla* Rydb. Mem. N. Y. Bot. Gard. i. 329 (1900). (?) *L. scaberrima* Piper, Bull. Torr. Cl. xxix. 545 (1902). (?) *L. angustata* Rydb. Bull. Torr. Cl. xxxi. 636 (1904). *L. Besseyi* Rydb. l. c. 636. (?) *L. grisea* Woot. & Standl. Contr. U. S. Nat. Herb. xvi. 164 (1913). *L. floribunda* of Piper (Bull. Torr. Cl. xxix. 537. 1902.) and other recent authors.

✓ **H. hispida** (Gray), comb. nov. *Echinospermum diffusum*, var. *hispidum* Gray, Proc. Am. Acad. xvii. 225 (1882). *E. hispidum* Gray, l. c. xx. 259 (1884). *L. hispida* Greene, Pittonia ii. 182 (1891).

✓ **H. ciliata** (Dougl.), comb. nov. *Cynoglossum ciliatum* Dougl. in Lehm. Pug. ii. 24 (1830). *Echinospermum ciliatum* Gray, Proc. Am. Acad. xvii. 225 (1882). *Lappula ciliata* Greene, Pittonia ii. 182 (1891).

✓ **H. setosa** (Piper), comb. nov. *Lappula setosa* Piper, Bull. Torr. Cl. xxix. 544 (1902).

✓ **H. cinerea** (Piper), comb. nov. *Lappula cinerea* Piper, Bull. Torr. Cl. xxix. 544 (1902).

✓ **H. ursina** (Greene), comb. nov. *Echinospermum ursinum* Greene in Gray, Proc. Am. Acad. xvii. 224 (1882). *Lappula ursina* Greene, Pittonia ii. 182 (1891).

✓ **H. hirsuta** (Woot. & Standl.), comb. nov. *Lappula hirsuta* Woot. & Standl. Contr. U. S. Nat. Herb. xvi. 164 (1913).

✓ **H. gracilentata** (Eastw.), comb. nov. *Lappula gracilentata* Eastw. Bull. Torr. Cl. xxix. 523 (1902).

✓ **H. floribunda** (Lehm.), comb. nov. *Echinospermum floribundum* Lehm. Pug. ii. 24 (1830). *Lappula floribunda* Greene, Pittonia ii. 182 (1891). *Rochelia patens* Nutt. Jour. Acad. Philad. vii. 44 (1834). *E. subdecumbens* Parry, Proc. Davenport Acad. i. 148 (1876). *L.*

subdecumbens Nels., Manual Rocky Mt. Bot. 412 (1909). (?) *L. leucantha* Greene, Leaflets i. 152 (1905). *L. Jessicæ* McGreg. Bull. Torr. Cl. xxxvii. 262 (1910). *L. diffusa* of Piper and other recent authors.—The plant referred here has always been associated with Lehmann's *Echinosperrum diffusum* despite the fact that it is perfectly portrayed in Hooker's, Fl. Bor. Am. ii. 84, t. 164 (1838), plate of *E. floribundum*, a plate apparently drawn from an isotype if not the actual type of that latter species. It is to be particularly noted that the plant, the *Lappula diffusa* of recent authors, which I refer to Lehmann's *Echinosperrum floribundum* agrees with the pictured plant in perennial duration and in size of corolla, developments not present in *H. leptophylla*, the plant usually referred to Lehmann's species. In spite of the note by Nelson and Macbride, Bot. Gaz. lxi. 42 (1916), the account given by Parry, l. c., and the isotype preserved in the Gray Herbarium both clearly show that Gray, Proc. Am. Acad. xvii. 225 (1882), and Piper, Bull. Torr. Cl. xxix. 539 (1902), were correct in referring *Echinosperrum subdecumbens* to the present species. The use of Parry's name in the Rocky Mountain Manual is incorrect! The plant is definitely blue-flowered, as the lack of mention of color in Parry's observations would suggest.

H. Eastwoodae, nom. nov. *Lappula micrantha* Eastw. Bull. Torr. Cl. xxx. 497 (1903); not *H. micrantha* (Ledeb.) Opiz.—Related to *H. floribunda*, but differing in small flowers and in having a few glochidiate prickles on the back of the nutlets. Perhaps only the Californian variety of that species.

H. bella (Macbr.), comb. nov. *Lappula bella* Macbr. Contr. Gray Herb. xlviii. 39 (1916). (?) *L. Rattanii* Brand in Fedde, Repert. xviii. 311 (1922).—Differing from the closely related *H. velutina* in possessing white corollas, and in having the back of the nutlets unarmed.

H. nervosa (Kell.), comb. nov. *Echinosperrum nervosum* Kell. Proc. Calif. Acad. ii. 146, f. 42 (1862). *Lappula nervosa* Greene, Pittonia ii. 182 (1891).

H. velutina (Piper), comb. nov. *Lappula velutina* Piper, Bull. Torr. Cl. xxix. 546 (1902).—Perhaps only a good variety of the last. The Hackelias of the Yosemite Region seem best referred here although they vary as to pubescence and have small corollas with short tubes.

H. californica (Gray), comb. nov. *Echinosperrum californicum* Gray, Proc. Am. Acad. xvii. 225 (1882). *Lappula californica* Piper, Bull. Torr. Cl. xxix. 546 (1902).

✓ **H. arida** (Piper), comb. nov. *Lappula arida* Piper, Bull. Torr. Cl. xxviii. 44 (1901). *L. Cottoni* Piper, l. c. xxix. 549 (1902).

✓ **H. arida**, var. **Cusickii** (Piper), comb. nov. *Lappula Cusickii* Piper, Bull. Torr. Cl. xxix. 542 (1902). *L. arida*, var. *Cusickii* Nels. & Macbr. Bot. Gaz. lxi. 41 (1916). *L. saxatilis* Piper, l. c. 541.

H. diffusa (Lehm.), comb. nov. *Echinosperrum diffusum* Lehm. Pug. ii. 23 (1830). *Lappula diffusa* Greene, Pittonia ii. 182 (1891). *L. Hendersoni* Piper, Bull. Torr. Cl. xxix. 539 (1902). (?) *L. trachyphylla* Piper, l. c. 540. *L. subdecumbens* of Nels. Man. Rocky Mt. Bot. 412 (1909), as to description only.—The plant concerned here agrees with Lehmann's description in height of growth, pubescence, size and color of flowers, and in the arming of the nutlets. It fits the description far better than the other plant, here called *H. floribunda*, which has borne Lehmann's specific name in the past. In fact the present plant diverges from Lehmann's description only by having usually acutish rather than obtusish cauline leaves.

✓ **H. diffusa** var. **caerulescens** (Rydb.), comb. nov. *Lappula caerulescens* Rydb. Mem. N. Y. Bot. Gard. i. 328 (1900). *L. subdecumbens caerulescens* Garrett, Fl. Wasatch Reg. 78 (1911).

2. THE GENUS ANTIPHYTUM.

IN the literature concerned with the *Boraginaceae* the species of *Antiphytum* have been repeatedly confused with the species now referred to *Plagiobothrys*, *Cryptantha*, and allied genera, despite the fact that the former genus appears to belong not to the *Eritrichieae*, but rather to the *Lithospermeae*. This confusion has resulted from the attention being too closely centered upon similarities in nutlets, similarities which caused Gray, Proc. Am. Acad. xx. 265 (1885), to refer the Mexican species of *Antiphytum* to *Krynitzkia*, and which gave Macbride, Contr. Gray Herb. xlviii. 41 (1916), his reasons for saying that *Amblynotopsis*, here referred to *Antiphytum*, is "intermediate between the genera *Allocarya* and *Plagiobothrys*." The genus *Antiphytum*, however, differs from *Plagiobothrys* in habit, color of flowers, and particularly in the geminate stigmas. The stigmas of *Antiphytum* definitely remove it from the *Eritrichieae* in which *Plagiobothrys* and its other supposed allies are found.

The genus *Antiphytum* was first described in Meisner's Genera, i. 280 (1836-43). The original description, about fifty words in length, applies well to the genus as it has been taken in the past. In the Commentary accompanying his Genera, ii. 188 (1836-43), Meisner gives the bibliography of the genus as follows:—

"ANTIPHYTUM. DC. Mss. in Moç. ic. fl. Mex. ined. (4 sp.)—*Anchusa oppositifolia*, H.B.K., nov. gen. 3. p. 91. t. 200. *A. cruciata* et *stoechadifolia*, Cham. in Linnaea, 4. p. 438. et *A. Mexicana*, DC. ap. Moç. l. c.—Genus jam foliis oppositis (unde nomen) insigne."

Mociño's flora referred to was unpublished until 1874, or over thirty years after the appearance of Meisner's Genera. *Antiphytum mexicana* DC., published in the Prodrômus, x. 121, in 1846, is *Heliotropium calcicola* Fernald, Proc. Am. Acad. xliii. 62 (1907). Although the only *Antiphytum* published in Mociño posthumous work, *A. mexicana* can scarcely be considered as the type of the genus since it remained so long unpublished and particularly since having typical *Heliotropium* fruit, it is not at all described in the original generic diagnosis. *Anchusa oppositifolia* HBK. is an *Allocarya*. This species being the first published species mentioned under *Antiphytum* and the only one with a cited illustration, might be considered the type of *Antiphytum* and that name treated as an older synonym of Greene's genus *Allocarya*, Pittonia i. 12 (1887). Usage, however, has restricted the name *Antiphytum* to the genus including Chamisso's *Anchusa cruciata* and *A. stoechadifolia*. This usage is justifiable by the workings of the logical process of residues, the other species originally placed in *Antiphytum* having been referred to other genera and the name *Antiphytum* left to that group which had a majority representation in the original definition of the genus. It is also to be noted that with the exception that they are never herbs, Chamisso's species agree with every item in Meisner's diagnosis. On the other hand *Anchusa oppositifolia* is never suffrutescent, and does not have scorpioid cymes, nor ciliate-papillose faucal protuberances.

In 1916 Macbride, l. c., erected the genus *Amblynotopsis* for the Mexican species which I refer to *Antiphytum*. Although four of the five recognized and previously published species had been at one time or another referred to *Antiphytum* no contrast was made between the members of the newly proposed genus and the old restricted one. A careful study of this relationship now shows that the Mexican plants, forming the genus *Amblynotopsis*, are distinguished from the Brazilian ones, forming the true *Antiphytum*, only by having non-blue corollas and alternate upper leaves. These are scarcely generic differences. The Mexican *Antiphytum heliotropioides* besides agreeing with the Brazilian *A. cruciatum* in shrubby habit and loose strigose pubescence of similar encrusted hairs, also has opposite leaves. The chief difference between the two plants being that in the Mexican plant the leaves of the inflorescence are alternate, whereas in the Brazilian

species the leaves are opposite throughout the plant. Among the Mexican species *A. floribundum* has all its leaves alternate. Such species as *A. peninsulare* and *A. nudicalces* have several pairs of opposite leaves. Hence within the enlarged *Antiphytum* there are all the stages from an entirely opposite-leaved condition to a completely alternate-leaved one. Since leaf-position has various degrees of development among the Mexican species and since the difference separating the Mexican and Brazilian species is simply a matter of slight degree it seems inadvisable to attempt the use of leaf-position as a generic character. Flower-color is equally unsatisfactory as a generic character. The Brazilian species have bluish flowers. Among the Mexican species *A. peninsulare* has white flowers, whereas the remainder have yellow ones. If the color of corolla is to be exalted to generic importance there will be need of three instead of merely two genera.

The Brazilian species have flat gynobases and nutlets that are basally attached by a short stipe-like prolongation. Although most Mexican specimens have their nutlets directly attached to a more or less pyramidal gynobase by a large oblique submedial ventral scar, certain specimens (*Palmer 443, 207*) here referred to the polymorphous *A. floribundum* have nutlets with basal attachments through a short stipe to a flattened gynobase quite like that exhibited in Brazilian specimens. A synopsis and bibliography of the genus follows:—

ANTIPHYTUM A.DC. in Meisner, Genera i. 280; ii. 188 (1836-43).
Thaumatocaryon Bail. Bull. Mens. Soc. Linn. Paris 839 (1890).
Amblynotopsis Macbr. Contr. Gray Herb. xlviii. 41 (1916).

Leaves all opposite; corolla bluish; South American.

Plant herbaceous; leaves 10-35 mm. broad; nutlets smooth, shiny; corolla tubular-funnelform. 1. *A. tetraquetrum*.

Plant suffrutescent; leaves 3-8 mm. broad; nutlets rugose, dull; corolla tubular-rotate. 2. *A. cruciatum*.

Leaves alternate at least above; corolla yellow or white; Mexican.

Pedicels elongating, becoming 5-10 mm. long; leaves alternate only in the inflorescence; corolla with definite tube and faucal appendages. 3. *A. heliotropioides*.

Pedicels not elongating, at most 5 mm. long; leaves in basal rosettes, alternate, or only lowermost opposite.

Corolla subrotate, throat broad and open, tube practically undeveloped; appendages lacking, stamens exposed.

Stems strictly erect, 3-8 dm. high; basal leaves few, oblanceolate to linear-oblanceolate, canescent, 3-10 mm. broad. 4. *A. floribundum*.

Stems decumbent, less than 2 dm. tall; basal leaves numerous, crowded, very narrowly linear, silvery, 1-2 mm. broad. 5. *A. paniculatum*.

Corolla salverform, tube cylindrical and well developed; appendages well developed; stamens included and hidden.

Corolla white; fruiting calyx 8 mm. long, sparsely strigose-hispid; plant bushy, about 5 dm. tall. . . . 6. *A. peninsulare*.

Corolla yellow; fruiting calyx 2-5 mm. long, densely strigose; plant caespitose or with a prostrate shrubby caudex, 1-2 dm. high.

Plant with a loosely branched shrubby caudex; leaves not in basal rosettes, all cauline. 8. *A. nudicalces*.

Plant densely caespitose; basal leaves in dense rosettes.

Corolla about 5 mm. broad; style surpassing nutlets; fruiting calyx 3-4 mm. long. 7. *A. caespitosum*.

Corolla about 1 mm. broad; style not surpassing nutlets; fruiting calyx 2-3 mm. long. 9. *A. Parryi*.

1. ANTIPHYTUM TETRAQUETRUM (Cham.) A.DC. Prodr. x. 122 (1846). *Anchusa tetraquetra* Cham. Linnaea viii. 113 (1833). *Thaumatocaryon Hilarii* Baill. Bull. Mens. Soc. Linn. Paris 839 (1890). *Antiphytum Bornmülleri* Pilger in Fedde, Repert. iii. 24 (1906). *Antiphytum Bornmülleri*, var. *asperior* Pilger l. c. 25.

2. *A. CRUCIATUM* (Cham.) A.DC. Prodr. x. 121 (1846). *Anchusa cruciata* Cham. Linnaea iv. 438 (1829). *Anchusa stoechadifolia* Cham. l. c. 439. *Antiphytum staechadifolium* A.DC. l. c. *Myosotis Berroi* Arech. Anal. Mus. Nac. Montevideo, ser. 2, i. 69, f. 5-6 (1911).—The lengthy descriptions given by Chamisso do not seem to contain any fundamental characters by which his two species can be distinguished, nor has any subsequent writer pointed out diagnostic characters.

3. *A. HELIOTROPIOIDES* A.DC. Prodr. x. 122 (1846). *Eritrichium heliotropioides* Torr. Bot. Mex. Bound. 140 (1859). *Krynitzkia heliotropioides* Gray, Proc. Am. Acad. xx. 265 (1885). *Cryptantha heliotropoides* Loes. in Fedde, Repert. xii. 243 (1913). *Amblynotopsis heliotropioides* Macbr. Contr. Gray Herb. xlviii. 41 (1916).

4. *A. FLORIBUNDUM* (Torr.) Gray, Proc. Am. Acad. x. 55 (1875). *Eritrichium floribundum* Torr. Bot. Mex. Bound. 140 (1859). *Krynitzkia floribunda* Gray, l. c. xx. 265 (1885). *Amblynotopsis floribunda* Macbr. Contr. Gray Herb. xlviii. 41 (1916). *Amblynotopsis durangensis* Macbr. l. c. 42.—As here taken the species is extremely polymorphous and almost certainly capable of division, but at present the material is too meager to attempt satisfactory segregation.

5. *A. paniculatum*, nom. nov. *Lithospermum linifolium* Mart. & Gal. Bull. Acad. Belg. xi. 338 (1844); not *Antiphytum linifolium* A.DC. (1846).

6. *A. peninsulare* (Rose), comb. nov. *Krynitzkia peninsularis* Rose, Contr. U. S. Nat. Herb. i. 85 (1890). *Amblynotopsis peninsularis* Macbr. Contr. Gray Herb. xlviii. 41 (1916).

7. **A. caespitosum**, sp. nov., mexicanum; caulibus erectis vel valde ascendentibus 8–16 cm. altis apicem versus pauce stricteque ramosis; foliis dense strigosis argyro-canescensibus 1–2 mm. latis acutiusculis, inferioribus anguste linearibus 2–5 cm. longis erectis rosulatis, caulinis 8–15 mm. longis; racemis paucis unilateralibus manifeste bracteatis 2–3 cm. longis; calyce 2.5–3 mm. longo 5-partito breve pedicellato; corolla flava, limbo 4–5 mm. lato plano, lobis rotundatis imbricatis extus pubescentibus, tubo 1.5–2 mm. longo ad apicem cum 5 appendiculis gibbosis instructo, staminibus inclusis cum filamentis antheris brevioribus; nuculis rugoso-tuberculatis 1.5–2 mm. longis, areolis amplis distincte sub medio locatis; gynobasi angusta pyramidalis; stylo nuculis longiore; stigmatibus geminatis.—MEXICO: Cerros near San Luis Tultitlanapa, Puebla, *Purpus 2606* (TYPE, Gray Herb.). Sonnige Kalkhügel bei Comitán, Chiapas, *Seler 3073*. Huauclilla, Nochixtlan, Oaxaca, *Conzatti & González 1222*.

8. **A. nudicalces**, sp. nov., diffusum; *A. caespitosum* similans sed differt ramis numerosis ramosis e caudice suffruticoso laxo ramoso prostrato vel etiam paullo subterraneo orientibus et foliis majoribus 2–3 mm. latis omnibus caulinis.—MEXICO: Sosola, alt. 7000 ft., Oaxaca, *L. C. Smith 393* (TYPE, Gray Herb.). Although differing from *A. caespitosum* conspicuously in habit this species is identical with it in inflorescence, floral, and fruit characters and may prove to be worthy of no more than varietal recognition.

9. *A. PARRYI* Wats. Proc. Am. Acad. xviii. 122 (1883). *Krynitzkia Parryi* Gray, Proc. Am. Acad. xx. 265 (1885). *Amblynotopsis Parryi* Macbr. Contr. Gray Herb. xlvi. 41 (1916).—MEXICO: En route from San Luis Potosí to San Antonio, Texas, *Parry* (TYPE). Sosola, Oaxaca, *L. C. Smith 394*. Without locality, *Coulter 1050* in part. The type is in advanced maturity and entirely lacks flowers. It is associated with the small-flowered Oaxacan plant only because of the remarkable similarity in the size and developments of all other parts.

3. NOVELTIES AND NEW COMBINATIONS IN THE GENUS CRYPTANTHA.

Cryptantha Abramsii, sp. nov., annua basem versus simplex supra sparse ascenderet ramosa 15–30 cm. alta strigosa; foliis linearibus vel lineari-filiformibus 1–3 cm. longis 1–1.5 mm. latis sessilibus acutiusculis basem versus hispidis, infimis oppositis; spicis solitariis vel geminatis 2.5–10 cm. longis conspicue bracteatis, bracteis linearibus vel lanceolatis; corolla evidenti 1.5–2 mm. lata; calycibus maturitate 3–4 mm. longis remotis non biseriatis strictis vel ascendentibus, lobis lanceolatis breviter hispidis calyce $\frac{1}{3}$ – $\frac{1}{4}$ brevioribus

abaxillaribus crassissimis et hispidissimis; nuculis 1-4 lanceolatis laevibus nitidis basi truncatis compressis 2-2.2 mm. longis, sulcis clausis basem versus furcatis; stylo alto $\frac{1}{3}$ - $\frac{1}{4}$ nuculis breviori; gynobasi subulata.—CALIFORNIA: San Pedro Hills near Malaga Cove, Los Angeles Co., March 14, 1903, *Abrams 3139* (TYPE, Gray Herb.; ISOTYPE, Univ. Calif. Herb.). Allied to *Cryptantha leiocarpa* (F. & M.) Greene, but differing from that species in its short style, erect habit, and fewer nutlets. It suggests the large-flowered forms of *C. Clevelandi* Greene, and possibly may be only a bracteate form of the latter species. Further material is a great desideratum.

Cryptantha Brandegei, sp. nov., annua diffusa decumbens; caulibus gracilibus 1-4 dm. longis strigosis pustulatis vel levibus; foliis oblongo-lanceolatis vel linearibus obtusis 6-15 mm. longis 2-3(-4) mm. latis basem versus sparse hispidis concoloribus; spicis solitariis vel rare geminatis aliquid sparse bracteatis vetustis 4-8 cm. longis; calycibus maturitate congestis vel remotis 2-4 mm. longis strictis; lobis calycis linearibus costatis cum setis flavescens horrentissimis marginibus sparse strigosis abaxillaribus longissimis hispidissimis; corolla parva minus quam 1 mm. lata; nuculis 1-4 laevibus 1.5-2 mm. lanceolatis nitidis basi truncatis, sulcis clausis basem versus furcatis; stylo alto nuculis $\frac{1}{3}$ - $\frac{1}{5}$ breviori; gynobasi subulata.—CALIFORNIA: Santa Rosa Island, June 1888, *T. S. Brandege* (TYPE, Gray Herb.; ISOTYPE, Univ. Calif. Herb.). This is an ally of *Cryptantha leiocarpa* (F. & M.) Greene, from which it differs in its southern island occurrence, greater range in nutlet-number, and particularly in its shorter style. It suggests phases of the polymorphous *C. Clevelandi* Greene, but is readily told from that species by its bracteate inflorescence and slightly longer style. *Cryptantha Brandegei* is to be distinguished from *C. Abramsii* by its smaller corolla and diffuse spreading habit.

Cryptantha albida (HBK.), comb. nov. *Myosotis albida* HBK. Nov. Gen. et Sp. iii. 91 (Aug. 1818). *Lithospermum ramosum* Lehm. Asperif. ii. 328 (Nov. or Dec. 1818). *Eritrichium ramosum* A. DC. Prodr. x. 132 (1846). *Krynitzkia ramosa* Gray, Proc. Am. Acad. xx. 274 (1885). *Cryptanthe ramosa* Greene, Pittonia i. 115 (1887). *Eritrichium hispidum* Buckley, Proc. Acad. Philad. 1861, 462 (1861). (?) *Krynitzkia mexicana* Brandg. Zoe v. 182 (1904).—Information kindly supplied me by Dr. J. H. Barnhart of the New York Botanical Garden has given the reason for reviving the long neglected *Myosotis albida* HBK. This name was published in the ninth part of the *Nova Genera* which, according to Dr. Barnhart, appeared probably

late in August 1818 since it was noted under the date of October 3, 1818 in the *Bibliographie de la France*, a work in which the appearance of books was usually announced about six weeks after their actual publication. The first part of Lehmann's *Asperifoliae* appeared before the ninth part of the *Nova Genera* and its priority was recognized by Kunth, *Flora* i. 601 (1818) and *Nov. Gen. et Sp.* iii. 451 (1820). When the first part of the *Asperifoliae* was reviewed in *Flora*, i. 501, under the date October 30, 1818, it was accompanied by the statement "Der zweyte Theil ist unter der Presse" which would seem to indicate that the second part of Lehmann's work did not appear for at least two months after the ninth part of the *Nova Genera*. The second part of the *Asperifoliae* may have appeared in November or December but at present there seems no way of telling whether it actually did appear before the end of 1818, the year given on the title page.

Cryptantha falcata (Hieron.), comb. nov. *Eritrichium falcatum* Hieron. *Bol. Acad. Córdoba* iv. pt. 1, 64 (1882).

Cryptantha patagonica (Speg.), comb. nov. *Amsinckia patagonica* Speg. *Anal. Soc. Cient. Argent.* liii. 137 (1902).

Cryptantha Spegazzinii, nom. nov. *Amsinckia angustifolia*, var. *microcarpa* Speg. *Anal. Soc. Cient. Argent.* liii. 136 (1902).—The nutlets described by Spegazzini are evidently not those of an *Amsinckia*. I am associating with this name a specimen from near General Roco, Rio Negro, *Fischer 131*, although the plant has the corolla and calyx subequal and not "corollae . . . calyce duplo longioris."

Cryptantha granulosa (R. & P.), comb. nov. *Myosotis granulosa* R. & P. *Fl. Peruv.* ii. 5 (1799).

Cryptantha corymbosa (R. & P.), comb. nov. *Myosotis corymbosa* R. & P. *Fl. Peruv.* ii. 5 (1799).

In 1887 Greene, *Pittonia* i. 58–60, proposed the genus *Eremocarya* and reestablished Torrey's *Piptocalyx*. Since that time the two genera have received almost universal acceptance despite the fact that they appear to lack fundamental characters and much resemble members of the genus *Cryptantha*. The nutlets found in *Eremocarya* and *Piptocalyx* are indistinguishable from those of *Cryptantha*, being of similar shape, possessing similar markings, and having a very similar groove. The gynobase also is much the same in all three genera. In fact, *Eremocarya* and *Piptocalyx* seem merely well marked species of *Cryptantha* and are consequently referred to *Cryptantha* where their species can be disposed of as follows:—

Cryptantha § **Piptocalyx**. *Piptocalyx* Torr. in Wats. Bot. King Exped. 240 (1871); not Oliver (1870). *Krynitzkia* Subsect. *Piptocalyx* Gray, Proc. Am. Acad. xx. 275 (1885). *Krynitzkia* Sect. *Piptocalyx* Greene, Bull. Calif. Acad. i. 206 (1885). *Greeneocharis* Gürke & Harms in E. & P. Nat. Pflanzenf., Gesamtreg. 462 (1899). *Wheelerella* Grant, Bull. So. Calif. Acad. v. 28 (1906).—This section of *Cryptantha* is characterized by its peculiar circumscissile calyx which is tubular to above the middle and has its lobes practically unribbed. A short distance below the sinuses the calyx-tube suddenly changes, at the line of dehiscence, from firm siliceous-hyaline to herbaceous. In the characters of its calyx the plants much resemble certain species of *Plagiobothrys*. Among the suggested generic characters of *Piptocalyx*, Greene especially stressed its possession of persistent pedicels although that development is present in such *Cryptanthas* as *C. albida*, *C. racemosa*, *C. holoptera*, and *C. pterocarya*. The character most emphasized by Greene, however, was the dichotomy of *Piptocalyx*. Unfortunately this character also fails since unmistakable and very similar dichotomy occurs in such species as *Cryptantha recurvata* and *C. micromeres*. The only distinctive character possessed by *Piptocalyx* is its circumscissile calyx. This development, however, is both present and absent in the closely related genus *Plagiobothrys* and there seems no particular reason why in the present case the character should be considered of generic value. The following two species are recognized.

Cryptantha circumscissa (H. & A.), comb. nov. *Lithospermum circumscissum* H. & A. Bot. Beech. 370 (1840). *Piptocalyx circumscissus* Torr. in Wats. Bot. King. Exped. 240. (1871). *Eritrichium circumscissum* Gray, Proc. Am. Acad. x. 58 (1874). *Krynitzkia circumscissa* Gray, l. c. xx. 275 (1885). *Wheelerella circumscissa* Grant, Bull. So. Calif. Acad. v. 28 (1906). *Greeneocharis circumscissa* Rydb. Bull. Torr. Cl. xxxvi. 677 (1909). *Cryptanthe depressa* Nels. Bot. Gaz. xxxiv. 29 (1902).

Cryptantha dichotoma (Greene), comb. nov. *Krynitzkia dichotoma* Greene, Bull. Calif. Acad. i. 206 (1885). *Piptocalyx dichotomus* Greene, Pittonia i. 60 (1887). *Wheelerella dichotoma* Grant. Bull. So. Calif. Acad. v. 28 (1906). *Greeneocharis dichotoma* Macbr. Proc. Am. Acad. li. 546 (1916). *G. circumscissa*, var. *hispida* Macbr. l. c.—Macbride's variety of *G. circumscissa* is evidently a reduced montane form of *C. dichotoma* which simulates *C. circumscissa* in gross aspect. It makes it impossible to use robustness as a distinguishing character between *C. dichotoma* and *C. circumscissa*, and leaves pubescence as the only differentiating character.

According to Greene, *Pittonia* i. 56 (1887), "*Eremocarya* is most excellently marked in a three-fold way by its racemes" which are biserial and very dense, conspicuously bracteate, and repeatedly dichotomous. Neither singly nor in combination do these characters distinguish *Eremocarya* from *Cryptantha*. Almost every species of *Cryptantha* has its flowers somewhat biserial. In *Cryptantha Grayi*, *C. albida*, *C. pusilla*, *C. maritima*, etc., particularly dense biserial racemes may be found. Dichotomy is also frequently present in *Cryptantha* and is quite unmistakable in *C. albida*. Bracteate racemes are well developed in *C. maritima*, *C. leiocarpa*, *C. albida*, etc. Also emphasized by Greene was the dye-secreting tissue of *Eremocarya*. Following him most recent authors have dignified that development by treating it as the crucial generic character. In *Plagiobothrys*, even as limited by Greene, there are species with dye-secreting tissue and those without. This example would give precedent for including dye-secreting and non-dye-secreting species within the same genus, even were there no recognized case of dye-secretion among the indubitable species of *Cryptantha*. Dye-secretions in the roots are not uncommon in *Cryptantha* and in the Gray Herbarium are found present in specimens of such distinct species as *C. Fendleri* (*Osterhout 3425, Patterson 112, Baker 780*) and *C. muricata* (*Parish 929*). During 1921 I collected on the islands of the Gulf of California a yet unpublished variety of *C. Grayi* which has its roots as heavily charged with purple dye as do the most characteristic specimens of *Eremocarya*. In addition to the above characters, which are evidently insufficient to justify generic segregation, Greene gave *Eremocarya* as having "a persistent open calyx and an enlarged persistent style." The persistent open calyx of *Eremocarya* is well matched in *C. holoptera* and in *C. albida*, while in what Greene calls an "enlarged persistent style" *Eremocarya* is indistinguishable from the several species allied to true *C. muricata*. A careful study of *Eremocarya* has failed to reveal characters other than those unsatisfactory ones enumerated by its author and I am consequently forced to the conviction that Greene's genus is unworthy of recognition even as a section. Accordingly the following species and variety are referred to *Cryptantha* where they fit naturally into the same group of species as *C. Grayi* and *C. angustifolia*.

Cryptantha micrantha (Torr.), comb. nov. *Eritrichium micranthum* Torr. Bot. Mex. Bound. 141 (1859). *Krynitzkia micrantha* Gray, Proc. Am. Acad. xx. 275 (1885). *Eremocarya micrantha* Greene, *Pittonia* i. 59 (1887). *Eremocarya muricata* Rydb. Bull. Torr. Cl. xxxvi. 677 (1909).

Cryptantha micrantha, var. **lepida** (Gray), comb. nov. *Eritrichium micranthum*, var. *lepidum* Gray, Synop. Fl. N. A. ii. pt. 1, 193 (1878). *Krynitzkia micrantha*, var. *lepida* Gray, Proc. Am. Acad. xx. 275 (1885). *Eremocarya lepida* Greene, Pittonia i. 59 (1887). *Eremocarya micrantha*, var. *lepida* Macbr. Proc. Am. Acad. li. 545 (1916).

4. A SYNOPSIS AND REDEFINITION OF THE GENUS *PLAGIOBOTHRYS*.

IN 1835 the name *Plagiobothrys* was originally used by Fischer and Meyer for what then appeared to be a monotypic Chilean genus. The first species, *P. fulvus*, was separated from *Eritrichium* because of the peculiar annular scar on its nutlets. In 1874 Gray, Proc. Am. Acad. x. 57, reduced *Plagiobothrys* to a section under *Eritrichium* and placed in the section besides the original species five others which lacked annular scars on the nutlets. *Plagiobothrys* was reestablished by Gray, Proc. Am. Acad. xx. 281, in 1885 when he amplified it to include fourteen species, five of which were placed in a newly erected section, and nine of which were put in his section *Genuini*, a group coextensive with his *Eritrichium* § *Plagiobothrys* of 1874.

Gray, Proc. Am. Acad. xi. 89, founded the genus *Echidiocarya* in 1876, and at that time included in it only the anomalous *E. arizonica* (*P. Pringlei* Greene). The character for the genus was found in the long-stiped nutlets. In 1877, Proc. Am. Acad. xii. 163, the genus was enlarged so as to include the newly described and obviously related *E. californica*. A third member of the group was added in 1883, Proc. Am. Acad. xix. 90, when Gray described *P. ursinus* and noted that, "The comparatively recent discovery of the preceding species [*P. ursinus*] of this section has made it clear that both of them should fall into *Plagiobothrys*, . . ." As a result of the transfer *Echidiocarya* was reduced to its original species and characterized by its "conspicuously stipitate" nutlets. In 1887 Greene, Pittonia i. 9 & 21, argued the artificiality of this latter concept and transferred to *Plagiobothrys* the remaining and type species of *Echidiocarya* saying that it had "every aspect and every character of *Plagiobothrys*, except that there is a stipe between the scar, or point of attachment to the gynobase, and the body of the nutlet." Greene's disposal of *Echidiocarya* has remained unchallenged.

Anyone who will study Gray's *Echidiocarya arizonica*, *E. californica*, and *Plagiobothrys ursinus* can not help appreciating the close relations between those species and the naturalness of *Echidiocarya* in its broadest sense, for the species agree not only in gross aspect, but in

scores of important and unimportant minute details as well. The fruit, though varying somewhat in the development of the stipe-like base, is similar in form and marking. Furthermore there is a strong similarity among the three species as regards calyx and corolla. None of the species have obvious relations within *Plagiobothrys* as that genus is currently taken. The three are sharply set off from it by their lack of a conspicuous caruncular scar on the nutlets and by their bearing the scar on a stipe projected above the ventral keel and not in a broad shallow transverse groove below the level of the keel. In fact *Echidiocarya* is not a part of *Plagiobothrys*, as that genus is usually taken, but belongs rather to the group which Greene named *Allocarya*. This latter relation is indicated by the occurrence of lower opposite leaves in all three species. Significant also is the fact that the habit of *Echidiocarya* is approached by various species of *Allocarya*, and its nutlet-form simulated by the fruit of *Allocarya australasica*. The species of *Echidiocarya* seem clearly congeneric with those of *Allocarya*, and since Gray's generic name is about ten years older than that of Greene the concept commonly called *Allocarya* will have to be called *Echidiocarya* if it be actually worthy of generic recognition.

The genus *Sonnea* was proposed by Greene, *Pittonia* i. 22, in 1887. It consists of two quite distinct and apparently not immediately related elements. The typical section of *Sonnea* contains the species which Gray called *Plagiobothrys glomeratus* and *P. hispidus*, and placed in the specially formed *Plagiobothrys* § *Hypsoula*. This group differs from all others of *Plagiobothrys* in its glomerate inflorescence, rough hispid pubescence, and supramedial caruncular scar. Although the group is a natural one and is fairly well marked, the form and structure of its nutlets reveal such unmistakable relations with *Plagiobothrys* that it seems best to consider it a member of that genus as most recent authors have been content to do. The fragile nature of the caruncle, particularly emphasized by Greene, is not positive nor capable of exact definition. It is not worthy of particular note and is certainly not of generic value.

The second section of *Sonnea* is composed of three species falling under what Gray, *Proc. Am. Acad.* xx. 281, in 1885 indicated as *Plagiobothrys* * *Ambigui*. These species differ from those in genuine *Plagiobothrys* by having a coarse hispid pubescence and nutlets which superficially closely simulate the nutlets of *Amsinckia*. There is little in common between the species of the second section of *Sonnea* and those of the first and typical section, apparently the most important agreement being in the coarse hispid pubescence. Greene

attributed to the second section a fragile caruncular scar similar to that in the typical section, but this attribute I am utterly unable to appreciate. The second section has a peculiar and characteristic nutlet development. The nutlets have a submedial scar that is borne, not at or below the lower end of the ventral keel, but surrounded by and wedged in between the pericarpial margins that form the keel and consequently appearing at first glance as if borne upon it. The striking nutlet difference seems of fundamental importance and were other important concomitant characters forthcoming I should feel that the group merits generic recognition. The problem deserves further study and for the present I am following current usage and referring the group to *Plagiobothrys* where it can form a new section which may appropriately be called **Amsinckiopsis**.

The genus *Allocarya* was erected by Greene, *Pittonia* i. 10-12, in 1887. In proposing the genus Greene argued that its species "agree admirably in that best mark of a good and natural genus, the habit" and that they possessed "a character very rare in the order, if not indeed unique, that of the lower leaves being not only opposite, but distinctly connate-perfoliate." He states further that "*Allocarya* is, in truth, much more nearly allied to *Plagiobothrys* than to *Krynitzkia* [*Cryptantha*]. Its nutlets are in general, not very different, being rugose, keeled more or less both dorsally and ventrally, and showing distinct lateral angles." Since its proposal *Allocarya* has been universally accepted in manuals and floras of western United States. The presence of opposite leaves in its species has been taken as the crucial character. Piper, *Contr. U. S. Nat. Herb.* xxii. 79 (1920), in his detailed "Study of *Allocarya*" speaks generally of the genus as follows,— "The genus as delimited by Greene has been generally accepted as valid. It is best distinguished from allied genera by the ventrally keeled nutlets, which are attached basally or suprabasally to a low gynobase, and by having the lowermost leaves opposite." Recently Macbride, *Contr. Gray Herb.* lix. 34 (1919), wrote, apropos of the reduction of *Allocarya* to *Lappula*, as follows:— "*Allocarya* is most closely related to *Plagiobothrys* and if Mr. Druce had referred his plant to the latter genus some well-taken arguments for his action could be presented. These genera also, however, are nicely distinct although in nutlet-characters they approach each other closely. The attachment of the nutlets of *Plagiobothrys* is nearly or quite medial rather than basal or supra-basal and the leaves are never opposite as are the lower ones of *Allocarya*. The fact that both genera contain numerous species none of which fail in any degree to conform to the

generic character in each case is the best argument to my mind as to the validity of those genera." Summing up the above paragraph it may be said that *Allocarya* deserves generic recognition because of its naturalness, this evidenced by its universal acceptance, and because of the constancy and generic value of its habit, the attachment of its nutlets, and its opposite leaves.

Allocarya is said to have a characteristic habit, but at least this is not evident upon a comparison of species so diverse in appearance as *A. mollis*, *A. Scouleri*, *A. Greenei*, *A. humistrata*, *A. californica*, and *A. stricta*. Not only do the species present quite different habits, but they are closely simulated by species commonly referred to *Plagiobothrys*. For example in gross aspect *A. mollis* is strikingly like southern forms of *P. canescens*; *A. Greenei* and *A. Scouleri* suggest *P. fulvus* and *P. nothofulvus*, while *A. scopulorum* and *A. Cooperi* simulate forms of *P. californicus*. It can be positively said that the species of *Allocarya* do not have a common and distinctive aspect, and furthermore that they are not as a group habitally distinct from *Plagiobothrys*.

The attachment of the nutlet is not distinctive of *Allocarya*. This is at once evident upon a comparison of the fruit of *A. Greenei* with that of *P. fulvus*, for in these species there is a remarkable agreement in size and shape of the nutlets and in the arrangement of keels and ridges upon them. Most striking of all is the occurrence in both species of similarly placed, very similar excavated scars. A Patagonian *Allocarya* described further along in this paper has nutlets closely approximating in both form and attachment those of *P. Torreyi*. The nutlets of *P. Torreyi* are also suggested by those of *A. mollis*. *Allocarya* does present extremes in fruit developments such as the elongate lance-like basally attached nutlets of *A. stipitata* and allies, but these are but culminations of tendencies which intermediate developments bring very close to the conditions present in various species of *Plagiobothrys*.

It would seem that the claims of *Allocarya* for generic recognition must rest upon the occurrence of opposite leaves on its species. This condition seems to have been at least vaguely realized by the authors who have maintained the genus, for in every keyed or descriptive account of the group the presence of opposite leaves has been given as its crucial character. What has not been realized, however, is that opposite leaves are not particularly characteristic of *Allocarya*, the development being quite evident and exactly similar in mature plants of *Cryptantha rostellata* and *C. affinis*, as well as in the younger stages

of most other species of *Cryptantha*. Furthermore the character is well developed and very obvious in *P. Pringlei* and in most (not all) specimens of *P. californicus*. *Allocarya Greenei* shows unmistakable relationships with *P. fulvus* and is probably the nearest relative of that species, yet because it has opposite lower leaves it is forthwith put into another genus. This species alone seems a good argument against the genus *Allocarya*. It should also be realized that opposite leaves occur in varying abundance in the several species of *Allocarya*, some having all the leaves opposite, others having a less large proportion or only the lowest pair opposite. In other words there seems to be a complete set of intermediate stages which connect up morphologically the completely opposite-leaved *Allocaryas* with the completely alternate-leaved *Plagiobothrys*. In the light of the unquestionably close relation between *Allocarya* and *Plagiobothrys*, and the varying proportion of opposite leaves in the species of *Allocarya*, it is most evident that the use of opposite leaves as a generic criterion is arbitrary and that the currently accepted line of cleavage between the genera is neither a profound nor a particularly natural one. Summing up the present paragraph it can be said that opposite leaves are considered a poor diagnostic character in the present instance because they are present or absent in certain species of *Plagiobothrys*, and because their absence in *Plagiobothrys* seems but the culmination (or the beginning) of the variable quantitative development of the character in *Allocarya*.

Although much stress has been placed on the fact that *Allocarya* has remained unchallenged since its promulgation over thirty years ago, the fact is significant only as it shows the lack of study of generic relations within the eritrichioid borages. The genus may have had wide acceptance, but it has not had repeated critical reconsiderations. The last critical study of the generic lines of the group was by Greene. Greene's grasp of the relations and characters of the western American eritrichioid borages is undeniable, but unfortunately his subdivisions within the borages, as in many other families, represent intergrading or scarcely distinct groups which seem better treated as sections or subgenera.

Plagiobothrys can not be separated from *Allocarya*, *Echidiocarya*, and *Sonnea* by developments possessed by the latter genera, and neither can it be distinguished from the enumerated genera by peculiar structures of its own. The character usually given as generically diagnostic for *Plagiobothrys* is the occurrence of a "caruncular scar" upon its nutlets. However, this character is probably best

developed in *Sonnea glomerata* and *S. hispida*, and is present although weakly developed in *Allocarya Scouleri* and in the Patagonian *Allocarya* described in this paper. In *A. Greenei* the character fails completely, for the scar in that species is essentially the same as the scar in *P. fulvus*. Although it can be said that the caruncular scar reaches a high development in *Plagiobothrys*, it can not be said that it characterizes the genus or reaches its greatest development there.

Although not previously pointed out, the species of true *Plagiobothrys* are fairly well characterized by the position of the scar. In *Plagiobothrys* the nutlet-scar is in a broad shallow transverse groove, and distinct from the ventral keel and below the level of it. In *Allocarya* and *Echidiocarya* the scar is usually contiguous with the ventral keel and either flush with it or projected from it on a stipe-like base. As with most other characters its universality is destroyed by *Allocarya Greenei*, that species which is an *Allocarya* only in its lower leaves.

Because of the lack of consistently diagnostic characters which would separate them, *Allocarya*, *Echidiocarya*, and *Sonnea* are all merged with *Plagiobothrys*. The result is a genus which appears to be a very natural one, and one which admits of great precision in definition. The amplified *Plagiobothrys* is at once distinguished from its nearest relatives, *Cryptantha* and *Oreocarya*, by the lack of a pronounced longitudinal ventral groove, and the possession instead of a well developed ventral keel and a definitely circumscribed small scar. The gynobase is a pyramid or low frustum and very much shorter than the nutlets, and is not subulate and about equalling the nutlets as in *Cryptantha* and *Oreocarya*. The nutlets in *Plagiobothrys* are commonly keeled and usually rugose, whereas in *Cryptantha* and *Oreocarya* they are rarely if ever keeled and the roughenings usually tuberculate or muricate. The pubescence in *Plagiobothrys* is mostly appressed and is less stiffly spreading than is the hispid indument characteristic of *Cryptantha*.

In order intelligently to select the specific names which should be transferred to *Plagiobothrys* it has been necessary to go into the intra-generic classification. As a result of this study and with the hope that it will give the paper a wider usefulness I have included a rough key to the accepted species. It is not pretended that the present paper supplies a finished study of the specific classification, but rather only a hastily prepared conservative synopsis which I hope may be preliminary to a future detailed descriptive account. Although it seems certain that future detailed work would cause the

reduction of some of the species here recognized, it is believed that the equally certain recognition of species here reduced will keep the total number of recognized species about as here given. The chief result of a protracted study would be the clarifying of specific lines and the naming and classifying of the abundant intraspecific variation.

During the preparation of this paper I have had Professor Piper's "Study of *Allocarya*" continually at hand, and have given his suggested classification a careful study. His treatment is based almost entirely upon the shape, sculpturing, and attachment of the nutlets; characters upon which he comments as follows:—"The nutlet characters seem remarkably constant, and in mixed gatherings serve perfectly to segregate the species. Relying on the constancy of the nutlet characters in particular, it is necessary to recognize additional species." The number of recognized species was increased from eighteen to seventy-nine. Although Piper's revision is based upon a wealth of material and shows every evidence of a patient and prolonged investigation I find that I am unable to follow it since I differ from its author in a fundamental point; *i.e.* I believe that the sculpturing and markings of the nutlets in *Allocarya* had best be considered excessively variable and consequently of minor if of any importance in the characterization of species. I am led to believe as I do because surprisingly numerous nutlet variations may be discovered in very small areas among plants remarkably uniform in aspect and in all other characters save those of nutlets. Piper has taken the nutlets as constant and has practically disregarded all other characters, whereas I have felt that a paralleling of several vegetative characters were more important than the variation of a single fruiting structure. The nutlet variations of *Allocarya* have been patiently worked out by Piper and named as species. These minute, very numerous microscopic species appear unpractical and seem justifiable only if they greatly increase the precision in identification and result in a more natural classification. Unfortunately even after considerable familiarity with his key to the numerous species I find it difficult to name plants satisfactorily according to Professor Piper's treatment, and I am compelled to believe that the minute nutlet sculpturings merely appear constant because their great arc of variation has been broken up and specific names associated with very short segments of variation. Though the classification seems carried to an unpractical extreme I would be glad to accept it were it clearly natural. Distribution, I feel, supplies one of the best tests of the naturalness of a species. By the disregard which Piper's species show for the principles underlying

Jordan's Law, Science n. s. xxii. 547 (1905), I feel forced to consider them, in a large part, to be unnatural entities. It is highly significant that by largely disregarding nutlet characters and basing species upon obvious external characters that a classification can be made which does not place closely related species together in the same small area. The four species of *Allocarya* recently published by Brand, Fedde Repert. xviii. 312 (1922), should also make one realize that the acceptance of species based upon unit nutlet characters will undoubtedly lead to the further multiplication of species, for future collecting is bound to turn up unnamed developments and a more careful examination of Piper's specimens is certain to reveal unnamed variations. This will soon make *Allocarya* one of those genera that are overdivided and hopelessly snarled, and one in which an identification is but rarely attempted—then only with a sigh—and never accomplished with either expedition or with confidence.

PLAGIOBOTHRYS F. & M. Ind. Sem. Hort. Petrop. ii. 46 (1835).
Echidiocarya Gray, Proc. Am. Acad. xi. 89 (1876). *Sonnea* Greene,
Pittonia i. 22 (1887). *Allocarya* Greene, *Pittonia* i. 12 (1887).

KEY TO SPECIES.

Leaves all alternate.

Caruncle of nutlet elongate, apparently extending along crest of ventral keel; nutlets trigonous, *Amsinckia*-like.

§ *Amsinckiopsis*.

Nutlets irregularly rugose; corolla 4–7 mm. broad.

Inflorescence elongated, loosely flowered; plant 1–4 dm. high.

1. *P. Kingii*.

Inflorescence glomerate or scarcely elongated, congested; plant 5–15 cm. tall.

2. *P. Harknessii*.

Nutlets conspicuously tessellate; corolla 1–2.5 mm. broad.

3. *P. Jonesii*.

Caruncle ovate or orbicular, at or below end of ventral keel.

Caruncle weakly developed, borne at tip of a short ventral stipe; nutlets lacking a broad transverse ventral groove.

16. *P. californicus*.

Caruncle well developed, sessile on nutlet, in a broad shallow transverse ventral groove.

Inflorescence glomerate; caruncle fragile, at or above the middle of nutlet; basal leaves lacking at maturity of plant. § *Sonnea*.

Nutlets dark, dull, conspicuously rugose and tuberculate, 1–2.3 mm. long.

4. *P. hispidus*.

Nutlets light colored, somewhat shiny, nearly smooth, 2.5–3 mm. long.

5. *P. glomeratus*.

Inflorescence elongate, racemose; caruncle cartilaginous, at or below middle of nutlet; basal leaves evident at maturity of plant. § *Euplagiobothrys*.

Calyx circumscissile in fruit, less than 4 mm. long; lobes usually connivent over fruit; usually only 1–2 nutlets developing.

Inflorescence a long simple bracteate raceme; stems usually about 2 dm. long, ascending,

- hispid, branched mainly below middle; nutlets highly arched in lateral outline, 1-2.5 mm. long; corolla 3 mm. broad 7. *P. arizonicus*.
- Inflorescence furcate, bracteate only at base if at all; stems strictly erect, about 3.5 mm. high, appressed hispid-villous, branched only above middle if at all; nutlets low and flattened in lateral outline, 2-3 mm. long; corolla 3-9 mm. broad. 6. *P. nothofulvus*.
- Calyx not circumscissile or if so the strongly accrescent calyx over 4 mm. in length; calyx-lobes erect or spreading; 4 nutlets usually developing.
- Nutlets with a conspicuous annular caruncle, 2.3-3.3 mm. long; calyx cleft to near base, fulvescent; corolla-tube slightly exceeding calyx. 8. *P. fulvus*.
- Nutlets with solid caruncle, less than 2.3 mm. long; calyx cleft $\frac{2}{3}$ to base.
- Transverse dorsal crests of nutlets very narrow and sharp, with medial keel enclosing polygonal granulate areas.
- Corolla-tube shorter than calyx; plants erect to prostrate, comparatively coarse-stemmed; leaves 3-7 mm. broad; Californian.
- Plant dye-stained throughout; nutlets 2. 9. *P. catalinensis*.
- Plant dye-stained if at all only at base; nutlets 4. 10. *P. canescens*.
- Corolla-tube equalling or slightly exceeding the calyx; plants very slender, strict or ascending; leaves 1.5-2.5 mm. broad; Chilian. 11. *P. tinctorius*.
- Transverse dorsal crests of nutlets very low and broad, separated only by low lineate grooves.
- Nutlets ovate, usually constricted only at apex, the base being rounded or rarely weakly constricted, dark-colored; plant dye-stained 12. *P. Torreyi*.
- Nutlets decidedly cruciform due to the abrupt equal constrictions at base and apex, glassy; plant only exceptionally dye-stained.
- Calyx 5-7 mm. long and nearly as wide; nutlets 2-2.7 mm. long; inflorescence bracteate; plant coarse, few-stemmed. 13. *P. shastensis*.
- Calyx 3-5(-7) mm. long, and about half as broad; nutlets 1.5-2 mm. long; slender, many-stemmed plants. 14. *P. tenellus*.
- Leaves opposite at least below.
- Nutlets attached to gynobase by a more or less well developed stipe-like ventral projection. § *Echidiocarya*.
- Stipe-like base about equaling body of nutlet, frequently united into pairs 15. *P. Pringlei*.
- Stipe-like base less than half length of body of nutlet, never joined into pairs 16. *P. californicus*.
- Nutlets attached directly to gynobase, without a definite stipe-like ventral prolongation. § *Allocarya*.

Plant perennial.

Flowers solitary in the axils.

Leaves linear; style greatly surpassing the nutlets. 17. *P. Kunthii*.

Leaves oblance-linear; style shorter or about equaling nutlets.

Leaves obtusish usually strigose-hispidulous 10-15 mm. long; corolla small, 2-3 mm. broad; compact alpine plants. 18. *P. pygmaeus*.Leaves acute, somewhat ciliate-strigose along margins and below on midrib; corolla 4-5 mm. broad; loosely branched submontane plants. 19. *P. linifolius*.

Flowers in axillary glomerules or racemes, frequently terminal; leaves linear.

Style greatly surpassing the nutlets. 20. *P. mollis*.

Style about equaling nutlets or evidently exceeded by them.

Pedicels becoming 2-5(-8) mm. long; mature herbage glabrate.

Leaves 2-2.5 mm. long; stems simple; calyx-lobes narrowly oblong, acutish, 3 mm. long.

21. *P. mexicanus*.Leaves 4.4-5 mm. long; stems branched above; calyx-lobes narrowly linear, obtusish, 2 mm. long. 22. *P. pedicellaris*.

Pedicels evidently less than 2 mm. long; mature herbage somewhat strigose-hispid.

Leaves 25(20)-60 mm. long; fruiting calyx 3 mm. long, lobes very narrowly linear; inflorescence a rather loose elongated raceme 15-20 mm. long, sparsely bracteate or naked. 23. *P. humilis*.Leaves 6-15(-25) mm. long; fruiting calyx 2 mm. long, lobes lance-linear; inflorescence a dense stout glomerule, 5-10 mm. long, leafy bracted throughout. 24. *P. congestus*.

Plant annual.

Spikes geminate. 25. *P. Scouleri*.

Spikes solitary.

Dorsal keel extending down length of nutlet, usually well developed.

Scar of nutlet solid, not below level of ventral keel; nutlets vitreous; Australian. 26. *P. australasicus*.

Scar of nutlet deeply excavated, below level of ventral keel; nutlets usually dull or glossy; Californian.

Nutlets 1-1.5 mm. long, weakly keeled dorsally; stems prostrate, much branched; fruiting calyces crowded. 27. *P. Piperi*.Nutlets 1.5-2 mm. long, strongly keeled dorsally; stems erect or ascending, loosely branched; fruiting calyces remote. 28. *P. Greenei*.

Dorsal keel not extending down to the middle of the nutlet, usually weakly developed.

Scar of nutlet nearly medial; plant dye-stained.

29. *P. patagonicus*.

Scar of nutlet at or near the base; plant not dye-stained.

- Ventral keel of nutlet sunken in a longitudinal groove; pedicels of lower fruiting calyces 5-20 mm. long, slender, spreading or recurved.
- Nutlets smooth and shiny, ovoid.....30. *P. lithocaryus*.
 Nutlets roughened, somewhat compressed. 31. *P. Chorisianus*.
- Ventral keel of nutlet prominent, not in a groove; pedicels of lower fruiting calyces less than 5 mm. long, coarse, stiff, strict or ascending.
- Midrib of calyx-lobes becoming indurated and enlarged in fruit; calyx sessile or subsessile by a narrowly conic base, usually asymmetrical in fruit.
- Plant very stout and fleshy.....32. *P. glaber*.
 Plant not stout and fleshy.
- Nutlets transversely rugose.....33. *P. humistratus*.
 Nutlets reticulately rugose.
- Branches strict or ascending.....34. *P. stipitatus*.
 Branches prostrate or widely spreading.
- Branches stiff; bracts few, mainly near base.....35. *P. divergens*.
 Branches merely stiffish; bracts more or less throughout inflorescence. 36. *P. Nelsoni*.
- Midrib of calyx-lobes scarcely indurate or thickened in fruit; calyx-lobes tending to differ sharply from the tube in structure; calyx usually pedicellate, symmetrical, base broadly conic.
- Plant sparsely hispid, lacking appressed hairs.
- Calyx 2.5-4 mm. long, short pedicellate; calyx-lobes 1-2 mm. long, much surpassed by corolla; inflorescence naked or with 1 or 2 bracts.....39. *P. Parishii*.
- Calyx 4-6 mm. long, subsessile; calyx-lobes 2-3 mm. long, about equaling corolla; inflorescence conspicuously leafy bracted.....40. *P. salsus*.
- Plant with pubescence at least in part of appressed hairs.
- Calyx-lobes spreading or reflexed in fruit, usually twice length of fruit.
- Nutlets reticulately rugose; scar large. 37. *P. plebejus*.
 Nutlets transversely rugose; scar medium size.....38. *P. trachycarpus*.
- Calyx-lobes connivent to ascending, 1-2 times length of nutlets.
- Calyx firm, strict; plant stiffly erect, glabrate.....41. *P. strictus*.
 Calyx herbaceous, tending to spread; plant prostrate to erect but not stiff, usually densely pubescent.
- Calyx-lobes 2-3 mm. long, 2 times length of nutlets.

- Leaves extremely narrow, 1-1.5 mm. broad; inflorescence practically naked. 42. *P. tenuifolius*.
- Leaves broadly linear, 2-5 mm. broad; inflorescence leafy-bracted.
- Nutlets not at all rugose or granulate. 43. *P. nitens*.
- Nutlets rugose or granulate or both. 44. *P. orthocarpus*.
- Calyx-lobes 1-2 mm. long, 1-1.5 times length of nutlets.
- Leaves fleshy, terete. 45. *P. mesembryanthemoides*.
- Leaves herbaceous, flattened.
- Nutlets muricate. 46. *P. muricatus*.
- Nutlets rugose.
- Nutlets transversely rugose, rugae usually low and broad; inflorescence usually naked above. 47. *P. scopulorum*.
- Nutlets reticulately rugose, rugae usually narrow and high; inflorescence usually leafy-bracted.
- Plant closely prostrate. 48. *P. Lechleri*.
- Plant erect or ascending. 49. *P. procumbens*.

1. *PLAGIOBOTHRYUS KINGII* (Wats.) Gray, Proc. Am. Acad. xx. 281 (1885). *Eritrichium Kingii* Wats. Bot. King Exped. 243, t. 23 (1871). *Sonnea Kingii* Greene, Pittonia i. 23 (1887). *Krynitzkia Kingii* Wats. acc. to Hillman, Agric. Exper. Sta. Nev. Bull. xxiv. 71 (1894).—Western Nevada and adjacent California. Apparently a rare species and known only from the vicinity of southern Washoe County, Nevada. It is well marked by its coarse spreading pubescence, large flowers, and naked geminate or ternate racemes.

2. *P. HARKNESSII* (Greene) Nels. & Macbr. Bot. Gaz. lxii. 143 (1916). *Sonnea Harknessii* Greene, Pittonia i. 23 (1887).—Eastern Oregon to Inyo County, California, and eastward to northwestern Utah. Much more common than the last and perhaps only a form of it.

3. *P. JONESII* Gray, Synop. Fl. ed. 2, ii. pt. 1, 430 (1886). *Sonnea Jonesii* Greene, Pittonia i. 23 (1887).—Eastern border of Southern California. Specimens from Inyo County, California, differ from the type in their prostrate habit and may represent an unnamed variety or species. The nutlets of this species remarkably simulate those of *Amsinckia tessellata*. Because of this Jones, Contr. W. Bot. xii. 57 (1908), wrote that "*Plagiobothrys Jonesii* Gray is an *Amsinckia* in every thing but the flowers, which are white. It has the tessellated pavement-like nutlets of *A. tessellata* and a little sharper

rugae, and illustrates again the very slim foundation on which some Boraginaceous genera rest." These ideas were accepted and repeated by Nelson and Macbride, Bot. Gaz. lxii. 143 (1916), in the following form,—“In this connection Jones has called attention to the fact that *P. Jonesii* . . . is an *Amsinckia* in everything but its white flowers. . . . The pubescence of *P. Jonesii* and the tessellated nutlets surely suggest a relationship to *A. tessellata*, but the white and short corollas that are so widely at variance with the long yellow ones of *Amsinckia* are perfectly congeneric with the SONNEA section of *Plagiobothrys*.” The above quotations show a striking lack of acquaintance with the real characters of *Plagiobothrys* and *Amsinckia* and are examples of hasty generalizations based upon superficialities. *Plagiobothrys Jonesii* and immediate relatives simulate species of *Amsinckia* in the form of nutlets, but are clearly not directly related in that genus, for like other species of *Plagiobothrys* they have undivided cotyledons and short appendaged corollas.

4. *P. hispida* Gray, Proc. Am. Acad. xx. 286 (1885). *Sonnea hispida* Greene, Pittonia i. 22 (1887).—Eastern Oregon southward through northeastern California and extreme western Nevada to the region about Mono Lake.

4a. *P. hispida*, var. *foliaceus* (Greene), comb. nov. *Sonnea foliacea* Greene, Pittonia i. 222 (1888). *P. foliaceus* Nels. & Macbr. Bot. Gaz. lxii. 143 (1916).—Known only from Washoe Mts., Nevada. Nelson and Macbride speak of the “dorsal depressions of the nutlets” as being “particularly unique” for this plant, but I find that exactly similar developments are frequent in *P. hispida*, var. *genuinus* and in *P. glomeratus*. The nutlets of the var. *foliaceus* are 2–2.5 mm. long, instead of 1.5–2 mm. long as in the var. *genuinus*, and appear to be elongated so that the scar appears decidedly above the middle rather than near the middle of the nutlet. The dorsal surface of the nutlets in the var. *foliaceus* lack the coarse papillae or irregular short elongate roughenings characteristic of the var. *genuinus*, instead showing a maximum development of the granulations which in the case of the var. *genuinus* are crowded by the larger rugosities nearly to extinction. Greene’s species is not given specific recognition because it is only known from the type collection. It is possible that the plant is a hybrid between *P. hispida* and *P. glomeratus*.

5. *P. glomeratus* Gray, Proc. Am. Acad. xx. 286 (1885). *Sonnea glomerata* Greene, Pittonia i. 22 (1887).—Western Nevada, rare. Characterized by its large rather smooth nutlets.

6. *P. NOTHOFULVUS* Gray, Proc. Am. Acad. xx. 285 (1885). *Eritrichium nothofulvum* Gray, l. c. xvii. 227 (1882).—Frequent over the length of California and locally reaching to the Columbia River Valley.

7. *P. ARIZONICUS* (Gray) Greene in Gray, Proc. Am. Acad. xx. 284 (1885). *Eritrichium canescens*, var. *arizonicus* Gray, l. c. xvii. 227 (1882).—Western New Mexico to Southern California. The species grows in arid situations, and in California is primarily a plant of the desert from which it occasionally extends through the low passes to the driest of the transmontane valleys. The species is quite variable as to nutlets, and in calyx and habit makes a close approach to, if it does not actually intergrade with *P. canescens*.

8. *P. fulvus* (H. & A.), comb. nov. *Myosotis fulva* H. & A. Bot. Beech. 38 (1830). *Eritrichium fulvum* A.DC. Prodr. x. 132 (1846). *M. alba* Colla, Mem. Acad. Torino xxxviii. 128, t. 42 (1835). *P. rufescens* F. & M. Ind. Sem. Hort. Petrop. ii. 46 (1835 or early 1836). *E. asperum* Phil. Anal. Univ. Chile xliii. 516 (1873). *E. laxiflorum* Phil. l. c. xc. 527 (1895). *P. rufescens*, var. *laxiflorus* Reiche, Anal. Univ. Chile cxxi. 812 (1908). *E. Rengifoanum* Phil. l. c. xc. 529 (1895). *P. rufescens*, var. *Renjifoanus* Reiche, l. c.—Central Chile.

8a. *P. fulvus*, var. *campestris* (Greene), comb. nov. *P. campestris* Greene, Pittonia ii. 282 (1892). *P. rufescens*, var. *campestris* Jeps. Fl. W. Midd. Calif. 446 (1901). *P. californicus* Greene, Pittonia ii. 231 (1892); not Greene (1887).—California from San Luis Obispo County and the upper San Joaquin Valley northward through the Sacramento Valley to southern Oregon. Through a misunderstanding Gray, Proc. Am. Acad. xx. 282 (1885), cited a specimen of *P. rufescens* as from "near Los Angeles." The Nevin collection upon which this record was based actually came from "n. Sacramento Co." The Oregon collections may represent a distinct variety, their nutlets being dark in color and nearly lacking the transverse dorsal rugae. The Californian plants do not differ in fruit from the Chilian ones, and it is only because the southern plants seem more slender than the northern material that the latter is put into a distinct variety.

9. *P. CATALINENSIS* (Gray) Macbr. Proc. Am. Acad. li. 546 (1916). *P. arizonicus*, var. *catalinensis* Gray, Synop. Fl. ed. 2, ii. pt. 1, 431 (1886).—Endemic on Santa Catalina Island, California. This species is intermediate in its characters between *P. canescens* and *P. arizonicus*, having the few nutlets and dye-stained herbage of the latter, and the spreading non-circumscissile calyx of the former. As dye is frequently developed in indubitable *P. canescens* (cf. Heller

7758 from Mohave, Calif.), and specimens of the var. *apertus* frequently have imperfectly circumscissile calyces, the claims of *P. arizonicus* and *P. catalinensis* to specific rank are clouded ones, the two species being maintained only for convenience pending further study.

10. *P. CANESCENS* Benth. Pl. Hartw. 326 (1849). *Eritrichium canescens* Gray, Proc. Am. Acad. x. 57 (1874). *P. microcarpa* Greene, Pittonia i. 21 (1887). *P. canescens*, var. *apertus* Greene, l. c.—Ranging the length of California. The typical phase of this species is the small, 1.5–2 dm. high, erect-growing plant which is most common in the Sacramento Valley. The var. *apertus* is best restricted to the large prostrate or subprostrate plant, usually with stellately spreading calyx-lobes, which is most common in the upper San Joaquin Valley. There are numerous other unnamed variations.

11. *P. TINCTORIUS* (R. & P.) Gray, Proc. Am. Acad. xx. 283 (1885). *Lithospermum tinctorium* R. & P. Fl. Peruv. ii. 4, t. 114 (1799). *Eritrichium tinctorium* A. DC. Prodr. x. 132 (1846). *L. myosotoides* Lehm. Asperif. ii. 319 (1818). *L. tingens* R. & S. Syst. iv. 44 (1819). *E. verrucosum* Phil. Linnaea xxix. 17 (1857).—Central Chile.

12. *P. TORREYI* Gray, Proc. Am. Acad. xx. 284 (1885). *Eritrichium Torreyi* Gray, l. c. x. 58 (1875). *Cryptanthe Torreyi* Rydb. Mem. N. Y. Bot. Gard. i. 331 (1900).—California; apparently confined to vicinity of Yosemite Valley.

12a. **P. Torreyi**, var. **diffusus**, var. nov., laxis prostratus; caulibus ad basin florigeris; floribus numerosis; calyce fructifero 3–4 mm. longo 3–4.5 mm. lato; bracteis grandis conspicuissimis.—CALIFORNIA: Sierra Valley, Lemmon. Donner Lake, Heller 6986 (TYPE, Gray Herb.). Sunnyside, Lake Tahoe Region, Eastwood 1067. About Tallac, July 1904, M. S. Baker. Echo Camp on Lincoln Highway, Heller 12,158. Yosemite, 1878, Lemmon. Upper San Joaquin, Madera Co., 1895, Congdon. Okenden, Pine Ridge, Fresno Co., Hall & Chandler 273. Volcano Cr., Tulare Co., Hall & Babcock 5317. This is the most common and widely distributed phase of *P. Torreyi*. It was mentioned by Gray when he described the species, but was not named by him. The type of *P. Torreyi* is evidently *Torrey* 338 and that is the slender erect-growing plant with few leaves and bracts which is frequently collected in the region about Yosemite Valley. The typical phase of *P. Torreyi* and the var. *diffusus* are quite dissimilar in aspect, differing as they do in direction of growth, leafiness, amount of branching, and size of bracts. Young forms of var. *diffusus* might be confused with typical *Torreyi*, but may be usually distinguished by having the lower floral bracts three or more times as long as the calyx.

12b. **P. Torreyi**, var. **perplexans**, var. nov., erectus gracilior altior apicem versus laxe ramosus; bracteis inconspicuis paucis; nuculis ovatis basin versus paulo constrictis; habitu *P. tenelli* sed caulibus colorantibus.—CALIFORNIA: Greenhorn Pass, alt. 4–5000 ft., *Purpus 5542* (TYPE, Univ. Calif.). Greenhorn Range, Kern Co., alt. 5000 ft., *Hall & Babcock 5041*. This variety has a characteristic habit, but it is primarily distinguished by its nutlets which, while most like those of *P. Torreyi*, have weakly constricted bases and so suggest the nutlets of *P. tenellus*. The new variety can be looked upon as a connecting link between *P. tenellus* and *P. Torreyi*, but due to its combining of characters it suggests a hybrid and so, pending further information, I am leaving the status of its possible parents unchanged.

13. **P. SHASTENSIS** Greene in Gray, Proc. Am. Acad. xx. 284 (1885).—California from the lower San Joaquin Valley northward to southern Oregon; not common. A very near relative of *P. tenellus* and perhaps only a rankly growing strain of it, but usually to be recognized by its large fruiting calyces and nutlets, erect simple few-flowered stems, and soft pubescence. It superficially suggests *P. canescens* but may be readily told by its very different nutlets.

14. **P. TENELLUS** (Nutt.) Gray, Proc. Am. Acad. xx. 283 (1885). *Myosotis tenella* Nutt. in Hook. Kew Jour. Bot. iii. 295 (1851), nom. subnudum. *Eritrichium tenellum* Gray, l. c. x. 57 (1875). *P. echinatus* Greene, Pittonia iii. 262 (1898). *P. asper* Greene, l. c. *P. humifusa* Jones, Contr. W. Bot. xiii. 7 (1910).—British Columbia to northern Utah and Nevada, and southward through the coastal drainage of California to northern Lower California. This is the most widely ranging and most variable of the species of true *Plagiobothrys*. Greene has named a number of forms, but these do not seem striking or constant enough to warrant their recognition. *Plagiobothrys asper* is a conspicuously hispid phase, which is not geographically correlated and intergrades so gradually and completely with the normal villous forms that its recognition even as a *forma* seems unpractical. *Plagiobothrys humifusus* is a compact form of *P. asper*.

14a. **P. tenellus**, var. **parvulus** (Greene), comb. nov. *P. parvulus* Greene, Pittonia iii. 261 (1898).—California; along the South Coast Ranges from San Francisco Bay Region to San Luis Obispo County. This is the prevailing form of the species in the area of its occurrence, and from its geographic correlation perhaps deserves minor recognition. It differs from other forms of the species by having its nutlets 1–1.5 mm. long and its fruiting calyces 2 mm. long or less.

In the typical form of the species the nutlets are 1.5–2 mm. long and the calyces measure 2–3 mm. in length.

14b. **P. tenellus**, var. **colorans**, comb. nov. *P. colorans* Greene Pittonia iii. 262 (1898).—Known only from extreme northern California. A poorly understood plant which appears to be only a dye-stained form of *P. tenellus*.

15. **P. PRINGLEI** Greene, Pittonia i. 21 (1887). *Echidiocarya arizonica* Gray, Proc. Am. Acad. xi. 89 (1875).—Southern Arizona and adjacent Sonora.

16. **P. CALIFORNICUS** (Gray) Greene, Bull. Calif. Acad. ii. 407 (1887). *Echidiocarya californica* Gray, Proc. Am. Acad. xii. 164 (1877). *P. Cooperi* Gray, l. c. xx. 285 (1885).—Southern California and northern Lower California. Differing from the last only in the length of the stipe-like base of the nutlet. There are the following well marked varieties.

Corolla 4–7 mm. broad; pubescence fine, appressed, usually somewhat silky.....var. *genuinus*.

Corolla 1–3 mm. broad; pubescence usually spreading.

Leaves narrowly linear, 2–2.5 mm. broad; pubescence fine, canescent.....var. *gracilis*.

Leaves oblanceolate, 3–5 mm. broad; pubescence coarse, fulvescent.

Racemes dense, hidden among the leaves.....var. *ursinus*.

Racemes elongated, projected from among the leaves and evident.....var. *fulvescens*.

16a. **P. californicus**, var. **genuinus**, var. nov.—CALIFORNIA: Near San Gabriel, *Brewer 147*. Near Upland, *Johnston 1839*. San Bernardino, *Parry 213*. Corona, *Johnston 1876*. Las Flores, *Abrams 3276*. La Jolla, *Clements 110*. San Diego, *Spencer 126*; *Brandege 1637*. LOWER CALIFORNIA: Tia Juana Valley, April 1882, *Pringle*. San Rafael Valley, April 1885, *Orcutt*. The above cited suite of selected specimens covers the range of *genuinus*. It is the common form on the grassy hillsides on the coastal drainage of Southern California. The stems are long, lax, and strigose-canescens. It has conspicuous corollas, large fruiting calyces, and broad oblanceolate leaves.

16b. **P. californicus**, var. **gracilis**, var. nov., hispidulosus minutiflorus; caulibus pergracilibus; foliis lanceolato-linearibus acutis sparsis; sepalis angustis.—CALIFORNIA: La Jolla, *Clements 111*. San Diego, *Brandege 1658* (TYPE, Gray Herb.); *Orcutt 1014*, in part. LOWER CALIFORNIA: Cedros Island, *Palmer 711*. Without locality *Parry*. A very well marked variety which apparently grows with var. *genuinus* and seems much less common. It is perhaps specifically distinct.

16c. **P. californicus**, var. **ursinus** (Gray), comb. nov. *Echidnocyarya ursina* Gray, Proc. Am. Acad. xix. 90. (1883). *P. ursinus* Gray, l. c. xx. 285 (1885).—CALIFORNIA: San Bernardino Mts., *Parish 927* (TYPE); *Munz 5725*. San Jacinto Mts., *Spencer 1656*; *Munz & Johnston 5416*. LOWER CALIFORNIA: Without locality. *Orcutt 908*. A variety inhabiting warm montane valleys and differing from the following only in its congested inflorescence.

16d. **P. californicus**, var. **fulvescens**, var. nov., hispidus minutiflorus; caulibus elongatis prostratis; foliis oblanceolatis; inflorescentia elongata remotiflora a foliis non obscurata.—CALIFORNIA: Santa Barbara, 1888, *T. S. Brandegee* (TYPE, Gray Herb.). Witch Creek, *Alderson 7625*. LOWER CALIFORNIA: Hansen's Ranch, April 1885, *Orcutt*.

17. **P. Kunthii** (Walp.), comb. nov. *Anchusa Kunthii* Walp. Nov. Act. Nat. Cur. xix. suppl. 1, 372 (1843). *Allocarya linifolia*, var. *Kunthii* Macbr. Proc. Am. Acad. li. 545 (1916). *Antiphytum Walpersii* A.DC. Prodr. x. 122 (1846). *Eritrichium Walpersii* Wedd. Chlor. And. ii. 90 (1859).—I associate with this name two Bolivian collections (*Mandon 382, 383*) in the herbarium of the New York Botanical Garden. The flowers are solitary in the axils and the corollas have very elongate tubes and conspicuous (ca. 4 mm. broad) limbs. The style surpasses the mature nutlets by nearly 2 mm. The pedicels are very slender becoming nearly 5 mm. long. Walpers's description is extremely short and vague, the Mandon collections being associated with it only because they come from Lake Titicaca, the type region of *Anchusa Kunthii*, and because they alone among the available Peruvian and Bolivian material agree with the "floribus solitariis, axillaribus" of the original diagnosis.

18. **P. pygmaeus** (HBK.), comb. nov. *Anchusa pygmaea* HBK. Nov. Gen. et Sp. iii. 92 (1818). *Eritrichium pygmaeum* Wedd. Chlor. And. ii. 89 (1859). *Lithospermum alpinum* R. & S. Syst. iv. 742 (1819).—Ecuador.

19. **P. linifolius** (Lehm.), comb. nov. *Anchusa linifolia* Lehm. Asperif. i. 215 (1818). *Antiphytum linifolium* A.DC. Prodr. x. 121 (1846). *Eritrichium linifolium* Wedd. Chlor. And. ii. 89 (1859). *Krynitzkia linifolia* Gray, Proc. Am. Acad. xx. 266 (1885). *Allocarya linifolia* Macbr. Proc. Am. Acad. li. 545 (1916). *Anchusa oppositifolia* HBK. Nov. Gen. et Sp. iii. 91, t. 200 (1818).—Ecuador.

20. **P. mollis** (Gray), comb. nov. *Eritrichium molle* Gray, Proc. Am. Acad. xix. 89 (1883). *Allocarya mollis* Greene, Pittonia i. 20 (1887).—California, along the northern Sierras, and in adjacent Nevada and Oregon.

20a. **P. mollis** var. **vestita** (Greene), comb. nov. *Allocarya vestita* Greene, *Erythea* iii. 125 (1895). *A. mollis*, var. *vestita* Jepson, *Fl. Midd. W. Calif.* 442 (1901).—Middle California; rare. Known only from Marin and Tulare counties. It is apparently a geographical variety differing from the typical form of the species in its darker and more loosely reticulate-rugose nutlets.

21. **P. mexicanus** (Macbr.), comb. nov. *Allocarya mexicana* Macbr. *Contr. Gray Herb.* lix. 34 (1919).—Mexico. Known only from the type collection made in the state of Mexico.

22. **P. pedicellaris** (Phil.), comb. nov. *Eritrichium pedicellare* Phil. *Anal. Univ. Chile* xc. 549 (1895). *Allocarya pedicellaris* Reiche, *Anal. Univ. Chile* cxxi. 809 (1907).—Chile. Known to me only by descriptions.

23. **P. humilis** (R. & P.), comb. nov. *Myosotis humilis* R. & P. *Fl. Peruv.* ii. 5 (1799). *Eritrichium humile* A.DC. *Prodr.* x. 133 (1846). *Allocarya humilis* Greene, *Pittonia* i. 17 (1887). *Amsinckia humifusa* Walp. *Nov. Act. Nat. Cur.* xix. suppl. 1, 371 (1843). *Benthania humifusa* Druce, *Rep. Bot. Exch. Cl. Brit. Isl.* iv. 298 (1916). *E. Germaini* Phil. *Anal. Univ. Chile* xc. 550 (1895). *Allocarya Germaini* Reiche, *Anal. Univ. Chile* cxxi. 809 (1907).—Peru and Bolivia. Apparently also in Chile, Philippi's species being doubtfully associated with the Peruvian one.

24. **P. congestus** (Wedd.), comb. nov. *Eritrichium humile*, var. *congestum* Wedd. *Chlor. And.* ii. 88 (1859).—Peru and Bolivia, apparently at high altitudes.

25. **P. Scouleri** (H. & A.), comb. nov. *Myosotis Scouleri* H. & A. *Bot. Beech.* 370 (1840), nom. subnudum. *Eritrichium Scouleri* A.DC. *Prodr.* x. 130 (1846). *Krynitzkia Scouleri* Gray, *Proc. Am. Acad.* xx. 267 (1885). *Allocarya Scouleri* Greene, *Pittonia* i. 18 (1887). *E. sessiliflorum* A.DC. l. c. 133. *A. sessilifolia* Greene, l. c. 17. *A. hirta* Greene, l. c. 161 (1888). *A. Scouleri*, var. *hirta* Nels & Macbr. *Bot. Gaz.* lxi. 36 (1916). *A. calycosa* Piper, *Contr. U. S. Nat. Herb.* xxii. 101 (1920). *A. figurata* Piper, l. c. 101. *A. dichotoma* Brand in Fedde, *Repert.* xviii. 313 (1922).—Oregon to southern British Columbia, and apparently also in central Chile.

26. **P. australasicus** (A.DC.), comb. nov. *Eritrichium australasicum* A.DC. *Prodr.* x. 134 (1846). *Allocarya australasica* Greene, *Erythea* iii. 57 (1895).—Australia. This is the only extra-American species of the genus.

27. **P. Piperi**, nom. nov. *Allocarya microcarpa* Piper, *Contr. U. S. Nat. Herb.* xxii. 91 (1920); not *P. microcarpus* Greene (1887).—

Known only from Mariposa County, California. Superficially nearly indistinguishable from *P. scopulorum*, but in fruit-characters clearly allied with *P. Greenei*.

28. **P. Greenei** (Gray), comb. nov. *Echinospermum Greenei* Gray, Proc. Am. Acad. xii. 163 (1877). *Allocarya Greenei* Greene, Bot. San Francisco 259 (1894). *A. Echinoglochin* Greene, Pittonia i. 15 (1887). *A. Austinae* Greene, Pittonia i. 18 (1887). *A. hystriacula* Piper, Contr. U. S. Nat. Herb. xxii. 87 (1920). *A. acanthocarpa* Piper, l. c. 87. *A. oligochaeta* Piper, l. c. 88. *A. echinacea* Piper, l. c. 88. *A. cristata* Piper, l. c. 89. *A. Eastwoodae* Piper, l. c. 89. *A. glyptocarpa* Piper, l. c. 90. *A. spiculifera* Piper, l. c. 90. *A. anaglyptica* Piper, l. c. 90. *A. papillata* Piper, l. c. 91. *A. distantiflora* Piper, l. c. 91.—Occuring over the length of California. Very conspicuously variable in the sculpturing and arming of the nutlets, even in a single locality, and apparently showing no tendency to break up into definite geographic variants. Some of the conspicuous extremes might well be treated as *formae*. *Allocarya glyptocarpa* probably is specifically distinct differing from the great mass of *P. Greenei* in its large corollas and elongate nutlets.

29. **P. patagonicus**, sp. nov., annuus tinctus; caulibus prostratis diffuse ramosis ca. 1 dm. longis sparse brevique villosis; foliis ovato-oblongis vel oblongis 13–15 mm. longis 3–5 mm. latis, infimis oppositis; racemis elongatis maturitate remote florentibus cum bracteis foliaceis; floribus albis ca. 2.5 mm. longis; corollae tubo calyce longiori cylindrico, lobis ascendentibus; calyce strigoso-hispido ad basin partito ad anthesin ca. 2 mm. longo fructifero aperto 3–4 mm. longo; nuculis 4 late ovatis ca. 1.5 mm. longis dorso congeste humileque rugosis ventrale carinatis in media parte ad gynobasin humilem adfixis.—ARGENTINA: Patagonia, 50° 3' Lat., 1882, *Moreno & Tonini 530* (TYPE, N. Y. Bot. Gard.). San Carlos de Bariloche, 800 m. alt., *Buchtien 118* (U. S.). In gross aspect much resembling *P. Torreyi*, var. *diffusus*, and in most parts suggesting a true *Plagiobothrys* rather than a species of *Allocarya* which it must be because of its opposite lower leaves. It is probably the "*Plagiobothrys decumbens*" of Macloskie, Fl. Patag. 679 (1905), and perhaps also the "*Cryptanthe globulifera*" of Skottsberg, Svenska Vet. Akad. Handl. lvi. no. 5, 290 (1916).

30. **P. lithocaryus** (Greene), comb. nov. *Krynitzkia lithocarya* Greene in Gray, Proc. Am. Acad. xx. 265 (1885). *Allocarya lithocarya* Greene, Pittonia i. 12 (1887).—California, along the North Coast Ranges. Rare.

31. **P. Chorisianus** (Cham.), comb. nov. *Myosotis Chorisiana* Cham. *Linnaea* iv. 444 (1829). *Eritrichium Chorisianum* A. DC. *Prodr.* x. 130 (1846). *Krynitzkia Chorisiana* Gray, *Proc. Am. Acad.* xx. 267 (1885). *Allocarya Chorisiana* Greene, *Pittonia*, i. 13 (1887). *E. connatifolium* Kell. *Proc. Calif. Acad.* ii. 163, f. 51 (1862). *A. Hickmanii* Greene, *Pittonia* i. 13 (1887). *A. myriantha* Greene, *Erythea* iii. 125 (1895). *A. Jonesii* Brand in Fedde, *Repert.* xviii. 313 (1922).—California, from San Francisco to Santa Barbara counties.

32. **P. glaber** (Gray), comb. nov. *Lithospermum glabrum* Gray, *Proc. Am. Acad.* xvii. 227 (1882). *Allocarya glabra* Macbr. *Proc. Am. Acad.* li. 543 (1916). *A. salina* Jepson, *Fl. W. Midd. Calif.* 442 (1901).—Middle California, and doubtfully also Arizona. Mrs. Brandegee, *Zoe* v. 94 (1901), doubts the Arizonian origin of the type of *L. glabrum*. No undoubted material is at hand from Arizona, and Professor J. J. Thornber of the University of Arizona writes me that he has neither collected such a plant in Arizona nor knows of anyone else having done so. It is possible that the following four species had best be treated as varieties of the present one.

33. **P. humistratus** (Greene), comb. nov. *Allocarya humistrata* Greene, *Pittonia* i. 16 (1887). *A. scripta* Greene, l. c. 142. *A. limicola* Piper, *Contr. U. S. Nat. Herb.* xxii. 97 (1920). *A. sigillata* Piper, l. c.—Middle California.

34. **P. stipitatus** (Greene), comb. nov. *Allocarya stipitata* Greene, *Pittonia* i. 19 (1887).—*Lappula stipitata* Druce, *Rep. Bot. Exch. Cl. Brit. Isl.* v. 38 (1918). *A. stipitata*, subsp. *micrantha* Piper, *Contr. U. S. Nat. Herb.* xxii. 94 (1920). *A. ambigens* Piper, l. c. 96.—Middle California. There are two conspicuous extremes in flower-size.

35. **P. divergens** (Piper), comb. nov. *Allocarya divergens* Piper, *Contr. U. S. Nat. Herb.* xxii. 92 (1920). *A. charaxata* Piper, l. c. 96.—California, from Tulare County to San Diego County.

36. **P. Nelsonii** (Greene), comb. nov. *Allocarya Nelsonii* Greene, *Erythea* iii. 48 (1895). *A. leptoclada* Greene, *Pittonia* iii. 109 (1896). *A. oricola* Piper, *Contr. U. S. Nat. Herb.* xxii. 92 (1920). *A. asperula* Piper, l. c. 93. *A. Wilcoxii* Piper, l. c. 93. *A. setulosa* Piper, l. c. 93. *A. Leibergii* Piper, l. c. 95. *A. tuberculata* Piper, l. c. 95. *A. fragilis* Brand in Fedde, *Repert.* xviii. 312 (1922).—Eastern Oregon and northern Nevada and northwestward to Montana and adjacent Saskatchewan.

37. **P. plebejus** (Cham.), comb. nov. *Lithospermum plebejum* Cham. *Linnaea* iv. 446 (1829). *Eritrichium plebeium* A. DC. *Prodr.*

x. 133 (1846). *Krynitzkia plebeia* Gray, Proc. Am. Acad. xx. 266 (1885). *Allocarya plebeia* Greene, Pittonia i. 16 (1887).—Alaska.

38. **P. trachycarpus** (Gray), comb. nov. *Krynitzkia trachycarpa* Gray, Proc. Am. Acad. xx. 266 (1885). *Allocarya trachycarpa* Greene, Pittonia i. 14 (1887). *Myosotis californica* F. & M. Ind. Sem. Hort. Petrop. ii. 42 (1835). *Eritrichium californicum* A. DC Prodr. x. 130 (1846). *K. californica* Gray, l. c. *A. californica* Greene, l. c. 20; not *P. californicus* Greene (1887). *A. diffusa* Greene, l. c. 14. *A. interrasilis* Piper, Contr. U. S. Nat. Herb. xxii. 108 (1920). *A. commixta* Brand in Fedde, Repert. xviii. 312 (1922).—Coast Ranges of middle California. The type of *K. trachycarpa*, Brewer 1007 from Sonoma County, is a good match for authentic specimens of *M. californica*, and appears to represent the very slender plant with long lax leafy stems and linear spreading calyx-lobes which seems to replace *P. scopulorum* in the region along the middle Coast Ranges of California. As I have taken it *P. trachycarpus* may consist of two things, the southern plants seeming to be less diffuse and to have shorter calyx-lobes.

39. **P. Parishii**, nom. nov. *Eritrichium Cooperi* Gray, Proc. Am. Acad. xix. 89 (1883). *Krynitzkia Cooperi* Gray, l. c. xx. 267 (1885). *Allocarya Cooperi* Greene, Pittonia i. 19 (1887); not *P. Cooperi* Gray (1885).—Mohave Desert of California.

40. **P. salsus** (Brandg.), comb. nov. *Allocarya salsa* Brandg. Bot. Gaz. xxvii. 452 (1899). *A. jacunda* Piper, Bull. Torr. Cl. xxix. 643 (1902). *A. Cusickii*, var. *jacunda* Nels. & Macbr. Bot. Gaz. lxi. 36 (1916).—Nevada and eastern Oregon.

41. **P. strictus** (Greene), comb. nov. *Allocarya stricta* Greene, Pittonia ii. 231 (1892).—Northern California, perhaps best restricted to the Calistoga plant.

42. **P. tenuifolius** (Gray), comb. nov. *Krynitzkia tenuifolia* Gray, Proc. Am. Acad. xx. 267 (1885). *Eritrichium tenuifolium* Phil. Anal. Univ. Chile xlii. 518 (1873), nom. nudum, & xc. 546 (1895). *Allocarya tenuifolia* Greene, Erythea iii. 57 (1895). *E. humile*, var. *capitatum* Clos in Gay, Fl. Chile iv. 471 (1849). *E. tenuifolium*, var. *longipes* Phil. l. c. xlii. 518 (1873). *A. tenuifolia*, var. *longipes* Reiche, Anal. Univ. Chile cxxi. 806 (1907).—Chile.

43. **P. nitens** (Greene), comb. nov. *Allocarya nitens* Greene, Pittonia iii. 108 (1896).—Nevada and Utah, apparently rare. Perhaps only a phase of the next.

44. **P. orthocarpus** (Greene), comb. nov. *Allocarya orthocarpa* Greene, Pittonia iv. 235 (1901).—Washington and Nevada, eastward to Utah and Colorado. A rare and poorly understood species.

45. **P. mesembryanthemoides** (Speg.), comb. nov. *Eritrichium mesembryanthemoides* Speg. Anal. Soc. Cientf. Argent. liii. 136 (1902).—Patagonia.

46. **P. muricatus** (R. & P.), comb. nov. *Lithospermum muricatum* R. & P. Fl. Peruv. ii. 4 (1799). *Eritrichium muricatum* A.DC. Prodr. x. 132 (1846). *Allocarya muricata* Reiche, Anal. Univ. Chile cxxi. 810 (1907).—Chile. This plant may be a *Cryptantha*, although Philippi's note, Anal. Univ. Chile xc. 540 (1895), makes it seem improbable. It is possible that the species should be amplified to include the concepts here called *P. procumbens* and *P. scopulorum*.

47. **P. scopulorum** (Greene), comb. nov. *Allocarya scopulorum* Greene, Pittonia i. 16 (1887). *Eritrichium californicum*, var. *subglochidiatum* Gray in Wats. Bot. Calif. i. 526 (1876). *Krynitzkia californica*, var. *subglochidiata* Gray, Proc. Am. Acad. xx. 266 (1885). *A. subglochidiata* Piper, Contr. U. S. Nat. Herb. xi. 485 (1906). *A. hispidula* Greene, l. c. 17. *A. Cusickii* Greene, l. c. 17. *A. penicillata* Greene, l. c. 18. *A. tenera* Greene, l. c. iii. 109 (1896). *A. cognata* Greene, l. c. iv. 235 (1901). *A. bracteata* Howell, Fl. N. W. Amer. 481 (1901). *A. cryocarpa* Piper, Contr. U. S. Nat. Herb. xxii. 98 (1920). *A. gracilis* Piper, l. c. 98. *A. laxa* Piper, l. c. 98. *A. pratensis* Piper, l. c. 99. *A. cervina* Piper, l. c. 100. *A. ramosa* Piper, l. c. 100. *A. vallata* Piper, l. c. 101. *A. undulata* Piper, l. c. 104. *A. minuta* Piper, l. c. 104. *A. scalpta* Piper, l. c. 104. *A. reticulata* Piper, l. c. 105. *A. areolata* Piper, l. c. 105. *A. inornata* Piper, l. c. 106. *A. media* Piper, l. c. 107. *A. divaricata* Piper, l. c. 107. *A. insculpta* Piper, l. c. 109. *A. dispar* Piper, l. c. 109. *A. granulata* Piper, l. c. 109. *A. conjuncta* Piper, l. c. 109. *A. corrugata* Piper, l. c. 110. *A. scalpocarpa* Piper, l. c. 111.—Western United States and adjacent Canada. This is the most common and widely distributed *Allocarya*, and that which has mostly borne the name *A. californica*. It varies considerably in the marking and sculpturing of the nutlets, and to a less extent in habit as well. A careful study will probably cause the recognition of a number of forms here submerged. There is a large-flowered plant on Vancouver Island (e.g. *Macoun* 56, 680), and a stiffish strict one of western Oregon (e.g. *Sheldon* 10,577) which may be distinct. Some plants from the Argentine, for the present referred to *P. procumbens*, seem indistinguishable from certain of the North American specimens.

48. **P. Lechleri**, nom. nov. *Eritrichium albiflorum* Griseb. Abhandl. Ges. Wiss. Gött. vi. 131 (1854); not *Myosotis albiflora* B. & S. in Hook. f. Fl. Antarct. ii. 329 (1847).—Patagonia and Fuego. This

is the plant which has been variously identified as *Eritrichium albiflorum* (Grisebach, l. c.), *E. diffusum* (Dusén, Svenska Exped. Magell. iii. 132 (1900)), and *Allocarya procumbens* (Skottsberg, Svenska Vet. Akad. Handl. lvi. 289 (1916)). It was a specimen of this species, incorrectly identified as *Myosotis albiflora*, that gave Greene, Erythea iii. 57 (1895), his reasons for proposing the combination, *Allocarya albiflora*. Regarding the identity of *Myosotis albiflora* B. & S. see the lengthy note by Skottsberg, l. c. 290–291, t. 23, f. 8a–d.

49. *P. PROCUMBENS* (Colla) Gray, Proc. Am. Acad. xx. 283 (1885), *Myosotis procumbens* Colla, Mem. Acad. Torino xxxviii. 130 (1834). *Eritrichium procumbens* A.DC. Prodr. x. 133 (1846). *Allocarya procumbens* Greene, Pittonia i. 17 (1887). *E. tenuicaule* Phil. Linnaea xxix. 18 (1857). *A. tenuicaulis* Macbr. Proc. Am. Acad. li. 544 (1916). *E. uliginosum* Phil. Anal. Univ. Chile xliii. 519 (1873). *A. uliginosa* Greene, l. c. 14. *E. calandrinoides* Phil. Anal. Univ. Chile xc. 541. (1895). *E. oppositifolium* Phil. l. c. 542. *A. oppositifolia* Reiche, Anal. Univ. Chile cxxi. 807 (1907). *E. polycanle* Phil. l. c. 542. *E. delicatulum* Phil. l. c. 544. *E. flavicans* Phil. l. c. 544. *E. pulchellum* Phil. l. c. 545. *E. cinereum* Phil. l. c. 545. *A. cinerea* Reiche, l. c. 808. *E. limonium* Phil. l. c. 546. *E. graminifolium* Phil. l. c. 547. *E. illapelinum* Phil. l. c. 548. *E. bracteatum* Phil. l. c. 548. *E. vernum* Phil. l. c. 550.—Chile and Argentine. This appears to be the South American homologue of *P. scopulorum*, and like it is very variable in its structures.

III. DIAGNOSES AND NOTES RELATING TO THE SPERMATOPHYTES CHIEFLY OF NORTH AMERICA.

BY I. M. JOHNSTON.

The subjoined paragraphs bring together miscellaneous data which have accumulated during the past few months as a by-product of general herbarium work. Considerable time has been spent by the author in ordering up the *Euphorbiaceae* of the Gray Herbarium. As a result of this work it has been found desirable to place on record certain undescribed species which have been detected and to make some new combinations which were needed in order that the naming of the collection could be strictly in accord with the International Rules of Nomenclature. Some time has also been spent in an

attempt to bring order into the covers of the Mexican Gnaphaliums. During the course of this work a few more undescribed species were found which seem worthy of record. Of particular interest in the present paper is the description of a new monotypic composite genus recently collected on the deserts of California.

Lilium Howellii, sp. nov., glabrum; cauli 3-7 dm. alto; bulbis ovoideis, squamis 2-3 cm. longis oblongo-lanceolatis; foliis obovatis vel oblanceolatis 2.5-4 cm. longis 10-17 mm. latis acutiusculis firmis saepe glaucis, superioribus in 3-6 verticillos dispositis, inferioribus alternis minoribus; floribus 1-3(-7) horizontalibus rubiginosis vel luride purpureis; segmentis paullo recurvatis 28-40 mm. longis 8 mm. latis.—OREGON: Coast Mt. of Curry County, June 13, 1884, *Thos. Howell* (TYPE, Gray Herb.). The species briefly described above is that called *L. Bolanderi* by Purdy, *Garden* lix. 331 (1901), and by Jepson, *Fl. Calif.* i. 311 (1921). The original description of *Lilium Bolanderi* Wats., *Proc. Am. Acad.* xx. 377 (1885), was based upon four collections which represent three distinct species. The Bolander plant from the Red Hills is that species which Purdy, l. c., described and figured as *L. Kelloggii*; the Rattan collection from near Arcata is *L. occidentalis* Purdy, *Erythea* v. 103 (1897); whereas the Rattan and the Howell collections from "near the State boundary" are both the plant current under the name *L. Bolanderi*. Purdy restricted the name *L. Bolanderi* to the last two elements of the Watsonian aggregate, arguing that Watson based his description primarily upon them. He disregarded, however, the fact that Watson, by citing the Bolander collection first and by coupling Bolander's name with the species, clearly showed his intentions of naming the Bolander plant. The Bolander specimen is not excluded from the original description of *L. Bolanderi*, but agrees with it as well as do any of the other collections cited. It seems best, therefore, to restrict the name *L. Bolanderi* to the Bolander collection, or in other words to take it as synonymous with the much later *L. Kelloggii* Purdy. The Oregon plant heretofore called *L. Bolanderi* is accordingly named, *L. Howellii*.

LILIUM PARDALINUM Kell. *Hesperian* (Sept. 1859). *L. pardalinum*, var. *angustifolium* Kell., l. c. *L. Roezli* Regel, *Gartenfl.* xix. 321, t. 667 (1870). *L. canadense*, var. *Hartwegii* Baker, *Gard. Chron.* 1165 (1871). *L. californicum* Domb. *Fl. Mag.* under plate 33 (1872). *L. pardalinum*, var. *californicum* Lindley in Baker, *Jour. Linn. Soc.* xiv. 242 (1874). *L. pardalinum*, var. *pallidifolium* Baker, l. c.—In the latest treatment of the Californian lilies, Jepson, *Fl. Calif.* i. 312

(1921), as well as in all other treatments since the Botany of California, ii. 166 (1880), the name *L. pardalinum* has been applied to lilies growing in both the Coast Ranges and in the Sierra Nevada of California, and by some even to lilies occurring in the mountains of Oregon and Washington. This wide use of the name seems unjustifiable since even a superficial study suffices to show that there are at least two quite distinct forms now included under Kellogg's name. The plants of the Coast Ranges, and perhaps also of the northern Sierran foothills, are larger-flowered than the other plants referred to the species, and have coarser pedicels, larger linear versatile anthers, and perianth-segments whose outer half is a bright orange-red. This large-flowered plant has the corolla-structure of *L. Humboldtii* Roezl & Leicht., but in other than these structures it is quite distinct, having differently colored somewhat smaller flowers, and a totally different bulb. The plant which is frequent in wet places in the Sierra Nevada and is at present going under the name, *L. pardalinum*, differs from the Coast Range lily in being smaller in all parts, having yellow or orange corollas, and short oblong usually erect non-versatile anthers. This Sierran plant strikingly simulates *L. columbianum* Hans. of the Northwest, from which it is primarily separated by its bulb, the Californian plant having a small rhizomatose bulb with jointed scales, whereas *L. columbianum* has a solitary bulb twice as large and one with simple triangular or lanceolate scales.

The correct application of *L. pardalinum* Kell. is readily determined by a study of Kellogg's original description and plate (plate reproduced in Bull. Calif. Acad. i. 149 (1885)). There can be no doubt that Kellogg originally described the large-flowered Coast Range plant. It is this form that has been illustrated by Regel, Gartenfl. xix. 321, t. 667 (1870); by Elwes, Monog. Lilium t. 28-29 (1877); by Waugh, Bot. Gaz. xxvii. 346, f. 12 (1899); and by Hall & Hall, Fl. Yosemite, pl. opp. pg. 56 (1912). The yellow-flowered Sierran plant appears to have been illustrated only by Armstrong, West. Wild Fl. 37 (1915), who has only one (the upper) of two corollas well represented. The Sierran plant seems best called

LILIUM PARDALINUM, var. *PARVIFLORUM* Eastw. Publ. Sierra Cl. no. 27, 14 (1902). Bulbs rhizomatous with jointed scales; stems 6-12 dm. high; leaves scattered or in definite whorls of 4-14, linear to lanceolate, becoming 14 cm. long and 25 mm. wide, glabrous; flowers one to many, terminal or loosely racemose; pedicels 6-15 mm. long usually spreading and nodding just below the corolla; perianth-lobes orange or yellow, lower half spotted with purple, 4-5 cm. long. 8-14 mm. wide.

erect for 10–15 mm. then strongly recurved; anthers oblong, 4–7 mm. long, 1.5–2 mm. wide, usually erect, appearing basifixed.—The above varietal name was originally applied to a local small-flowered variant of the Sierran plant, but its limits are here amplified to include all of the Sierran tiger-lilies. This Sierran lily is given only varietal rank since Dr. H. M. Hall assures me that there is a specimen in the University of California Herbarium which combines the characters of the Sierran and Coast Range forms. This specimen, Univ. Calif. Herb. 68,798, comes from the Mt. Pinos Region where intergrades are to be expected. From the material in the Gray Herbarium alone the Sierran and Coast Range lilies seem sharply distinct and worthy of specific separation. The variety *parviflorum* differs from genuine *L. pardalinum* in range, in having the perianth-segments 4–6 cm. long and entirely yellow or orange and not 6–8 cm. long with the outer half conspicuously orange-red, and in having oblong non-versatile usually erect anthers 4–7 mm. long rather than linear versatile ones 9–14 mm. long. It ranges from Tulare County in the southern Sierra Nevada of California, northward into southern Oregon. Forms of it are apparently the basis for many, if not all, the Californian records of *L. columbianum*. The latter species ranges from British Columbia and Idaho southward to middlewestern Oregon where it is replaced by, or perhaps even grades into, *L. Howellii*. Hansen, *Erythea* vii. 21 (1899), has given a pleasing account of the habits of the plant here called *Lilium pardalinum*, var. *parviflorum*.

Alternanthera nesiotes, sp. nov., prostrata; caulibus teretibus gracilibus ca. 1 dm. longis e radice perenni crassa orientibus; foliis orbicularibus vel ovatis integerrimis 6–8 mm. longis 4.5–6 mm. latis dense villosis-strigosis, juvenibus sparse strigosis viridibus supra venis impressis; floribus brunescens in glomerulos sessiles axillares dense congestis cum capillis longis tenuissimis albis intermixtis; bracteis bracteolisque acuminatis oblongo-lanceolatis quam sepala tertiam partem brevioribus; sepalis ovato-oblongis 2–2.5 mm. longis valde 3-nervatis acutis vel breviter acuminatis; filamentis staminodijisque subulatis tubo longioribus; stylo quam ovarium multo breviori; utriculo ovoideo.—GALAPAGOS ARCHIPELAGO: Occasional among rocks near shore of Cormorant Bay, Charles Island, *Stewart 3154* (TYPE, Gray Herb.). This is a very distinct member of *Alternanthera* and apparently without any close described relative. In gross aspect the plant much suggests a species of *Guilleminia*. The type-collection, distributed as *Coldenia fusca* Hook. f., bears on its label the locality "Connerant Bay".

PICKERINGIA MONTANA Nutt. in T. & G. Fl. N. A. i. 389 (1840). *Xylothermia montana* Greene, Pittonia ii. 188 (1891).—The generic name "*Pickeringia*" was used twice by Nuttall, once in 1834, Jour. Philad. Acad. vii. 95, for a member of the *Myrsinaceae*, and again in 1840, l. c., for a leguminous plant. Although only the later homonym had been recognized, Greene, l. c., held it non-valid and proposed in 1891 the substitute name *Xylothermia*. The earlier *Pickeringia* was at one time maintained by the elder DeCandolle, Prodr. vii. 733 (1839), as a dubious member of the *Ericaceae*, but was subsequently referred by his son, Prodr. viii. 123 (1844), to synonymy under *Ardisia* where all subsequent writers have been content to leave it. Although Greene suggested that future writers would find the earlier *Pickeringia* to be worthy of generic recognition, it is significant that neither Mez, Pflanzenr. iv. Fam. 236, 57 (1902), who recently monographed the family, nor even Small, Fl. S. E. United States ed. 2, 907 (1913), or Britton and Millspaugh, Bahama Fl. 315 (1920), with their narrow generic concepts, have found it at all advisable to resurrect the older Nuttallian genus. As the *Pickeringia* of 1834 is universally recognized as non-valid the homonym of 1840 is here maintained in accordance with Article 50 of the International Rules of Nomenclature. The proper combination for the following well marked geographical variety seems never to have been made.

Pickeringia montana Nutt., var. **tomentosa** (Abrams), comb. nov. *Xylothermia montana*, subsp. *tomentosa* Abrams, Bull. Torr. Cl. xxxiv. 263 (1907).—Although very positive in its single character—its copious pubescence—the present variety seems identical with the typical form of the species in all other respects. It is the southern phase of the species, replacing it in the mountains of San Bernardino and San Diego counties of California.

Adenopeltis serrata (Ait.), comb. nov. *Excoecaria serrata* Ait. Hort. Kew ed. 2, v. 418 (1813). *Adenopeltis Colliguaya* Bert. in Juss. Ann. Sci. Nat. xxv. 24 (1832).

Astrocasia (?) **populifolia**, sp. nov., dioecia glaberrima fruticosa 9–12 dm. alta; foliis reniformibus vel orbicularibus vel ovatis 20–43 mm. longis 20–35 mm. latis integerrimis firmis subtus pallidioribus apice rotundatis basi rotundatis vel cordatis angustissime peltatis, petiolis teretibus 6–25 mm. longis; floribus ignotis; pedicello fructifero gracili tereti saepe reflexo 2–4 cm. longo; capsula depressa triloba 4–6 mm. alta ca. 1 cm. lata reticulata in cocos bivalves dissiliente; columella persistente; seminibus in quoque loculo geminis brunneis lateraliter compressis plano-convexis late ovatis 4–5 mm. longis ca.

4 mm. latis ecarunculatis ventraliter sulcatis; albumine dure carnosos; cotyledonibus tenuibus latis planis; radícula cylíndrica.—MEXICO: Jaumave Valley, Tamaulipas, ca. 2000 ft., 1898, *Nelson 4455* (TYPE, Gray Herb.). Vicinity of Palmilla, Tamaulipas, 1830, *Berlandier 796, 2216*. En route from San Luis Potosi to Tampico, 1878-9, *Palmer 1140*. An anomalous species of doubtful affinities which is only provisionally referred to *Astrocasia*. No flowering specimens of *A. populifolia* have been seen by me. I am referring the Mexican species to *Astrocasia* because in that genus alone among the American *Phyllanthoideae* do I find a broad-leaved dioecious shrub with similar very long fruiting pedicels and essentially similar capsules and seeds. A careful search through the literature and in the Gray Herbarium has not only failed to discover any close relative of *A. populifolia*, but any previous mention of it as well. I am inclined to believe that the discovery of staminate flowers will reveal the species to be a monotype. In outline, the leaves of *A. populifolia* suggest those of an aspen or of some of the broader-leaved *Jatrophas* related to *J. canescens* (Benth.) Müll.

Cnidoscolus inermiflorus, sp. nov., fruticosus; petiolis puberulentis 5-14 cm. longis; laminis foliorum 8-12(-18) cm. longis ca. 10(-17) cm. latis puberulentis membranaceis irregulariter acuteque dentatis longe setosis elobatis vel 3-5-lobatis, basi profunde cordatis; pedunculis 10-18 cm. longis ad apicem dense puberulentis vel velutinis; cymis corymbiformibus parce stimulosis, bracteis lineari-lanceolatis inferioribus 12 mm. longis; calyce extus velutino-pubescenti estimuloso 10-13 mm. longo, lobis ovatis obtusis tubo dimidio brevioribus, disco annulari glabro, columna staminali 4-5 mm. alta basi villosa; staminibus fertilibus 2-verticillatis 10, sterilibus 3.—MEXICO: Along road over mountains between Victoria and Jaumave Valley, Tamaulipas, 1898, *Nelson 4439*. Vicinity of Victoria, Tamaulipas, 1907, *Palmer 140* (TYPE, Gray Herb.). A very distinct species of doubtful relationship. Probably nearest *C. tubulosus* (Müll.) Johnston, from which it differs in its setose-margined entire or broadly lobed leaves, larger staminate flowers, and villous staminal tube.

Cnidoscolus Pringlei, sp. nov., glaber dense stimulosus; petiolis 4-10 cm. longis stimulosis; laminis foliorum 8-10 cm. latis 6-8 cm. longis rotundato-reniformibus ad 1/3 longitudinis 3- vel 4-lobis basi cordatis, lobis grosse inciso-dentatis parce stimulosis; cymis pedunculatis modice laxifloris corymbiformibus; calyce albo infundibuliformi parce stimuloso puberulento 8-10 mm. longo ad mediam partem vel ultra tubulato, lobis obovatis obtusis, disco annulari glabro,

columna staminali 5 mm. alta basi villosissima; staminibus fertilibus 2-verticellatis 10 filiformibus; capsula 8 mm. longa stimulosa; seminibus pallidis 8 mm. longis; carunculis lutescentibus.—MEXICO: Baranca near Guadalajara, Jalisco, 1886, *Palmer 141* (TYPE, Gray Herb.). Hills near Iguala, Guerrero, 3000 ft., 1907, *Pringle 10,387*. Related to *C. angustidens* Torr. of northwestern Mexico and adjacent United States, but differing in its remote southern range, less prolonged tooting on the firmer leaves, smaller capsules, lighter-colored seeds, more densely villous staminal tube, and longer filaments.

Cnidoscolus aconitifolius (Mill.), comb. nov. *Jatropha aconitifolius* Mill. Gard. Dict. ed. 8 (1768).

Cnidoscolus albomaculatus (Pax), comb. nov. *Jatropha albomaculata* Pax, Pflanzenr. iv. Fam. 147, i. 90 (1910).

Cnidoscolus calyculatus (Pax & Hoffm.), comb. nov. *Jatropha calyculata* Pax & Hoffm. Pflanzenr. iv. Fam. 147, i. 97 (1910).

Cnidoscolus cordifolius (Pax), comb. nov. *Jatropha cordifolia* Pax, Pflanzenr. iv. Fam. 147, i. 107 (1910).

Cnidoscolus herbaceus (L.), comb. nov. *Jatropha herbacea* L. Sp. Pl. 1007 (1753).

Cnidoscolus loasoides (Pax), comb. nov. *Jatropha loasoides* Pax, Pflanzenr. iv. Fam. 147, i. 92 (1910).

Cnidoscolus longipes (Pax), comb. nov. *Jatropha longipes* Pax, Pflanzenr. iv. Fam. 147, i. 106 (1910).

Cnidoscolus multilobus (Pax), comb. nov. *Jatropha multiloba* Pax, Pflanzenr. iv. Fam. 147, i. 107 (1910).

Cnidoscolus platyandrus (Pax), comb. nov. *Jatropha platyandra* Pax, Pflanzenr. iv. Fam. 147, i. 110 (1910).

Cnidoscolus polyanthus (Pax & Hoffm.), comb. nov. *Jatropha polyantha* Pax & Hoffm. Pflanzenr. iv. Fam. 147, i. 105 (1910).

Cnidoscolus tenuifolius (Pax & Hoffm.), comb. nov. *Jatropha tenuifolia* Pax & Hoffm. Pflanzenr. iv. Fam. 147, i. 107 (1910).

Cnidoscolus tubulosus (Müll. Arg.), comb. nov. *Jatropha tubulosa* Müll. Arg. Linnaea xxxiv. 212 (1865).

Ditaxis sinaloae, sp. nov., monoecia perennis ca. 35 cm. alta basem versus suffruticosa; caulibus simplicibus paucis herbaceis 2-3 dm. longis erectis dense sericeo-strigosis conspicue sulcatis; foliis ovatis vel oblongis 4-8 cm. longis 25-45 mm. latis conspicue denticulatis apice breviter acuminatis basi subacutis supra viridibus et sparse villosis infra villosito-tomentosis et canescentibus, petiolis brevissimis 1-4 mm. longis; floribus in glomerulos axillares subsessiles congestis; floribus masculis 4-5-meris, sepalis acutis lanceolatis 1 mm. latis ca.

4 mm. longis extus villosis, petalis ovato-lanceolatis acutis 2 mm. latis 4-5 mm. longis quam sepalae saepe paulo longioribus extus villosis intus glabris ad columnam paullo supra basem adfixis, disco glandulari vix distincto per totam longitudinem columnae adnato, staminibus 10 biseriatis; floribus femineis 5-meris basi glomerulae solitariter adfixis, sepalis maturitate lanceolatis 7 mm. longis extus villosis, petalis lineari-lanceolatis ca. 4 mm. longis, lobis disci glandularis ovatis vel deltoideis glabris; capsulis villosis ca. 4 mm. crassis; seminibus pallidis ovoideis reticulatis ca. 2 mm. longis.—MEXICO: Culiacan, Sinaloa, 1891, *Palmer 1462* (TYPE, Gray Herb.). This species belongs to *Ditaxis* § *Anacanthium* as that section is defined by Pax and Hoffmann, *Pflanzenr.* iv. Fam. 147, vi. 58 (1912), and to the same immediate group of species as *D. tinctoria* (Millsp.) Pax & Hoffm. and *D. manzanilloana* Pax & Hoffm. *Ditaxis sinaloae* differs from both the species mentioned in its coarse stems, large leaves, and different range. It differs from *D. tinctoria* in its lack of dye-stained tissue, longer broader staminate sepals, glabrous stamens, more elongate pistillate sepals, and less developed pistillate glands. From *D. manzanilloana* it differs in its larger flower-parts, and in the pubescence and shape of the pistillate sepals and corolla.

EUPHORBIA DEPPEANA Boiss. Cent. Euphorb. 6 (1860). *Anisophyllum californicum* Kl. & Gar. Abhandl. Akad. Wiss. Berlin 1859, 36 (1860).—Millspaugh, Publ. Field Mus. Bot. Ser. ii. 409 (1916), has indicated *E. Anthonyi* and *E. clarionensis* Brandg., *Erythea* vii. 7 (1899), two species endemic on the Revillagigedo Islands off the west coast of Mexico, as synonymous with the very obscure *E. Deppeana*. This procedure was no doubt due to a desire to associate the name with some west American plant because both *Euphorbia Deppeana* Boiss. and *Anisophyllum californicum* Kl. & Gar. are based upon a collection cited "In California (Deppe)." The relations of *E. Deppeana* are clearly within that peculiar group of shrubby species that Boissier, DC. Prodr. xv. pt. 2, 11 (1862), called the *Gymnadeniae*: That species can hardly be either *E. Anthonyi* or *E. clarionensis*, for it has according to Boissier, "involucris terminalibus solitariis breviter pedunculatis hemisphaericis . . . glandulis . . . exappendiculatis, ovario glabro." Brandegee's two species have on the other hand the small pubescent very numerous turbinate involucre in dense axillary clusters, glands that are somewhat appendaged, and the ovary very pubescent. As *E. Deppeana* seems very closely related to *E. Hookeri* Boiss, and to *E. multiformis* Gandg., it seems that like these species and their immediate relatives it is probably indigenous to the

Hawaiian Archipelago. As no plant approaching *E. Deppeana* has been discovered in either California or Mexico and as Deppe is known to have collected in the Hawaiian Islands, it seems more than probable that the plant in question was obtained in this Archipelago and that through some confusion of data the original collection was erroneously attributed to California. Highly suggestive if not indicative of confusion of data in the Deppe collections is the fact that the unmistakable *Aleurites moluccana* L., a tree unknown along the Pacific Coast of North America although very common in the Hawaiian Islands, is also reported, Pflanzenr. iv. Fam. 147, i. 131, from California upon the basis of a Deppe specimen.

Halliophytum, gen. Euphorb. nov. Flores dioici apetalii. *Flores masculini* ad axilla fasciculati: Pedicelli longi graciles. Sepala 4-5 imbricata. Disci lobi 4-5 staminibus alterni. Stamina 4-5, filamentis liberis sepalis oppositis. Ovarii rudimentum evolutum 3-fidum. *Flores feminei* solitarii: Pedicelli breves validi. Ovarium 3-loculare. Styli distincti recurvi indivisi apice dilati. Ovula in loculis gemina. Capsula sicca in cocos 2-valves dissiliens. Semina oblonga strophiolata compressa testa granulata. Frutex rigide ramosus. Folia alterna parvula integerrima fasciculata oblanceolata. Plantae septentrionali-mexicanae et australi-californicae.—This proposed genus belongs to the *Euphorbiaceae-Phyllanthaeae*. It appears to be most nearly related to *Securinega* from which it differs by having large firm solitary capsules borne on short stout pedicels, and by having carunculate seeds which by abortion are usually solitary in each capsular cell. *Halliophytum* is also distinct in habit being composed of divaricately much branched very rigid desert shrubs which have small fasciculate oblanceolate leaves. The genus is named for Dr. H. M. Hall, formerly of the University of California but now of the Carnegie Institution, who in 1906 made the first collection of the Californian species during one of his many very fruitful collecting expeditions into the deserts of California. The following species are known.

✓ **H. fasciculatum** (Wats.), comb. nov. *Bernardia fasciculata* Wats. Proc. Am. Acad. xviii. 153 (1883). *Securinega fasciculata* Johnston, Univ. Calif. Pub. Bot. vii. 441 (1922).—MEXICO: Mts. 24 m. N. E. of Monclova, Coahuila, *Palmer 1233* (TYPE). Shrub 5 ft. high, plains S. W. of San Pablo, (?) Chihuahua, April 22, 1847, *Gregg*. Saucillo, Chihuahua, *Thurber 837*. Vicinity of Santa Rosalia, Chihuahua, *Palmer 384*.

H. Hallii (Brandg.), comb. nov. *Tetracoccus Hallii* Brandg. Zoe v. 229 (1906). *Securinega Hallii* Johnston, Univ. Calif. Pub. Bot. vii.

442 (1922).—CALIFORNIA: Cottonwood Springs, Eagle Mts., *Parish* 10,844, 10,845.

H. capense (Johnston), comb. nov. *Securinega capensis* Johnston, Univ. Calif. Pub. Bot. vii. 441 (1922).—MEXICO: Coast below Pescadero, Lower Calif., Sept. 23, 1893, *T. S. Brandegee*.

Jatropha arizonica, sp. nov., herbacea; rhizomatibus crassis carnis; caulibus 1–4 dm. altis simplicibus glabris; petiolis 3–7 cm. longis; laminis foliorum basi subcordatis 5–10 cm. longis saepe profunde 5-lobatis, lobis arrectis lanceolatis setaceo-dentatis; stipulis 5–8 mm. longis setaceo-dissectis; cymis inter folia superiora breviter pedunculatis; bracteis setaceis; calycis 5–7 mm. longi lobis setaceis vel lanceolatis; corolla 6–10 mm. longa segmentis ad $\frac{7}{8}$ longitudinis connatis glabris; glandulis liberis; columna staminali 6 mm. alta gracili glabra; staminibus fertilibus 2-verticillatis 10, sterilibus 0; capsula 10–12 mm. longa; seminibus 8 mm. longis pallidis vel lutescentibus, caruncula lacero-multifida.—ARIZONA: Foothills of Santa Rita Mts., 1882, *Pringle* (TYPE, Gray Herb.). Near Ft. Huachuca, 1882, *Lemmon* 2871. Ft. Huachuca, 1890, *Palmer* 467. Douglas, 1920, *W. W. Jones* 202. SONORA: Dry plains near San Bernardino, *Thurber* 354. Guadaloupe, May 1851, *Thurber* 403. CHIHUAHUA: Casas Grandes, 1899, *Goldman* 429. The plant concerned here is that northern one which has been called *Jatropha macrorhiza* Benth., a name which is properly restricted to a very differently appearing plant of central Mexico. The newly described plant differs from the genuine *J. macrorhiza* in its more northern distinct range, in its deeply lobed much toothed less firm leaves, and in its much more developed stipules. It seems very strange that two such distinct and manifestly different species should ever have been confused under one name.

Jatropha grandifrons, sp. nov., glabra; foliis grandibus, petiolis 15 cm. longis, laminis 2 dm. longis 17 cm. latis supra viridibus subtus pallidis marginibus sublobatis lobulis rotundatis capitato-glanduligeris, basi profunde cordata auriculata valde imbricata; cymis longe pedunculatis dichotome longirameis; sepalis floris pistillati 3 mm. longis ovatis obtusis basi connatis; corolla 6–8 mm. longa segmentis usque ad $\frac{4}{5}$ longitudinis connatis; capsula 1 mm. longa.—MEXICO: Vicinity of Oaxaca, alt. 1550 m., 1901, *Conzatti & Gonzáles* 1206 (TYPE, Gray Herb.). A very well marked species which is closely related to *Jatropha olivacea* Müll., but which differs from it by having leaves three or four times as large, less lobed, glabrous, and with the basal lobes strongly imbricated, and by having the peduncles of the inflorescence longer and the flowers averaging larger.

Macaranga Heynei, nom. nov. *Rottlera montana* Heyne in Wall. Cat. 272, no. 7833A (1848).—*M. montana* Pax & Hoffm. Pflanzenr., iv. Fam. 147, vii. 321 (1914); not *M. montana* Merr. Philipp. Jour. Sci., Bot. vii. 394 (1912).

Manihot mexicana, sp. nov., humilis fruticosa; ramis saepe glabris nigrescentibus; foliis palmatis fere ad basin lobatis 6–11 cm. latis supra viridibus infra pallidis; lobis 5 vel 7 lanceolatis ad apicem setigeris divergentibus duobus exterioribus brevibus; stipulis subulatis subpersistentibus; racemis paucifloris 4–6 mm. longis, bracteis subulatis deciduis; calycibus lutescentibus vel purpurascensibus pendulis 9–12 mm. longis glaberrimis; antheris 1.5–2 mm. longis 3-plo longioribus quam latis; capsulis rugosis globosis vel ovoideis ecostatis 10–11 mm. longis.—MEXICO: Hillsides of Zapotlan, Jalisco, alt. 5000 ft., 1905, *P. Goldsmith* 120 (TYPE, Gray Herb.). Near Guadalajara, Jalisco, *Pringle* 5159, 11318; *Palmer* 142, 156. Guanajuato, *Dugès* 8, 20, 203. Without precise locality, 1848–49, *Gregg* 198. (?) Top of the ridge back of Tonalá, Chiapas, 1895, *Nelson* 2899. This species has been confused with the closely related *Manihot angustiloba* (Torr.) Müll. It is readily separated from that species, however, by its southerly range, smaller bicolored leaves, more slender commonly purplish stems, and smaller less roughened fruit.

Manihot rubricaulis, sp. nov., fruticosa 12–15 dm. alta; ramis numerosis rubescentibus; foliis in parte superiori aggregatis, petiolis 4(–8) cm. longis, laminis profunde 5–7-partitis glabris concoloribus, lobis linearibus apice setaceis 4–9(–15) mm. latis acutis integris basi in disculum confluentibus duobus exterioribus minime divergentibus; stipulis subulatis inconspicuis; racemis 3–6 cm. longis, bracteis subulatis ca. 8 mm. longis, pedicellis erectis 4–10 mm. longis; calyce glabro glauco lutescente 10–13 mm. longo apud florem pistilliferum 5-lobato apud florem staminiferum 5-partito; antheris 2–3 mm. longis 4- vel 5-plo longioribus quam latis; capsulis verrucosis globosis ca. 12 mm. longis.—MEXICO: East slope of Iron Mt. near Durango, 1896, *Palmer* 224 (TYPE, Gray Herb.). A very distinct species probably nearest to *Manihot mexicana* Johnston, from which it differs in its tall subsimple reddish shrubby stems, linear concolorous leaf-segments, and larger anthers.

Pachystroma longifolium (Nees), comb. nov. *Ilex longifolia* Nees, Flora 1821, pt. 1, 301 (1821). *P. ilicifolium* Müll. Linnaea xxxiv. 178 (1865). *P. ilicifolium* Müll., var. *longifolium* Müll. l. c.

Pera heteranthera (Schrank), comb. nov. *Spixia heteranthera* Schrank, Denkschr. Akad. München vii. 242 (1821). *S. Leandri*

Mart. Flora 1841, pt. 2, Beibl. 30 (1841). *P. Leandri* Baill.; Müll. in DC. Prodr. xv. pt. 2, 1027 (1862).

Sapium cremostachyum (Baill.), comb. nov. *Stillingia cremostachya* Baill. Adansonia v. 322 (1865). *Sapium biglandulosum*, var. *Klotzschianum* Müll. Linnaea xxxii. 117 (1863). *Sapium Klotzschianum* Huber, Bull. Herb. Boiss. ser. 2, vi. 438 (1906).

Stillingia texana, nom. nov. *Sapium sylvaticum*, var. *linearifolia* Torr. Bot. Mex. Bound. 201 (1859). *Stillingia sylvatica*, var. *linearifolia* Müll. in DC. Prodr. xv. pt. 2, 1158 (1862). *Stillingia linearifolia* Small, Fl. S. E. United States 704 (1903); not Watson, Proc. Am. Acad. xiv. 297 (1879).—The species here considered is that Texan plant which has gone under the name of *Stillingia angustifolia* Engelm., a name published in 1883 by Watson, Proc. Am. Acad. xviii. 154. If *S. angustifolia* is not at once to be rejected as a hyponym it must be taken as being based on the cited *Stillingia sylvatica*, var. *angustifolia* Müll. Müller's variety, however, was founded on two collections from Florida and is clearly the narrow-leaved southeastern phase of *Stillingia sylvatica*. Hence it is that "*Stillingia angustifolia* Engelm." is improperly applied to the common Texan species. Torrey, l. c., gave the first acceptable name to the Texan plant when he called it *Sapium sylvaticum*, var. *linearifolia*. In 1903 Small, l. c., raised Torrey's variety to specific rank, a legitimate step were it not for the fact that Watson in 1879 had applied the resulting binomial to a universally recognized Californian plant of the same genus. In 1912 Pax, Pflanzenr. iv. Fam. 147, v. 192, took up Small's combination and renamed the plant which Watson has christened *Stillingia linearifolia*. Such procedure, however, recognizes intercategory priority, a principle contrary to the International Rules of Nomenclature. The Texan plant being without an acceptable name it is here called *Stillingia texana*. The Californian plant continues to be properly called *Stillingia linearifolia* Wats. while *Stillingia gymnogyna* Pax & Hoffm. falls as an absolute synonym of it.

Stillingia Treculiana (Müll.), comb. nov. *Gymnanthes Treculiana* Müll. Linnaea xxxiv. 216 (1865). *Stillingia Torreyana* Wats. Proc. Am. Acad. xiv. 298 (1879). *Sapium annuum*, var. *dentatum* Torr. Bot. Mex. Bound. 201 (1859). *Stillingia dentata* Britt. & Rusby, Trans. N. Y. Acad. vii. 14 (1887).

Tragia leptophylla (Torr.), comb. nov. *T. ramosa*, var. *leptophylla* Torr. Bot. Mex. Bound. 201 (1859). *T. stylaris*, var. *leptophylla* Müll. Linnaea xxxiv. 181 (1865).

Coldenia hispidissima (Torr.) Gray, var. **latior**, var. nov., foliis quam apud formam typicam latioribus non linearibus sed potius lanceolatis, lamina latitudine basin induratum expansam aequanti vel superanti 2-3 mm. lata.—UTAH: 1873, *Capt. Bishop*. ARIZONA: 1871, *Lieut. Wheeler*. 1877, *Palmer 343*. NEVADA: Muddy Valley, Lincoln County, *Kennedy & Goodding 79* (TYPE, Gray Herb.). Virgin River, *Goodding 706*. The variety *latior* includes those forms of the species which occur in Arizona, Utah, and Nevada, the northwest portion of the specific range as a whole. It is simply a well marked foliar variation.

Penstemon hians, sp. nov., glaber 6-9 dm. altus basem versus ramosus; caulibus erectis simplicibus; foliis firmissculis viridibus vel glaucescentibus post exsiccationem languide viridibus 10-14 mm. latis 5-7 cm. longis basi in petiolum brevem attenuatis acute denticulatis, caulinis sessilibus cordatis ovato-lanceolatis dentatis in inflorescentiam extentibus et gradatim reductis; inflorescentia laxa pauciflora 3 dm. longa 7-8 cm. lata, ramis laxe ascendentibus 15-40 cm. longis a bracteis foliaceis suffultis, pedicellis gracilibus 10-25 (saepissime 15-20) cm. longis a bracteis herbaceis ovatis vel oblongis 4-6 mm. longis subtentis; calyce glabro vel puberulento, lobis imbricatis acutis ovatis 5 mm. longis; corolla 25-30 mm. longa alba caesio- et roseo-tincta, tubo 4-5 mm. longo et ca. 4 mm. crasso, faucibus perinflatis 12-15 mm. crassis patenter hiantibus, labio inferiori patenti 9-12 mm. longo intus conspicue barbato in 3 segmentis latis 3-4 mm. longis lobato, labio superiori erecto 2-lobato 8-11 mm. longo; stamine sterili conspicue exserto dense longeque flavo-barbata; staminibus fertilibus saepe inclusis glaberrimis; capsula ignota.—CALIFORNIA: San Benito River, San Benito County, May 25, 1915, *Hall 9924* (TYPE, Gray Herb.). Lewis Creek, San Benito County, May 14, 1893, *Eastwood*. This plant has gone as *P. Palmeri* Gray, but although belonging to the same immediate group of species it differs from the desert-inhabiting *P. Palmeri* in its very lax leafy inflorescence, very large stout corollas, and sparse narrow non-connate scarcely glaucous leaves. *Penstemon hians* is much nearer *P. Grinnellii* Eastw., a mountain species of Southern California, from which it differs in its slender taller stems, more open leafy non-glandular inflorescence, and very much larger more gaping bluish-tinged corollas. The newly described species seems to represent the *P. Palmeri* group in the South Coast Ranges of California.

During the examination of an interesting suite of *Hymenopappus*, sent to the Gray Herbarium by Mr. George Osterhout of Windsor,

Colorado, the problems in the classification of the genus became apparent and an attempt was made at solving them. The tangible result of this study is the subjoined synopsis of the genus. In the past much emphasis has been placed upon the relative length of corolla-lobes and corolla-tube, and upon the development of the pappus, two characters which from my study seem highly variable and hence poor specific indicators. In the present synopsis duration, pubescence, and leaf-lobing, are stressed, since they seem best to indicate the main specific tendencies. Except for overthrowing the monotypic genus *Leucampyx*, the genus *Hymenopappus* and immediate relatives are taken as defined by Rydberg, No. Am. Fl. xxxiv. 43-44 (1914). Certain authors have merged *Hymenothrix* into *Hymenopappus*, but such a step logically results in dragging down *Flouresia* also. As I am not certain that *Flouresia* is best treated as a part of *Hymenopappus* I am following the only natural alternative of recognizing *Hymenothrix* and *Trichymenia*. The generic lines as here taken are very weak and those that maintain them must find their arguments in precedence and convenience.

Plants biennial or annual; occurring east of continental divide.

Achene-faces not striate..... 1. *H. Palmeri*.

Achene-faces striate.

Leaf-segments broad, 2-4 mm. wide.

Tip of tegules white, at first conspicuously surpassing the disk..... 2. *H. scabiosaeus*.

Tip of tegules yellow, about equaling the disk.

Lower leaves as pinnatifid as upper ones..... 3. *H. corymbosus*.

Lower leaves less pinnatifid than upper ones.. 4. *H. artemisiaefolius*.

Leaf-segments very narrow, ca. 1 mm. wide.

Plant very canescent; leaf-segments usually crowded. 5. *H. robustus*.

Plant greenish; leaf-segments not crowded.

Achenes glabrate; tegules ovate, glabrate.... 6. *H. flavomarginatus*.

Achenes villous; tegules oblong, somewhat villous.

Tip of tegules conspicuously colored; forms of

3. *H. corymbosus*.

Tip of tegules inconspicuously colored..... 7. *H. tenuifolius*.

Plant perennial, multicapital; ranging along the Rocky Mts. and westward.

Leaves entire or simply pinnate with broad segments; achenes glabrate, stout..... 8. *H. mexicanus*.

Leaves at least bipinnate, segments linear-filiform; achenes villous.

Heads radiate.

Receptacle paleaceous..... 9. *H. Newberryi*.

Receptacle naked..... 10. *H. radiatus*.

Heads eradiate.

Stems scapose, cauline leaves much reduced and few.

Florets 30-40..... 11. *H. gloriosus*.

Florets 15-25..... 12. *H. lugens*.

Stems more or less leafy, cauline foliage little reduced.

Florets 10-15..... 13. *H. pauciflorus*.

Florets 15-25.

Pinnules 1-2 mm. long, crowded, very canescent... 14. *H. luteus*.
Pinnules 3-20 mm. long, remote, greenish. 15. *H. filifolius*.

1. HYMENOPAPPUS PALMERI (Gray) Hoffm. in E. & P. Nat. Pflanzenf. iv. Abt. 5, 256 (1890). *Hymenothrix Palmeri* Gray, Proc. Am. Acad. xxi. 391 (1886). *Hymenothrix glandulosa* Wats. Proc. Am. Acad. xxiii. 278 (1888). *Hymenopappus glandulosus* Rydb. No. Am. Fl. xxxiv. 48 (1914). *Hymenothrix glandulosa*, var. *Nelsonii* Greenm. Proc. Am. Acad. xl. 46 (1904). *Hymenopappus Nelsonii* Rydb. l. c. 49.—CHIHUAHUA: Parral to Batopsis, 1898, *Goldman* 160. Near Colonia Garcia, 1899, *Townsend & Barber* 273; *Nelson* 6210 (type of *H. glandulosa*, var. *Nelsonii*). Above Canyon St. Diego, 1891, *Hartman* 766. Near Chihuahua, 1886, *Pringle* 762. Southwestern Chihuahua, 1886, *Palmer* 395 (type of *H. Palmeri*). Sierra Madre, 1887, *Pringle* 1293 (type of *H. glandulosa*). DURANGO: Sandia Station, 1905, *Pringle* 13,559. This species varies considerably in pappus and glandularity but shows no tendency to break up into geographically correlated variants.

2. *H. SCABIOSAEUS* L'Hér. Hymenop. 1 (1788). *Rothia caroliniensis* Lam. Jour. Hist. Nat. i. 17 (1792). *Hymenopappus caroliniensis* Porter, Mem. Torr. Cl. v. 338 (1894).—SOUTH CAROLINA: Aiken, 1869, *Canby*. GEORGIA: near Millen, 1901, *Harper* 762. FLORIDA: near Marianna, 1901, *Curtiss* 6806. Near Gainesville, *Curtiss* 1508. MISSISSIPPI: Columbus, 1896, *Tracy* 1400. ILLINOIS: Beardstown, 1842, *Geyer*. MISSOURI: Scott Co., 1894, *Eggert*.

3. *H. CORYMBOSUS* T. & G. Fl. N. Am. ii. 372 (1842). *H. Engelmannianus* Kunth, Ind. Sem. Hort. Berol. 15 (1848). *H. flavescens* Gray, Mem. Am. Acad. ser. 2, iv. 97 (1849). *H. sulphureus* Rydb. in Britt. Man. 1007 (1901). *H. Fisheri* Woot. & Standl. Contr. U. S. Nat. Herb. xvi. 191 (1913).—KANSAS: Riley Co., 1895, *Norton* 285 (isotype of *H. sulphureus*). Hamilton Co., 1895, *Hitchcock* 286. ARKANSAS: Dr. *Leavenworth* (isotype of *H. corymbosus*). OKLAHOMA: near Waynoka, 1913, *Stevens* 5742. Near Longdale, 1913, *Stevens* 831. TEXAS: San Antonio, May 1853, *Thurber*. Bracken, 1903, *Groth* 90. Weatherford, 1902, *Tracy* 8544. NEW MEXICO: 1847, *Fendler* 464 (type of *H. flavescens*). Study of isotypic material of the poorly understood *H. corymbosus* clearly shows that the present usage of the name is correct. Gray's *H. flavescens* was based upon a good specimen of the present species collected by Fendler, and upon a few fragments, apparently of *H. artemisiaefolius*, which were collected by Wislizenus.

4. *H. ARTEMISIAEFOLIUS* DC. Prodr. v. 658 (1836).—TEXAS: Houston, *Bush* 35; *Lindheimer* 107. Without definite locality, *Drummond* 182; *Berlandier* 349. The exact relation of this species to *H. corymbosus* is uncertain. Perhaps *H. corymbosus* had best be made a variety of the present species.

5. *H. ROBUSTUS* Greene, Bull. Torr. Cl. ix. 63 (1882).—TEXAS: Toyah Creek, 1902, *Tracy & Earle* 140. Canyon City, 1901, *Eggert*. Frontera, *Parry* 69. El Paso, 1880, *Vasey*. NEW MEXICO: Hills towards the Gila, 1880, *Greene* 104. Santa Rita del Cobre, 1877, *Greene* (22). Betw. Ft. Wingate and Belen, 1880, *Rusby* 180. Silver City, *Eastwood* 8530. Without definite locality, *Wright* 378, 1253, 1412. ARIZONA: Catalina Mts., 1881, *Lemmon* 218. Camp 2, Rio Zuni, *Sitgreave Exped.* CHIHUAHUA: Near Paso del Norte, 1886, *Pringle* 759.

6. *H. flavomarginatus*, sp. nov., biennis e radice simplice oriens; caulibus erectis solitariis 6–10 dm. altis striatis sparse floccosotomentosis foliosissimis; foliis infra sparse tomentosus, supra glabratis, inferioribus bipinnatis ca. 6 cm. longis 2.5 cm. latis, superioribus pinnatis vix reductis, segmentis remotis angustis linearibus; inflorescentia laxa corymbosa; pedunculis 1–5 cm. longis dense tomentosus; capitulis 8–9 mm. altis; tegulis 8–10 glabratis ovatis vel orbiculari-ovatis flavescens medium et basem versus viridescens 5–7 mm. longis; flosculis flavis (?), 40–60, faucibus campanulatis, lobis deltoideis quam fauces 1/3 brevioribus, tubo villosus; achaeniis ca. 2.5–3 mm. longis glabratis transverse rugulosis quadrangularibus, faciebus lateralibus manifeste longitudinaliter costatis; pappo 1–0.3 mm. longo obscuro.—MEXICO: Sierra Madre south of Saltillo, Coahuila, 1880, *Palmer* 650 (TYPE, Gray Herb.). The type of *H. flavomarginata* was determined by Gray as *H. flavescens*, but it is certainly distinct from that species differing conspicuously in its narrow leaf-segments and broad ovate tegules. It is probably most nearly allied to *H. robustus* from which it differs in its broad tegules, glabrate achenes, inconspicuous pappus, and green herbage.

7. *H. TENUIFOLIUS* Pursh, Fl. Am. Sept. ii. 742 (1814). *H. corymbosus*, var. *Nuttallii* T. & G. Fl. N. Am. ii. 372 (1842).—NEBRASKA: Long Pine, 1899, *Bates*. Neligh, 1906, *Bacon*. KANSAS: Ewing, 1899, *Bates*. Osborne City, 1894, *Shear* 71. Grove Co., 1895, *Hitchcock* 287. OKLAHOMA: Ft. Supply, 1882, *Potter*. Red River, *Nuttall* (isotype *H. corymbosus*, var. *Nuttallii*). TEXAS: Dallas, 1875, *Reverchon*. Baird, 1882, *Letterman*. COLORADO: near Cheyenne Wells, 1887, *Demetrio*. Apishipa Creek, *Osterhout* 2043. NEW MEXICO: North of Glorieta, 1908, *Standley* 5233.

8. *H. MEXICANUS* Gray, Proc. Am. Acad. xix. 29 (1883). *H. integer* Greene, Pittonia iii. 249 (1897). *H. obtusifolius* Heller, Bull. Torr. Cl. xxvi. 551 (1899). *H. petaloideus* Rydb. No. Am. Fl. xxxiv. 54 (1914).—NEW MEXICO: Mogollons Mts., 1881, *Rusby 179* (isotype of *H. integer*). Pinos Altos Mts., 1880, *Greene*. Burro Mts., 1906, *Blumer 1848*. ARIZONA: Willow Springs, 1890, *Palmer 517*. Flagstaff, 1898, *MacDougal 240* (isotype of *H. obtusifolius*). Chiricahua Mts., 1907, *Blumer 2215*. Marshall Gulch, Catalina Mts. 1917, *Shreve 5399*. SAN LUIS POTOSI: Minas de San Rafael, 1911, *Purpus 4772a*. Mountains near San Miguel, 1876, *Schaffner 348* (type of *H. mexicanus*). CHIHUAHUA: Colonia Garcia, 1899, *Nelson 6109*. Base of Sierra Madre, 1887, *Pringle 1308*. GUANAJUATO: Guanajuato, 1883, *Dugès*. This plant varies in foliage from entire to simply pinnate, doing it so gradually that the designation of even *formae* seems inadvisable.

9. *H. Newberryi* (Gray), comb. nov. *Leucampyx Newberryi* Gray in Porter & Coulter, Synop. Fl. Colo. 77 (1874).—COLORADO: La Pagosa, 1860, *Newberry* (type). Pagosa Springs, 1899, *Baker 692*. Soda Springs 35 mi. W. of Canyon City, 1872, *Porter*. Hardscramble Canyon, 1874, *Brandege 294*. Near Elliott Creek, Mineral Co., 1911, *Murdoch 4623*. NEW MEXICO: Winsor's Ranch, San Miguel Co., 1908, *Standley 4003*. *Hymenopappus radiatus* and *Leucampyx Newberryi* seem so closely and unmistakably related that it seems highly artificial to keep them generically separated. Consequently, as the reference of *H. radiatus* to *Leucampyx* would leave that latter genus without any characters, *L. Newberryi* is referred to *Hymenopappus*. The presence of palea in *H. Newberryi* may be looked upon as an atavism and consequently of merely specific significance. *Hymenopappus Newberryi* ranges from southwestern Colorado into northern New Mexico and differs from its relative, which occurs in southeastern Arizona and adjacent New Mexico, almost entirely in its possession of palea.

10. *H. RADIATUS* Rose, Contr. U. S. Nat. Herb. i. 122 (1891).—ARIZONA: Willow Springs, 1890, *Palmer 615* (isotype).

11. *H. GLORIOSUS* Heller, Bull. Torr. Cl. xxvi. 551 (1899). *H. scaposus* Rydb. Bull. Torr. Cl. xxvii. 634 (1900). *H. nudatus* Woot. & Stand. Contr. U. S. Nat. Herb. xvi. 191 (1913).—TEXAS: (?) Town Creek, Randall Co., 1901, *Eggert*. NEW MEXICO: Santa Fe, 1897, *Heller 3555*. Burro Mt., 1903, *Metcalf 107* (isotype of *H. nudatus*). Silver City, 1919, *Eastwood 8402*. ARIZONA: Catalina Mts., 1881, *Lemmon 217*. Flagstaff, 1898, *MacDougal 129* (isotype of *H. scap-*

osus). About Mormon Lake, 1898, *MacDougal* 71 (isotype of *H. gloriosus*). Grand Canyon, 1915, *Macbride & Payson* 969. UTAH: Richfield, 1875, *Ward* 168. IDAHO: Mackay, 1911, *Nelson & Macbride* 1561. Challis Creek, 1916, *Nelson & Macbride* 3338. OREGON: Burns-Prineville road of Crook Co., 1901, *Cusick* 2631. WASHINGTON: Touchet, 1883, *Brandege* 903. The last four specimens have glabrate involucre and perhaps represent a distinct form. *Hymenopappus gloriosus* seems to be merely a many-flowered phase of the next species.

12. *H. LUGENS* Greene, *Pittonia* iv. 43 (1899). CALIFORNIA: Bear Valley, *Parish* 3717; *Abrams* 2899. Upper Santa Ana Canyon, 1906, *Hall* 7507. Near Cuyamaca Lake, 1917, *Spencer* 597. Near Julian, 1880, *Parish* 238. Cordilleras behind San Diego, *Parry*. LOWER CALIFORNIA: Tantillas Mts., 1875, *Palmer*.

13. *H. pauciflorus*, sp. nov., perennis; caulibus pluribus gracilibus sparse tomentosis 15–30 cm. altis simplicibus vel rare supra ramosis foliosis basem versus frutescentibus; foliis canescentibus 5–7 cm. longis 10–15 mm. latis, lobulis pergracilibus, foliis inferioribus bipinnatis, caulinis pinnatis; inflorescentia paucicapitulata; pedunculis saepe vix 1 cm. rare 5 cm. longis; tegulis oblongis late acutis 7–10 sparse tomentosis; flosculis flavis 9–15, faucibus campanulatis, lobis triangularibus quam fauces $2/3$ – $1/2$ brevioribus, tubo villosis; achaeniis villosis 3.5 mm. longis, pappo conspicuo, squamellis oblongis 0.5–1 mm. longis.—UTAH: Along San Juan River near Bluffs, *Rydberg & Garrett* 9951 (TYPE, Gray Herb.). ARIZONA: Colorado Chiquito, May 1858, *Newberry*. Navaho Reservation, 1916, *Vorhies* 130. Related to *H. filifolius* but differing in lower, more slender habit and few-flowered heads.

14. *H. LUTEUS* Nutt. *Trans. Am. Philos. Soc.* ser. 2, vii. 374 (1841).—Rocky Mts., *Nuttall* (isotype). Green River, Wyo., 1897, *Nelson* 3051. Perhaps only a depauperate plateau phase of the next.

15. *H. FILIFOLIUS* Hook. *Fl. Bor. Am.* i. 317 (1834). *H. tomentosus* Rydb. *Bull. Torr. Cl.* xxvii. 633 (1900). *H. ochroleucus* Greene, *Pl. Baker*, iii. 30 (1901). *H. eriopodus* Nels. *Bot. Gaz.* xxxvii. 274 (1904). *H. columbianus* Rydb. *No. Am. Fl.* xxxiv. 52 (1914). *H. niveus* Rydb. l. c.—NEBRASKA: Near Thedford, 1893, *Rydberg* 1321. Central Nebraska, 1873, *Pruddin*. Upper Missouri, 1874, *Coues*. COLORADO: Cimarron, 1901, *Baker* 269. Naturita, 1914, *Payson* 365. UTAH: Diamond Valley, 1902, *Goodding* 880 (isotype of *H. eriopodus*). St. George, 1877, *Palmer* 270 (isotype of *H. tomentosus*). NEVADA: Lee Canyon, Charleston Mt., 1913, *Heller* 11017. Pahrnagat Mt.,

1871, *Searls*. Las Vegas, 1905, *Goodding* 2287. OREGON: Muddy, 1885, *Howell* 447. John Day River, 1897, *Cusick* 1692. WASHINGTON: Morgan's Ferry, 1884, *Suksdorf* 373. Near Moses Lake, 1893, *Sandberg & Leiberg* 375 (isotype of *H. columbianus*). Sentinel Bluffs, 1903, *Cotton* 1366. Hooker's name has been usually applied to plants growing along the east base of the Rocky Mountains, but a study of the original diagnosis shows clearly that the name was originally applied to the tall-growing tomentose plant of the Columbia River Valley which Rydberg has described as *H. columbianus*. It seems probable that *H. filifolius*, as here taken, is an aggregate since the available material comes from three distinct regions.

15a. **H. filifolius**, var. **cinereus** (Rydb.), comb. nov. *Hymenopappus cinereus* Rydb. Bull. Torr. Cl. xxvii. 634 (1900). *H. arenosus* Heller, Bull. Torr. Cl. xxv. 200 (1898). (?) *H. parvulus* Greene, Pl. Baker, iii. 30 (1901). (?) *H. polycephalus* Osterh. Torreyia xviii. 90 (1918).—ALBERTA: Milk River, 1895, *Macoun* 10937. NORTH DAKOTA: Bad Lands, Little Missouri, 1883, *Manly*. MONTANA: Gallatin City, 1883, *Lawson-Scribner* 111a. Bannack, 1880, *Watson* 220. WYOMING: Sybille Hills, 1894, *Nelson* 328. Ft. Laramie, 1901, *Nelson* 8310. Chug Creek, 1900, *Nelson* 7360. Forte Steele, 1900, *Nelson* 7150. COLORADO: Gann, 1920, *Osterhout & Clokey* 3952. Denver, 1920, *Clokey* 3951. Near Livermore, 1917, *Osterhout* 5680 (isotype of *H. polycephalus*). Twin Lakes, 1872, *Porter*. Arboles, 1899, *Baker* 688. Paradox, 1912, *Walker* 78. NEW MEXICO: Near Espanola, 1897, *Heller* 3542 (isotype of *H. arenosus*). Laguna, 1884, *Lemmon* 3261. Although the plant here called *H. filifolius*, var. *cinereus* seems distinct enough from *H. filifolius*, I have been unable to detect any characters which would be diagnostic even in a majority of cases. *Hymenopappus parvulus* is referred here with great doubt and I am inclined to believe that it probably is specifically distinct as it differs from the variety *filifolius* in its subscapose habit and small heads. *Hymenopappus polycephalus* is a puzzling form which suggests a perennial phase of *H. tenuifolius*. The variety *cinereus* differs from the genuine *filifolius* in its lower more compact habit, and slender less pubescent stems.

Gnaphalium nubicola, sp. nov., perenne?; caulibus e caudice brevi suffruticoso orientibus erectis vel ascendentibus foliosis tomentosis; foliis oblongo-obovatis late adfixis decurrentibus laxe tomentosissimis sed aetate aliquando sparsius vestitis 2-3 cm. longis 6-10 mm. latis superioribus vix brevioribus; capitulis 5-6 mm. altis 4-5 mm. diametro in glomerulos densos lanuginosos solitarios vel sub-

corymbosos congestis; tegulis ca. 18 brunneis et albidis 2-seriatis, exterioribus ovatis acutis, interioribus oblongis rotundatis mucronatis; floribus perfectis 5-6 ca. 2.5 mm. longis, imperfectis 30-40; pappi setis distinctis solitariter deciduis ca. 14 scabratis 2.5 mm. longis; achaeneis oblongis glabris brunnescentibus 0.6 mm. longis.—MEXICO: Near timber-line on Mt. Ixtaccihuatl, 1905, *Purpus 1524* (TYPE, Gray Herb), 1528. Related to *Gnaphalium volcanicum* Johnston, but readily distinguished from that species by its obtuse bicolored tegules.

Gnaphalium sonora, sp. nov., perenne; caulibus compluribus erectis tomentosis 2-3 dm. altis apicem versus ramosis; foliis integerrimis tomentosis supra viridioribus acutis basi late adfixis, inferioribus oblongo-oblanco-latis 20-35 mm. longis 5-8 mm. latis, superioribus lineari-oblongis 1-2 cm. longis; inflorescentia corymbosa conspicue foliosa; capitulis in glomerulos paucifloros congestis cylindratis 3 mm. latis 5 mm. longis basem versus laxe lanuginosissimis; tegulis albis 3-seriatis, exterioribus acutis oblongo-ovatis, interioribus rotundatis vel acutis lanceolato-oblongis; floribus 50 vel paucioribus, hermaphroditis 3.5 mm. longis 5-6; pappi setis antrorse hispidulis; achaeniis glabris 0.6 mm. longis oblongis.—MEXICO: Hermosillo, Sonora, 1888, *M. A. Crawford* (TYPE, Gray Herb.). Related to *Gnaphalium Wrightii* Gray, and to *G. microcephalum* Nutt., but readily distinguished from both by its less crowded heads and much looser leafy corymbs.

Gnaphalium rosaceum, sp. nov., annuum; caulibus erectis simplicibus dense villosa-strigosis 2-3 dm. altis; foliis oblanco-latis apice rotundatis vel late acutis 15-35 mm. longis 4-8 mm. latis integerrimis, supra sparse tomentosis viridibusque infra pallidis et dense sericeo-tomentosis, superioribus gradatim diminuatis; capitulis rosaceis 3.5 mm. longis 2 mm. latis in glomerulos axillares congestis spicam infra interruptam formantibus; tegulis 2-seriatis ca. 18, exterioribus ovatis acuminatisque, interioribus lineari-oblongis acutisque; floribus perfectis 2 mm. longis 4, imperfectis ca. 50; pappi setis ad basem connatis 15 scabris.—MEXICO: Region of San Luis Potosi, 1878, *Parry & Palmer 426* (TYPE, Gray Herb.). In the mountains near Morales, San Luis Potosi, 1876, *Schaffner 224* in pt. Santiago Papasquiara, Durango, 1896, *Palmer 66*. Belonging to the *Gnaphalium purpureum*-group in which it is characterized by its strict simple annual stems, and dense spicate inflorescence of rose-colored heads.

Gnaphalium pedunculatum, sp. nov., annuum; caulibus erectis 2-3 dm. altis villosa-strigosis vel floccosis simplicibus vel saepe ramosis-

simis, ramis strictis; foliis spathulatis vel lineari-oblongatis 10–35 mm. longis 2–5 mm. latis concoloribus vel supra viridioribus; capitulis 4–5 mm. altis 3–4 mm. latis in glomerulos dense foliosos hemisphaericos terminales vel in pedunculis brevibus axillaribus elevatos congestis; tegulis 3-seriatis ca. 20, exterioribus ovatis acuminatis, interioribus lineari-oblongis obtusis; floribus hermaphroditis 4–5 ca. 2.5 mm. longis, imperfectis ca. 50; pappi setis ca. 6 basi connatis 2.5 mm. longis.—MEXICO: Otinapa, Durango, 1906, *Palmer 411* (TYPE, Gray Herb.). Fields, Serrania de Ajusco, Federal District, 9000 ft. alt., 1896, *Pringle 6502*. In mountains near Morales, San Luis Potosi, 1876, *Schaffner 224* in pt. This has been confused with *Gnaphalium purpureum* L. but it is probably more closely related to *G. spathulatum* Lam. The newly described species is well marked by its strict growth and interrupted inflorescence composed of capitate pedunculate glomerules.

✓ ***Gnaphalium stagnale***, sp. nov., annuum; caulibus paucis vel multis gracilibus decumbentibus vel ascendentibus 5–20 cm. longis tomentosus laxe ramosis; foliis oblanceolatis 10–25 mm. longis 2.5–7 mm. latis apice mucronatis rotundatis vel late acutis, superioribus paulo brevioribus; capitulis 2.5–3 mm. longis 2–2.5 mm. crassis glomerulatis inflorescentiam cylindratam vel pyramidatam 2–3 cm. longam formantibus; tegulis ca. 16–20 triseriatis, exterioribus ovatis acutisque, interioribus lineari-oblongis obtusis roseis; floribus perfectis 2 mm. longis ca. 3, imperfectis ca. 50; pappi setis 15–18 ad basem connatis scabrosis; achaeniis oblongis glandulosis 0.6 mm. longis.—MEXICO: Marshes about San Luis Potosi, Aug. 1876, *Schaffner 225* (TYPE, Gray Herb.). Region of San Luis Potosi, 1878, *Parry & Palmer 425*. States of Coahuila and Nuevo Leon, 1880, *Palmer 2072*. Wet soil, Jalapa, Vera Cruz, *Pringle 8468*. Although this species has been confused with both *Gnaphalium americanum* Mill. and *G. purpureum* L., it differs from both in its small heads, more lax inflorescence, and conspicuously in its low diffuse habit of growth. It appears to frequent low ground.

Gnaphalium vulcanicum, sp. nov., annuum; caulibus simplicibus erectis vel ad basem ramosis tomentosus foliosis 2–3 mm. crassis 15–30 (saepius ca. 20) cm. altis, lateralibus paucis basem versus laxe ascendentibus; foliis concoloribus integerrimis sparse tomentosus, primis spathulatis vel oblanceolatis ca. 5 cm. longis 9–13 mm. latis, caulinis numerosis ascendentibus linearibus vel oblanceolatis acutis late adfixis vel subdecurrentibus; capitulis 6–7 mm. altis 6 mm. crassis in glomerulos densos lanuginosos solitarios vel subcorymbosos

congestis; tegulis 3-seriatis ca. 20 concoloribus hepaticis vel stramineis conspicue acutis, exterioribus ovatis; floribus perfectis 3 mm. longis 5-11, imperfectis 3 mm. longis ca. 50; pappi setis distinctis solitariter deciduis scabratis 4 mm. longis; achaeniis oblongis glabris brunnescentibus ca. 0.6-0.8 mm. longis.—MEXICO: Grassy slopes near timber-line on Nevado de Toluca, 1892, *Pringle 4232*. Mt. Popocatepetl, alt. 8000-9000, ft. *Schaffner 50*. Near timber-line on Popocatepetl, 1908, *Purpus 1529, 3033, 3644*. Rocks near timber-line on Ixtaccihuatl, 1905, *Purpus 1521, 1529*. Sides of Orizaba, 1901, *Rose & Hay 5777*. Mt. Orizaba, alt, 14,000 ft., 1891, *Seaton 242*. Near timber-line on Citlaltepétl (Mt. Orizaba), 1907, *Purpus 2782* (TYPE, Gray Herb.). Orizaba, 14,000-15,300 ft. alt., *Liebmann 319*. Cuchilla, n. e. side of Volcano of Colima, alt. 10,000 ft., 1905, *Goldsmith 63*. Without locality, *Coulter 451*. The present species is related to *G. brachypterum* DC. which differs in being a perennial with tufted rank loosely branched stems 4-7 dm. high, and in having contrastedly bicolored leaves the upper surface of which is green and glabrous and the lower surface white with a close floccose tomentum. *Gnaphalium brachypterum* ranges widely over Mexico at low altitudes, but *G. vulcanicum* appears to be restricted to the area near timber-line on the high volcanic cones which dominate southern Mexico. Practically all the material cited above has been distributed under one of the unpublished herbarium names of Schultz Bipontinus. As this name, an adjective formed from the noun Popocatepetl, is long and cumbersome a shorter name is associated with the species in publishing it.

Eremonanus, gen. *Compositarum* ut videtur *Heleniarum-Eriophyllinarum* novum. Capitula homogama discoidea minima ad apices ramorum solitaria; floribus omnibus hermaphroditis 4(-3). Involucrum anguste cylindricum; tegulis 4 uniseriatis aequalibus concavis achaenia semi-includentibus herbaceis. Receptaculum cum prosessu elongato centrali erecto quadrialato munitum. Corollae breves tubulosae regulares apice lobatae cylindricae flavae. Antherae vix cohaerentes apice longe appendiculatae, basi sagittatae auriculis brevibus triangularibus ecaudatis. Styli rami compressi apice obtusi exappendiculati. Achaenia subulata strigosa teretia multicostata. Pappi paleae 12-14 obovatae persistentes scariosae uniseriatae integrae basi cohaerentes inaequales.—Herbae annuae villosae. Folia opposita integerrima. (Name from ἐρημία, desert, and νᾶνος, dwarf.)
 ✓ **Eremonanus mohavensis**, sp. nov., minimus depressus 2-3 cm. diametro vix 1 cm. altus; cotyledonibus persistentibus oblongis ro-

tundatis late sessilibus anguste connatis; caulibus numerosis brevibus gracilibus prostratis glabris foliosis; foliis 6–8 mm. longis 1.0–1.7 mm. latis anguste oblanceolatis mucronatis firmis basi attenuatis supra glabratis vel sparse villosis subtus longe albo-villosis infimis rosulatis, caulinis oppositis; capitulis 4 mm. altis 1.3 mm. latis; pedunculis 1.0–2.5 mm. longis juventate villosis; tegulis 3.5 mm. longis oblanceolato-linearibus apice rotundatis vel obtusis breviter villosa-ciliatis; corollis 2.0–2.3 mm. longis faucibus brevissimis, tubo cylindrico externe pubescenti 1.5 mm. longo 0.6 mm. crasso, lobis acutis margine incrassatis; styli 1.6 mm. longi lobis 0.6 mm. longis usque ad apicem stigmaticis; antherarum loculis 0.5 mm. longis oblongis, appendicibus oblongis scariosis quam loculi ca. quartam partem brevioribus; filamentis obcompressis ca. 3 mm. sub antheris textura abrupte mutatis; achaeniis nigrescentibus 2.5 mm. longis 0.7 mm. latis; pappi paleis ad tegulas spectantibus longioribus.—CALIFORNIA: in collibus saxosis prope Barstow, May 1, 1922, *Mary F. Spencer 1949* (TYPE, Gray Herb.; ISOTYPE, Baker Herb.); May 1, 1922, *Fidella Woodcock* (Gray Herb. and Univ. Calif. Herb.).

The genus *Eremonanus* has its nearest relative in *Dimeresia Howellii* Gray, a monotype growing in eastern Oregon. It agrees with *Dimeresia* in being a depressed annual herb with persistent cotyledons, and in having opposite leaves, very narrow heads, and very few florets and tegules. It differs in having a pappus of 12–14 persistent obovate scales rather than one composed of numerous plumose bristles, solitary instead of glomerate heads, 4 instead of merely 2 tegules and florets, and finally short yellow corollas which are cut $\frac{1}{3}$ their length instead of elongate flesh-colored corollas that are cut only about $\frac{1}{6}$ their length. There is further a pronounced difference in the character of the receptacle. In *Dimeresia* it is very small, flat, and naked, whereas in *Eremonanus* the center of the receptacle is occupied by an elongated process about 1 mm. high which has 3–4 wing-like lobes that extend out between the achenes and join the adjacent tegules along their suture. The achene in *Eremonanus* is therefore attached in a pit formed partly by the process on the receptacle and partly by the base of the tegule.

Although *Eremonanus* and *Dimeresia* seem closely related, their position in the tribes of the *Compositae* is uncertain. In publishing *Dimeresia* Gray, *Synop. Fl. N. A.* ed. 2, ii. pt. 1. 448 (1886), placed the genus in the tribe *Inuleae*. This disposition was followed by Hoffmann in the *Pflanzenfamilien*, iv. Abt. 5, 193 (1890), who definitely placed the genus in the subtribe *Angianthineae* of the

Inuleae. Although the range and habit of *Dimeresia* are not in accord with the indubitable members of the *Angianthineae*, it seems to fit, as far as technical characters are concerned, into the subtribe as defined by Hoffmann, l. c., and by Bentham and Hooker, Gen. Pl. ii. 185 (1873). On the other hand *Eremonanus* is atypical in the crucial character of that subtribe, having solitary instead of glomerate heads.

* *Dimeresia* and *Eremonanus* appear so evidently related that it seems as though they must be associated in the scheme of genera. Their ranges make them very suspicious members of the *Inuleae-Angianthineae*, for otherwise, with the exclusion of an anomalous East Indian species, the members of the subtribe are entirely Australian and all have habits utterly different from *Dimeresia* and its relative. The two American genera do not occur in a region that has close floristic affinities with Australia, and it would seem more probable and less spectacular for the genera to have relations in some of the polymorphous West American groups. The most natural hypothesis would be that they are related to the helenioid genus *Eriophyllum*, for *Dimeresia* and *Eremonanus*, particularly the latter, strikingly simulate in habit certain species of that characteristic West American genus. Dissections seem to show that similarities go deeper than the surface. In fact *Eremonanus mohavensis* has similarly shaped fruit and pappus, and has florets which are quite similar to the outer disk-florets in *Eriophyllum multiflorum* (DC.) Gray and *E. Pringlei* Gray. In anthers particularly, these species of *Eriophyllum* are almost indistinguishable from *Eremonanus mohavensis*, all three species having sagittate anthers with broad triangular auricles. In fact upon consideration, it seems not improbable that *Eremonanus* is a relative of *Eriophyllum* in which specialization has been towards the reduction in number of parts. Considering structures, habit, and range there seems little doubt that *Eremonanus* finds its closest relations in the *Helenieae*. The same can be said of *Dimeresia*. The definitely sagittate anthers are the only inuloid developments in the two West American genera, but as that character is present in the habitually similar helenioid genus *Eriophyllum*, as well as in a number of other non-inuloid genera the character can be taken as substantiating the hypothesized helenioid relationship rather than necessitating a less clear one among the Australian inuloids. The genus *Eremonanus* and the seemingly related *Dimeresia* are hence placed with fair confidence in the *Helenieae-Eriophyllanae*, Rydb. No. Am. Fl. xxxiv. 81 (1915), in which they are characterized by their few tegules and florets, opposite leaves, and persistent cotyledons.

The discovery of *Eremonanus mohavensis* is the result of several days joint collecting by Mrs. Mary F. Spencer and Miss Fidella Woodcock, who spent the early days in May of last year in botanizing on the Mohave Desert near Barstow, San Bernardino County, California. Miss Woodcock writes me in detail that the plant was collected at "Ord's Mountain" "on the high bench near the east bank of the Mohave river nearly opposite the Santa Fe passenger station in Barstow." Going down a north slope "small patches of the plant appeared like mesa-moss," but at the base of the slope where water had settled "an abundance of it grew with *Glyptopleura* in fine gravel."