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STUDIES IN THE BORAGINACEAE.—VI.

A REVISION OF THE SOUTH AMERICAN BORAGINOIDEAE.

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A REVISION OF THE SOUTH AMERICAN BORAGINOIDEAE.

By Ivan M. Johnston.

In the present paper an attempt has been made to give a critical descriptive account of the American species of the subfamily *Boraginoideae* now known from south of Panama. The species of this group were last brought together in the general account of the whole subfamily published in 1846 in the 10th volume of DeCandolle's Prodromus. Since the appearance of this scholarly treatment great changes have come about, the generic classification has been well nigh remade and the great abundance of the group in the Chilean flora has become known, the recognized species being much more than doubled. The subfamily having the South American distributional center in Chile, the recent work dealing most extensively with these plants is Reiche's account of the family published serially in the Anales de la Universidad de Chile (vol. cxxi) in 1907 and 1908 and as part of his Flora de Chile (vol. v) in 1910. This treatment is very disappointing, for through the author's careless and often manifestly inaccurate interpretations of the Philippian species, the types of which he might have studied, he has only added to that confusion in the literature on the Chilean flora that first arose from R. A. Philippi's over zealous multiplication of species.

The classification here presented has developed from a fairly detailed account of the Chilean species which I prepared in 1926 while studying in the Philippi herbarium at the Museo Nacional in Santiago. After my return from Chile I was loaned the South American material of the group from the collections of the United States National Herbarium, the New York Botanical Garden and the Field Museum of Chicago. With this extensive material to supplement the rich collections of the Gray Herbarium the extra-Chilean species were also studied, the account of the Chilean species thoroughly revised and the present paper written. Though as thorough and critical as the materials and facilities available permitted, the following treatment makes no pretense at finality, but is believed to afford a consistent and logical summary of our present knowledge, thus providing a sound foundation for the work still to be done in further elucidation of the complexities of this interesting group.

Without opportunity to study the extensive and fundamental collections of Philippi in the Museo Nacional at Santiago the subjoined account of the South American *Boraginoideae* could never have been written. I am, therefore, under particular obligation to the Committee on Sheldon Fellowships at Harvard University for the privilege

of visiting Chile as a Sheldon Traveling Fellow. I am also extremely indebted for the very courteous treatment which I received from the staff of the Museo Nacional de Chile at Santiago. Prof. Carlos Porter, Prof. Marcial R. Espinoza, Sr. Luis Moreira, Sr. Gualterio Looser and Sr. Gilberto Montero were very friendly and helpful and did much to make my work in the museum both pleasant and profitable. I am particularly indebted, however, to Prof. Francisco Fuentes, Curator of the Phanerogamic Herbarium, through whose friendliness and courtesy I was afforded every facility for studying the famous collection which is in his charge. While at Santiago I also received very courteous treatment from Prof. Victor M. Baeza, of the Instituto Pedagóico de Chile, being through his kindness permitted to study the fine herbarium of recent collections brought together by his efforts and those of Prof. Federico Johow and their students.

Various persons have assisted me in important details. Dr. H. M. Hall of the Carnegie Institution and Mr. E. P. Killip of the United States National Museum generously procured for me photographs of various essential types in the European herbaria. Prof. H. Lecomte of the Muséum d'Histoire Naturelle, Paris, most kindly sent for my examination, fragments of certain obscure species of Clos and Weddell. Dr. A. Brand, the well known monographer of the family, in generous coöperation has provided me with fragments of and notes concerning his recently published South American species. I have also been much aided by notes and specimens received from Dr. A. W. Hill, Director of the Royal Gardens at Kew, Prof. Carl Skottsberg of the Göteborgs Botaniska Trädgård, Prof. C. C. Hosseus, of the Universidad Nacional de Córdoba, Prof. Lucien Hauman, formerly of the Universidad de Buenos Aires, Dr. Alberto Castellanos of the Museo Nacional of Buenos Aires, Prof. L. R. Parodi of the Universidad de Buenos Aires, and the late Carlos Spegazzini of La Plate. Of great aid in the present work, have been the large loans received from the United States National Herbarium through Dr. W. R. Maxon, from the New York Botanical Garden through Dr. N. L. Britton and from the Field Museum of Natural History of Chicago through Mr. D. C. Davies and Mr. J. F. Macbride. In preparation of this paper, as well as in the previous ones of the series, I have profited much from the suggestions and the able editorial assistance of Prof. B. L. Robinson as well as from the help in bibliographic matters received from the librarian of the Gray Herbarium, Miss Ruth D. Sanderson. Greatly appreciating the aid of all these persons, who have so courteously responded to my needs, I would here express my hearty thanks for their generous assistance.

In the systematic account, which follows, I have cited all the material which I have examined. I have tried to arrange the collections listed in geographical sequence grouping them under the countries and the major subdivisions (Provinces or Departments) of the countries. Following the citation of each collection, I have appended in parenthesis initials indicating the herbarium in which I have seen material of the particular collection. The initials used and the herbaria they indicate are as follows—"G" for Gray Herbarium, "NY" for New York Botanical Garden, "US" for United States National Herbarium, "FM" for Field Museum of Chicago, "MS" for the Museo Nacional of Santiago and "IP" for the Instituto Pedagóico of Santiago.

Artificial Key to South American Genera.

Nutlet wing-margined or appendaged dorsally.
  Nutlets with appendages or teeth of the margin tipped with stout uncinate bristles, the body usually with uncinate pubescence; slender herbs with the lowermost leaves opposite.....17. *Pectocarya.*
  Nutlets with glochidiate appendages; leaves all alternate.
    Nutlets equalling the subulate gynobase to which they are affixed for nearly their whole length along the ventral keel.....13. *Lappula.*
    Nutlets much longer than the pyramidal gynobase to which they are affixed by a broad areola.
      Nutlets spreading or divergent, not keeled ventrally; areola apical or lateral and extending down from the apex of the nutlet.....16. *Cynoglossum.*
      Nutlets ascending, keeled ventrally above the medial areola.
        Pedicels recurving in fruit; inflorescence paniculate, sparsely bracted or naked; herbs.....14. *Hackelia.*
        Pedicels erect in fruit; inflorescence corymbose, bractless; shrub.....15. *Selkirkia.*
Nutlets neither wing-margined nor appendaged dorsally.
  Attachment-surface of nutlet plug-shaped, strophiolate, surrounded by a tumid rim.
    Corolla subrotate, suggesting that of a Solanum; stamens conspicuously exserted, appendaged dorsally.....7. *Borago.*
    Corolla salverform; stamens included, unappendaged.....6. *Anchusa.*
  Attachment-surface of nutlets flat, convex or annulate, simple or carunculate, not surrounded by a tumid rim.
Stamens very unequal, some exserted; corolla irregular.....5. *Echium.*
Stamens equal, usually included; corolla regular.
  Corolla-lobes contorted in the bud.....8. *Myosotis.*
  Corolla-lobes imbricated in the bud.
    Calyx or bracts with uncinate hairs.
      Inflorescence bracted; nutlets stipitate.....3. *Thaumatocaryon.*
      Inflorescence bractless; nutlets sessile.....4. *Moritzia.*
    Calyx or bracts completely lacking uncinate hairs.
      Nutlets with a broad basal attachment; leaves all alternate.....1. *Lithospermum.*

Nutlets attached laterally; at least lower leaves opposite.
Corolla blue; stigmas geminate. . . . . 2. *Antiphytum*.
Corolla not blue; stigmas solitary and simple.
Corolla yellow or orange, throat unappendaged. 12. *Amsinckia*.
Corolla white, throat appendaged.
Nutlets with pericarpial wall fused above middle to form a definite medial ventral keel. 11. *Plagiobothrys*.
Nutlets with a medial ventral groove formed by the non-fusion of the pericarpial wall.
Calyx cut to base, distinct from the bracts. 9. *Cryptantha*.
Calyx cylindrical, merely toothed, with floral bracts decurrent on its lower part. . . . . 10. *Nesocaryum*.

I. Tribe Lithospermeae.

Nutlets erect, straight or rarely bent, smooth or rough, unmargined; areola basal or occasionally suprabasal, near tip of cotyledon, unmargined, flat or nearly so, not at all strophiolate, usually sessile but occasionally stipitate; gynobase flat or low-pyramidal, not excavated; style cleft or entire; stigmas 2 or exceptionally 4, distinct or proximate or rarely fused, capitate or obscurely thickened; corolla yellow or orange or occasionally white or somewhat purplish.—Johnston, Contr. Gray Herb. lxxiii. 43 (1924).

Key to Genera.

Corolla with conspicuously oblique limb and unequal stamens. . . 5. *Echium*.
Corolla with horizontal limb and equal stamens.
Mature calyx cut to near base, the elongate lobes erect or spreading; nutlets usually 4, falling individually; calyx and bracts lacking uncinate hairs.
Nutlet-areola basal, sessile; leaves all alternate. . . . . 1. *Lithospermum*.
Nutlet-areola suprabasal, sessile or stipitate, at least the lower leaves opposite. . . . . 2. *Antiphytum*.
Mature calyx cylindrical or ellipsoid, merely toothed with the teeth connivent over the fruit; nutlets solitary, falling away tightly invested by the calyx; calyx or bracts with uncinate pubescence.
Inflorescence bracted; calyx lacking uncinate hairs; corolla-throat pubescent along obscure horizontal plaits; nutlet with stipitate areola. . . . . 3. *Thaumatocaryon*.
Inflorescence bractless; calyx with uncinate hairs; corolla-throat with circular villous spots or intruded appendages; nutlet with sessile basal areola. . . . . 4. *Moritzia*.

1. **Lithospermum** L.

Calyx usually divided. Corolla tubular or salverform; tube cylindrical; lobes spreading, imbricate; throat with intruded appendages or

towards the base of the tube; stamens borne about middle of tube, ca. 0.7 mm. below throat; filaments subulate, compressed, ca. $\frac{1}{3}$–$\frac{1}{4}$ length of anthers; anthers oblong, obtuse, 0.8–1 mm. long; corolla-throat with 5 small (ca. 0.5 mm. long) emarginate glabrous trapeziform appendages of intruded tissue; corolla-lobes obovate, ca. 3 mm. long, rounded, spreading; nutlets (only slightly immature ones seen) 2–4, ovate-oblong, ca. 1.6 mm. long, ca. 0.6 mm. broad, minutely tuberculate, homomorphous, broadest ca. 0.5 mm. above base, gradually tapering above towards the acutish apex and rounded off below towards the truncate base, back convex, sides acute below and rounded towards apex, the groove open, narrow, abruptly dilated at forking to form a small deltoid areola; gynobase subulate, ca. $\frac{2}{3}$–$\frac{3}{4}$ height of nutlets, 4-angled; style long, very much surpassing nutlets, ca. 1.5 mm. long.—*Heliotropium stylosum* Ph. Bot. Zeit. xxviii. 500 (1870) and Anal. Univ. Chile xlvii. 191 (1875); Hemsley, Bot. Challenger i. pt. 3, 100 (1884); Reiche in Eng. & Drude, Veg. Erde viii. [Grundz. Pflanzenverb. Chile] 269 (1907); Reiche, Anal. Univ. Chile cxxi. 832 (1908) and Fl. Chile v. 237 (1910).

CHILE: Isla San Ambrosia, Aug. 1869, *Simpson* (MS, TYPE; G, photo.); Isla San Ambrosia, Sept. 1874, *Vidal* (MS; G. photo.).

A very peculiar insular monotype evidently derived from *Cryptantha* and characterized by its peculiar calyx and corolla-structures. The calyx is decidedly cylindrical, very broadly, obliquely and firmly attached, and bears on the abaxial side above the base an elongate appendage. This appendage is evidently the floral bract that has become decurrent upon and fused with the lower part of the calyx. The corolla-tube below the middle on its inner surface is provided with 5 pairs of knife-like lamellae which are apparently similar in origin to the minute scales frequently present at the base of the corolla-tube in *Cryptantha* and other genera. These unusual developments, the floral bracts decurrent on the calyx and the unusually large appendages of the corolla-tube, separate the proposed genus, not only from *Cryptantha*, but from practically all other genera of the subfamily.

Nesocaryum is a derivative of the section *Krynitzkia* of *Cryptantha* and probably from a member of the series *Barbigerae*. The fruit is indistinguishable from *Cryptantha* and quite like that of the large-flowered South American species of the series mentioned.

11. **Plagiobothrys** F. & M.

Calyx cut almost to base into lanceolate or oblong erect or connivent lobes. Corolla with a short tube at most barely surpassing the calyx;

lobes spreading, imbricate, rounded; throat with intruded appendages. Style slender, usually short; stigma capitate. Ovules 4. Nutlets usually 4, erect, ovate to lanceolate, smooth or roughened; areola basal to medial, at lower end of the strong ventral keel or rarely terminating a stipitate prolongation of it, plane or excavated, simple or caruncu-late. Gynobase low-convex or pyramidal or frustate.—Annual or perennial herb. Leaves with at least the lowermost pair opposite but sometimes obscurely so from a rosulate basal arrangement, leaves linear to oblong. Flowers white, in bracted or naked racemes.—Ind. Sem. Hort. Petrop. ii. 46 (1835). *Echidiocarya* Gray, Proc. Am. Acad. xi. 89 (1876). *Allocarya* Greene, Pittonia i. 12 (1887). *Sonnea* Greene, Pittonia i. 22 (1887). *Echinoglochin* Brand in Fedde, Repert. xxi. 252 (1925).

A difficult genus of about 60 species. Except for two outlying species, one in Australia and another in Kamchatka, the group is American, reaching its greatest development in western United States and Chile.

Key to Species.

Lower leaves crowded to form a rosette and their opposite arrangement obscured. § *Euplagiobothrys.*

Racemes bractless; nutlets 2.5–3 mm. long, with an excavated annulate carunculate scar; plant 1.5–5 dm. tall, dye-stained only on root and on midribs and bases of lower leaves ..... 1. *P. fulvus.*

Racemes bracted; nutlets 1–2 mm. long, with solid scar; plant 0.5–2 dm. tall, dye-stained throughout.

Plant prostrate or spreading; nutlets 1.3–2 mm. long, with low rounded ridges; Argentina and Chile .... 2. *P. verrucosus.*

Plant erect or strictly ascending; nutlets 1–1.5 mm. long, with sharp well developed ridges or papillae; Chile and Peru ..... 3. *P. tinctorius.*

Lower leaves not crowded to form a rosette, loose, with the lowermost evidently opposite.

Ventral keel drawn out below the middle into a short stipe bearing the areola. § *Echidiocarya* ..... 4. *P. collinus.*

Ventral keel not at all drawn out into a stipe, the areola sessile. § *Allocarya.*

Corolla much surpassed by calyx; plant ca. 5 cm. tall; leaves filiform, 0.5–2 cm. long, 1 mm. broad; calyx cylindrical, subsessile, strict, 2.7–3 mm. long; a very poorly understood species of central Chile ..... 5. *P. armeriifolius.*

Corolla at length equalling and usually clearly surpassing the calyx.

Plant perennial, mostly of high altitudes.

Plants densely strigose; stems ascending; southern Chile.

Stems with only a single pair of opposite leaves; leaves 2–5 cm. long, 1–2.5 mm. broad ..... 6. *P. Germaini.*

Stems with 4–6 pairs of opposite leaves; leaves 1–2.5 cm. long, 0.6–1 mm. broad ..... 7. *P. foliosus.*

Plants sparsely villous or glabrescent; stems prostrate or long-trailing; northern Argentina to Colombia.
Style very much surpassing the mature fruit; flowers in axils of cauline leaves or in subacaulescent forms from a leafy tuft and seemingly scapose; corolla 4–6 mm. broad; pedicels 3–6 mm. long, slender; Lake Titicaca Region.....8. *P. Kunthii.*
Style short, shorter than or at most reaching to the tips of the nutlets.
Flowers racemose, in axils of alternately disposed bracts; Peru, Bolivia and northern Argentina.
Tips of calyx-lobes darkly tawny; racemes usually elongate and loose; foliage very sparsely strigose or glabrescent.....9. *P. humilis.*
Tips of calyx-lobes at most pale straw-colored; racemes usually glomerate; foliage cinerescent, hispid-villous.....10. *P. congestus.*
Flowers solitary in the axils of the opposite cauline leaves; Ecuador and Colombia.
Corolla 2.5–3.3 mm. broad; mature calyx with short obscure pedicels 0.3–0.9 mm. long; leaves narrowly oblance-linear, 0.8–1.5 cm. long, 0.8–1.1 mm. broad.....11. *P. pygmaeus.*
Corolla 4–6 mm. broad; mature calyx with evident pedicels 1–1.5 mm. long; leaves narrowly oblanceolate or linear-oblanceolate, 1–2.5 cm. long, 1.5–3 mm. broad.....12. *P. linifolius.*
Plant annual, mostly from low altitudes.
Corolla inconspicuous or small, 1–3 mm. broad.
Nutlets not rugose, merely tuberculate or papillate; scar large, concave or somewhat excavated; Peru.....13. *P. Macbridei.*
Nutlets always somewhat transversely rugose, frequently also more or less tuberculate or papillate; Chile.
Nutlets with an excavated or decidedly concave scar, reticulate-rugose, all somewhat tuberculate or papillate or subulate-appendaged or commonly only the more or less heteromorphous axial one so, appendages frequently glochidiate.....14. *P. procumbens.*
Nutlets with a solid scar, not papillate or subulate-appendaged, definitely homomorphous; appendages never glochidiate.
Nutlets narrowly reticulate-rugose, ovate, ca. 1 mm. long.....15. *P. polycaulis.*
Nutlets broadly transverse-rugose, usually narrowly ovate, 1.5–2.3 mm. long.
Nutlets decidedly compressed, with a convex or very broadly (obtuse-)angled anterior face.....16. *P. calandrinioides.*
Nutlets weakly compressed, with a prominently (right-)angled anterior face.
17. *P. oppositifolius.*
Corolla evident to large, (3–)4–6 mm. broad.
Nutlets sparsely but prominently papillate, transverse rugae obscure or none.....18. *P. pulchellus.*

Nutlets reticulate-rugose.
Reticulate ridging of nutlets prominent and narrow.....19. *P. uliginosus.*
Reticulate ridging of nutlets low and broad.
Lower pedicels elongating, very slender, 4–8 mm. long.....20. *P. pedicellaris.*
Lower pedicels, 0.5–3 mm. long.
Herbage sparsely and inconspicuously strigose; style surpassing the nutlets..21. *P. corymbosus*
Herbage densely strigose; style reaching to the tips of the nutlets.....22. *P. pratensis.*

1. **Plagiobothrys fulvus** (H. & A.) Johnston. Annual, 1.5–4 dm. tall, short-villous, with one or rarely two erect simple or sparsely and ascendingly short-branched stems; root and midribs of lower leaves stained with a purple dye; basal leaves in a rosette, oblanceolate, 2–12 cm. long, 5–10 mm. broad; cauline leaves scattered, alternate, lance-oblong to linear; racemes bractless, solitary to ternate, 5–20 cm. long, becoming very loosely flowered; calyx tawny at first, divided almost to base into lanceolate ascending lobes, at maturity 3–5 mm. long; pedicels 1–1.5 mm. long; corolla white, tube equalling or very slightly surpassing the calyx, lobes ascending, limb 1.5–3 mm. broad; nutlets 4, 2.5–3 mm. long, 1.5–2 mm. broad, pale, gray, densely granulate or granulate-muriculate, with a sharp medial dorsal keel and margins, also with less prominent transverse ridges which are frequently broken up into rows of papillae or murications; caruncular areola inframedial, annular, much below the crest of the very sharp ventral keel.—Contr. Gray Herb. lxviii. 70 (1923). *Myosotis fulva* H. & A. Bot. Beechey Voy. 38 (1830). *Eritrichium fulvum* A. DC. Prodr. x. 132 (1846); Clos in Gay, Fl. Chile iv. 465 (1849). *M. alba* Colla, Mem. Acad. Torino xxxviii. 128, t. 41 (1834). *P. rufescens* F. & M. Ind. Sem. Hort. Petrop. ii. 46 (1835 or 1836); A. DC. Prodr. x. 134 (1846); Clos in Gay, Fl. Chile iv. 474 (1849); Gray, Proc. Am. Acad. xx. 282 (1885); Reiche, Anal. Univ. Chile cxxi. 811 (1908) and Fl. Chile v. 216 (1910). *E. asperum* Ph. Anal. Univ. Chile xliii. 516 (1873); not *E. asperum* Ph. Linnaea xxix. 16 (1857) which is a *Cryptantha*. *E. fulvum*, var. *pinguis* Ph. Anal. Univ. Chile xliii, 518 (1873). *E. laxiflorum* Ph. Anal. Univ. Chile xc. 527 (1895). *P. rufescens*, var. *laxiflorus* Reiche, Anal. Univ. Chile cxxi. 812 (1908) and Fl. Chile v. 217 (1910).

CHILE. VALDIVIA: Pampa de Negron, March, 1864, *Krause* (MS, TYPE of *E. asperum*). MALLECO: Collipulli, 1915, *Baeza* (IP). BIO-BIO: Almendes, Araucania, 1889, *Philippi* (MS). ÑUBLE: Chillan, 1866, *Ant. de Solis* (MS); near Chillan, Oct. 1878, *Puga* (MS). TALCA: Talca, Oct. 1921, *Claude-Joseph 1651* (US). SANTIAGO: San Cristobal, Sept. 16, 1881, *collector not given* (MS); San Cristoral, Sept. 1879, *no collector given* (MS); San Cristobal

near Santiago, Nov. 3, 1900, *Hastings 113* (NY, US); Santiago, Oct. 1918, *Claude-Joseph 551* (US); "Colina, Renca, etc.," 1871, *no collector given* (MS, TYPE of *E. rufescens*, v. *pinguis;* G, photo.); Cerro de Renca, Sept. 1876, *no collector given* (MS); Renca, Sept. 30, 1887, *no collector given* (MS); Nuñoa, Nov. 1920, *Claude-Joseph 1302* (US); Hacienda Mercedes, Oct. 6, 1888, *no collector given* (MS, TYPE of *E. laxiflorum;* G, photo.); Santa Rita, Sept. 12, 1879, *no collector given* (MS); Prov. Santiago, Sept. 1830, *Gay 1627* (MS); San Bernardo, 1923, *Baeza* (IP). VALPARAISO: Valparaiso, Oct. 1925, *Claude-Joseph 3640* (US); Valparaiso, April, 1895, *Buchtien* (US). ACONCAGUA: Zapallar, 1909, *Johow* (IP). INDEFINITE: Porcillos, *no collector given* (MS); Chile, *Gay 300* (NY); Chile, *Gay* (G); moist sandy open places, "Quillota, Rancagua," 1835, *Bertero 445* and *1156* (G, NY).

This species has an extremely close relative in California. It differs from the North American plant only in being more slender and generally a little smaller in all its parts and in having the calyx somewhat less darkly tawny. Because of these differences I feel that the Californian form is worthy of a varietal name; certainly it is not specifically distinct. In accordance with these views the correct name of the form in California is, *P. fulvus*, var. *campestris* (Greene) Johnston, Contr. Gray Herb. lxviii. 70 (1923).

2. **P. verrucosus** (Ph.), comb. nov. Prostrate or loosely ascending 15–25 cm. broad, dye-stained throughout; stems spreading, one to several, branches ascending; basal leaves in a loose rosette, some of them evidently opposite, oblanceolate, 2–3 cm. long, 4–5 mm. broad; cauline leaves oblong or linear-oblong, obtuse; racemes leafy-bracted, solitary or geminate, 5–8 cm. long; calyx divided almost to base into erect or loosely connivent lanceolate lobes, at maturity 2–2.5 mm. long; pedicels ca. 1 mm. long; corolla white, shortly surpassing the calyx, 1–2 mm. long; nutlets broadly ovate, 1.3–2 mm. long, rounded at base, constricted just below apex, sparsely and obscurely granulate, medial dorsal keel low and rounded or rarely narrow, the transverse ridges occasionally narrow and definite but usually rounded and obscure; caruncular scar inframedial, in a shallow transverse ventral groove evidently below the crest of the well developed ventral keel.—*Eritrichum verrucosum* Ph. Linnaea xxix. 17 (1857). *P. patagonicus* Johnston, Contr. Gray Herb. lxviii. 76 (1923).

CHILE. LINARES: Cordillera de Linares, Jan. 1856, *Germain* (MS, TYPE of *E. verrucosum;* G. photo.).

ARGENTINA. RIO NEGRO: San Carlos de Bariloche, 800 m. alt., *Buchtien 118* (G, US). CHABUT: arid places near Lago Paz, Feb. 1900, *Spegazzini* (G); Colonia 16 de Octubre, Feb. 1926, *Guinazú 7344* (G). SANTA CRUZ: Patagonia, lat. 50°-53°, *Moreno & Tonini 530* (NY, TYPE of *P. patagonicus*).

In gross aspect much suggesting the Californian, *P. Torreyi*, var. *diffusus* Johnston, but differing from it in details and particularly in the marking of the nutlets. The nutlets of the Californian plant have

the back broken up into low-convex areas separated by several pairs of transverse lineate grooves. *Plagiobothrys verrucosus* is most related to *P. tinctorius*, but differs in being somewhat coarser and prostrate, and in having nutlets which average larger and have low and rounded rather than sharp and prominent ridges. The species has a basal rosette much looser than in other species of the section *Euplagiobothrys*, the opposite arrangement of the rosette-leaves being usually readily discernable. The type of *E. verrucosum* is not characteristic of the species. It consists of a very slender (possibly erect) plant, ca. 10 cm. long, which has a single branch ca. 8 cm. long. It is in mature fruiting condition. The nutlets are ca. 2 mm. long and are very obscurely roughened. The type is clearly not referable to *P. tinctorius*.

3. **P. tinctorius** (R. & P.) Gray. Plant erect, 5–20 cm. tall, dye-stained throughout; stems slender, one to several, branched, strictly ascending; basal leaves in a more or less persistent rosette, oblong-linear to linear-oblanceolate, 1–4 cm. long, 1–4 mm. broad, obtusish; cauline leaves oblong to lance-oblong or linear, alternate; racemes solitary or geminate, becoming loosely flowered, 2–10 cm. long, leafy-bracted at least below; calyx slightly tawny, divided almost to base into erect or loosely connivent lanceolate lobes, at maturity 1.5–2.5 mm. long; corolla white, limb 1–2.5 mm. broad, tube shortly surpassing the calyx; nutlets broadly ovate, 1–1.5 mm. long, rounded at base, constricted below apex, granulate, always with a strong medial dorsal keel and rather well developed lateral crests, roughened by sharp parallel sometimes reticulate ridges or commonly also by papillae or murications which are scattered or arranged in a reticulate or parallel manner; caruncular scar inframedial, seated in the broad transverse ventral groove a little beneath the level of the well developed ventral keel.—Proc. Am. Acad. xx. 283 (1885); Reiche, Anal. Univ. Chile cxxi. 811 (1908) and Fl. Chile v. 216 (1910); Johnston, Contr. Gray Herb. lxviii. 71 (1923). *Lithospermum tinctorium* R. & P. Fl. Peruv. ii. 4, t. 114 (1799). *Eritrichium tinctorium* A. DC. Prodr. x. 132 (1846); Clos in Gay Fl. Chile iv. 469 (1849). *L. myosotoides* Lehm. Asperif. ii. 319 (1818). *L. tingens* R. & S. Syst. iv. 44 (1819). *E. Pugae* Ph. Anal. Univ. Chile xc. 532 (1895).

PERU. AREQUIPA: Volcan El Chachani, ca. 4000 m. alt., April 1895, *Bailey* (G); gravelly places on open rocky slopes, 3700–4000 m. alt., Nevada de El Chachani, *Pennell 13279* (G, FM).

CHILE. MALLECO: margin Rio Renaico, Esperanza, 1915, *Baeza* (IP). BIO-BIO: between Nacimiento and Angol, Jan. 1877, *no collector given* (MS). CONCEPCION: St. Vicente, 1890, *no collector given* (MS). ÑUBLE: between Bollen and Coihueco, Oct. 1878, *Puga* (MS, TYPE of *E. Pugae;* G, photo.).

MAULE: San José, 1861–62, *Volckmann* (MS). TALCA: Talca, Oct. 1921, *Claude-Joseph 1683* (US). COLCHAGUA: San Fernando, Sept. 1864, *no. collector given* (MS). OHIGGINS: Rancagua, Sept. 8, 1879, *Gay* (MS); Rancagua, Oct. 1828, *Bertero 442* (G, NY). SANTIAGO: Santiago, Sept. 15, 1921, *Claude-Joseph 1363* (US); San Cristoral, Sept. 4, 1879, *no collector given* (MS); "colibus" San Christoral, Sept. 1840, *Gay 1618* (MS); San Cristobal, Aug. 8, 1876, *no collector given* (MS); Cerro San Cristobal, Nov. 10, 1923, *Looser* (Looser Herb.; G); Santa Rita, Sept. 12, 1879, *no collector given* (MS); San Bernardo, 1923, *Baeza* (IP); Cordillera de la Dehesa, Nov. 1861, *no collector given* (MS); Curacari, Sept. 1853, *no collector given* (MS); Tiltil, 1911, *Horst* (IP); Chacabuco, Sept. 1864, *no collector given* (MS). VALPARAISO: Quillota, Oct. 1829, *Bertero 1160* (NY); Valparaiso, 1909, *Rudolph* (IP). ACONCAGUA: Catemu, Sept. 1860, *no collector given* (MS). INDEFINITE: Maeul, 1917, *Baeza* (IP); Chile, *Gay* (G, NY); Chile, *Bridges 314* (G).

This readily recognized plant of south-central Chile apparently must be accredited to southern Peru. The two collections from the volcano, El Chachani, above Arequipa, seem quite the same as the far removed plant of central Chile. *Plagiobothrys tinctorius* is related to the North American *P. Torreyi* Gray, and *P. tenellus* (Nutt.) Gray, though clearly distinct from both.

4. **P. collinus** (Ph.), comb. nov. Stems several, ascending to strictly ascending, 3–15 cm. long, branched, usually appressed-villous or hispid-villous; leaves linear to oblance-linear, obtusish, 1–3 cm. long, 2–4 mm. broad, the lowermost clearly opposite; racemes 2–5 cm. long, bracted at base; calyx 1.5–2.5 mm. long, parted into connivent lanceolate lobes, fulvescent, subsessile; corolla inconspicuous, 1–1.5 mm. broad; nutlets obliquely ovoid, 1.2–1.5 mm. long, acute, reticulate-rugose with strong sharp ridges, the ventral keel well developed and towards base of nutlet drawn out into a short thick stipe bearing the areola; style about equalling the nutlets in length.—*Eritrichum collinum* Ph. Linnaea xxix. 17 (1857). *Cryptantha collina* Reiche, Anal. Univ. Chile cxxi. 828 (1908) and Fl. Chile v. 233 (1910). *E. inconspicuum* Ph. Anal. Univ. Chile xc. 534 (1895). *C. inconspicua* Reiche, Anal. Univ. Chile cxxi. 820 (1908) and Fl. Chile v. 225 (1910).

CHILE. COQUIMBO: La Serena, Oct. 1878, *Philippi* (MS, TYPE of *E. inconspicuum;* G, photo.); Coquimbo, Sept. 1885, *Philippi* (MS; G, photo.); hills, Huanta, Aug. 1836, *Gay 1623* (MS, TYPE of *E. collinum;* G, photo.).

A very close relative of *P. californicus* (Gray) Greene, of southern California and adjacent Mexico and perhaps conspecific with it. The Chilean plant is closest to *P. californicus*, var. *gracilis* Johnston, and var. *fulvescens* Johnston, cf. Contr. Gray Herb. lxviii. 73 (1923), but differs from both in its apparently erect habit and more prominently rugose nutlets. In size and shape of nutlets, in leaf-form, in inflorescence and in form and size of the calyx it is closest to the var. *fulvescens*

though differing conspicuously from it in having softer pubescence. The relationship between the Californian and Chilean plants is very clear and strong, so incontravertable in fact, that some changes in the classification of the North American forms will probably be made.

5. **P. armeriifolius** (Ph.), comb. nov. Annual, 5.5 cm. tall, erect, short appressed pallid hirsute-villous throughout, herbaceous, from above base producing numerous short strict leafy branches; leaves filiform-linear, strict, 0.5–2 cm. long, 0.8–1 mm. broad; racemes slender, densely flowered, 1–1.5 cm. long, geminate, ascending, sparsely leafy-bracted; calyx (before anthesis) very elongate, 2.7–3 mm. long, ca. 0.8 mm. thick, strict, divided, the very narrowly linear lobes erect, base abruptly contracted and subsessile; corolla (not quite mature) with tube reaching about $\frac{2}{5}$ height of calyx, the narrow (probably ascending) lobes reaching to about $\frac{2}{3}$ height of calyx, at anthesis the corolla probably distinctly surpassed by the calyx-lobes; fruiting structures unknown.—*Eritrichium armeriifolium* Ph. Anal. Univ. Chile xc. 551 (1895).

CHILE. COLCHAGUA: San Fernando, Sept. 1864, *Philippi* (MS, TYPE; G, photo.).

A curious plant known only from the type specimen which consists of a single small plant, broken off at ground, lacking fruit, and with the flowers only in well developed bud. It was originally described as biennial or perennial and as hard and woody at the base, but that I believe to be incorrect. The plant appears to be an annual which grew in dryish soil. The lower part is no more hard and woody than are similar parts in any of the common annual species of the section *Allocarya*. I am quite unable to detect any close relationships for *P. armeriifolius*. Perhaps it is only a freak or extreme ecological form of some well-known species with its identity further masked by its immaturity. More collections of this strange and puzzling plant are greatly desired.

6. **P. Germaini** (Ph.), comb. nov. Perennial from a cluster of thickened roots; stems usually several, decumbent or ascending, 5–15 cm. long, closely and densely fine-strigose; leaves numerous, very elongate, linear, 2–5 cm. long, 1–2.5 mm. broad, strigose, mostly basal and crowded, those of the stem few, usually the lowest pair opposite; racemes bractless or very sparsely bracted, tending to become loosely flowered at maturity; mature calyx 3–4 mm. long, base conical and tapering to a pedicel ca. 1 mm. long, lobes strict and densely fulvescent-strigose; corolla 3–7 mm. broad, white; nutlets ovate with a rounded base and acute apex, 1.2–1.5 mm. long, granulate, with a

definite dorsal keel and strong loosely reticulate lateral ridges at least above the middle, below the middle the medial keel and lateral ridges weak or broken up into papillae or murications, scar suprabasal; gynobase pyramidal; style equalling or much surpassing the nutlets.—*Eritrichium Germaini* Ph. Anal. Univ. Chile xc. 550 (1895). *Allocarya Germaini* Reiche, Anal. Univ. Chile cxxi. 808 (1908) and Fl. Chile v. 214 (1910).

CHILE. MALLECO: San Ignacio de Pemehue, Cordillera fronting Victoria, 1894–95, *Germain* (MS, TYPE; G, photo.); Victoria, 1913, *Baeza* (IP); Victoria, 1914, *Stuardo* (IP).

A remarkably distinct species of uncertain relationship.

7. **P. foliosus,** sp. nov. Perennis dense canescenti-strigulosus; caulibus numerosis gracilibus foliosis laxe decumbentibus 6–12 cm. longis e radice gracili verticali orientibus, internodiis saepissime 5–12 mm. longis; foliis numerosis linearibus 1–2.5 cm. longis 0.6–1 mm latis omnibus (supremis solis exceptis) oppositis; racemis solitariis vel geminatis ebracteatis 2–5 cm. longis; calycibus maturitate strictis, lobis linearibus erectis obtusis ca. 3.5 mm. longis, pedicellis 0.7–1.2 mm. longis; corolla conspicua alba cum limbo 4–6 mm. lato; nuculis ovatis 1.3–1.5 mm. longis irregulariter rugosis carinatis; areola suprabasali obliqua parva; stylo nuculas paullo superante.

CHILE. ÑUBLE: Yungay, Feb. 20, 1916, *Stuardo* (IP, TYPE; G, frag.).

A very well marked species perhaps most related to *P. Germaini* from which it differs in its leafy stems, slender root, and shorter and narrower opposite leaves.

8. **P. Kunthii** (Walp.) Johnston. Perennial, matted, acaulescent or with stout repent stems, roots fasciculate at nodes; leaves narrowly linear, obtusish, 1–2.5 cm. long, 0.7–1 mm. broad, in a loose basal tuft or clearly opposite along the stem, appressedly and sparsely hispid-villous, margins sparsely ciliate, base dilated and papery; flowers solitary and axillary, in caulescent states in the axils of opposite cauline leaves but in stemless ones springing from the basal tuft of leaves and apparently scapose; calyx cylindrical, sparsely short-villous, base at first narrowly conical but in fruit broad and rounded; calyx-lobes linear or oblance-linear, erect or spreading, becoming 2–4 mm. long; pedicels 3–6 mm. long, becoming stout, usually erect; corolla white with yellowish appendages, limb 4–6 mm. broad, tube 3–3.5 mm. long and 1–1.4 mm. thick; nutlets ovate with a rounded base and acute apex, 1.4–1.8 mm. long, coarsely reticulate-rugose at least above the middle, frequently spiculate on the ridges, medial keel definite only towards the apex, areola suprabasal; style extremely long,

much surpassing the nutlets.—Contr. Gray Herb. lxviii. 74 (1923). *Anchusa Kunthii* Walp. Nov. Act. Acad. Caes. Leop. Nat. Cur. xix. suppl. 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. Andina ii. 90 (1859).

PERU. Puno: low pampa on shore of Lake Titicaca, Puno, Oct. 12, 1919, *Shepard 4* (G).

BOLIVIA. La Paz: margin of Laguna de Pachaujo, between Laripata and Ticonguaya near Sorata, 4300 m. alt., Sept. 1858, *Mandon 383* (NY); wet places, Omasuyos near Achacache, 3950 m. alt., Dec. 1857–April 1858, *Mandon 382* (NY); old lake-bed, Pocoata, Feb. 12, 1903, *Hill 337* (Kew).

This species is known only from the vicinity of Lake Titicaca. It is readily recognized by its very long style and by its large, evidently pedicellate flowers. The original description of *A. Kunthii* is extremely brief. Since I have seen no authentic material it is possible that I may have the species incorrectly interpreted. However the very distinct species here treated is the only one I know from the Titicaca region with solitary subterminal axillary flowers, as called for in Walpers's short diagnosis, and so is very probably the species he described. The species as treated here somewhat suggests *P. congestus* in habit and in pubescence but is probably most related to *P. pygmaeus* and *P. linifolius*, particularly to the former. I doubtfully refer to the species a plant collected by Hill (no. 336, Kew) in a damp place near Guaqui at the south end of Lake Titicaca. This plant is glabrescent and has well developed very slender stems, although in other characters it is like the plants I have unconditionally referred to *P. Kunthii*.

9. **P. humilis** (R. & P.) Johnston. Repent perennial from a taproot; stems prostrate or frequently with the tips ascending, usually rooted at some of the nodes, glabrescent or sparsely strigose; leaves numerous, all opposite, linear with a rounded apex, 2–6(–11) cm. long, 1.5–3 mm. broad, sparsely strigose to merely ciliate, glabrescent, bases papery and dilated; racemes 2–9 cm. long, usually equalling or surpassing the subtending leaves, becoming very loosely flowered and somewhat pedunculate, interruptedly bracted; bracts alternately arranged, 0.5–2(–3) cm. long; calyx appressed-villulose, canescent with tawny tips, at maturity 2.5–3.5 mm. long, base rounded, pedicels 0.5–1 mm. long, lobes lanceolate and erect; corolla white, limb 1–2 mm. broad; nutlets ovate with a rounded base and acute apex, 1–1.5 mm. long, granulate, irregularly and loosely reticulate-ridged, with a definite medial dorsal keel only above the middle, scar suprabasal; style surpassed by nutlets or at most equalling them.—Contr. Gray Herb.

lxviii. 75 (1923). *Myosotis humilis* R. & P. Fl. Peruv. ii. 5 (1799); Lehm. Asperif. i. 108 (1818). *Eritrichium humile* A. DC. Prodr. x. 133 (1846); Clos in Gay, Fl. Chile iv. 471 (1849); Wedd. Chlor. Andina ii. 88 (1859). *Allocarya humilis* Greene, Pittonia i. 17 (1887). *Cynoglossospermum humile* Kuntze, Rev. Gen. iii. pt. 2, 204 (1898).

PERU. ANCASH: dryish brook-bed, Catuc, ca. 24 km. east of Huaraz, 3150 m. alt., Oct. 1922, *Macbride & Featherstone 2510* (G, FM). JUNIN: marshy places in pasture, La Quinua, 3600 m. alt., May 1922, *Macbride & Featherstone 2013* (G, FM). LIMA: wet or desiccated places on slope, Cerro Colorado near Antaicocha east of Canta, 3300–3800 m. alt., June 1925, *Pennell 14640* (G, FM); muddy brook-margin, Matucana, 2400 m. alt., April–May 1922, *Macbride & Featherstone 459* (G, FM); near Chicla, 3600–3900 m. alt., April 1882, *Ball* (G, NY); Baños, *Wilkes Exped.* (G, NY). CUSCO: moist slopes, La Raya, 4300–4500 m. alt., April 1925, *Pennell 13504* (G, FM). MOQUEGUA: Carumas near Volcano Ticsani, 4000 m. alt., Feb. 1925, *Weberbauer 7325a* (G, FM).

BOLIVIA. LA PAZ: marshy places, La Paz, 3750 m. alt., Jan. 28, 1919, *Buchtien 43* (FM); near Jungas, 1200 m. alt., *Rusby 2581* (NY); Unduavi, 3300 m. alt., Nov. 1910, *Buchtien 4682* (US); Chacambaya near Quiabaya, 3000 m. alt., *Mandon 380* (NY); near Rio Mulluponcu between Laripata and Tani, 3000–3100 m. alt., *Mandon 379* (G, NY). INDEFINITE: Bolivia, *Bang 1908* (G, NY); Bolivia, *Bang 1962* (G, NY, FM).

The type of *Myosotis humilis* R. & P. came from Pillao, a locality about 50 km. northeast of Huánuco, Peru. It is described as a hispid annual. As I have seen no authentic material I feel it best to follow usage, largely traceable to Weddell's Chloris Andina, and accept the name at least tentatively for the widely distributed Peruvian perennial above described. The plant treated here is most related to *P. congestus* but is readily separated by its coarser looser habit, sparser pubescence and tawny calyx-lobes. It is usually very quickly recognized merely by an examination of the calyx which is very characteristic in having the lobes very tawny at the tips. The species assumes a dwarfed condition exemplified by *Buchtien 4682*, *Pennell 13504*, *Weberbauer 7325a* and *Macbride & Featherstone 2510*, in which the racemes are glomerate and partially concealed by a tuft of leaves. Weddell probably included such forms in his var. *congestum* along with the plant which I have treated as *P. congestus*. These dwarfs forms of *P. humilis* are quickly distinguished from *P. congestus* by the very sparsely pubescent or glabrescent leaves and, of course, tawny calyx-lobes.

10. **P. congestus** (Wedd.) Johnston. Perennial from a taproot, repent; stems decidedly prostrate, rooting at the nodes, much branched, sparsely villous or glabrescent; leaves numerous, all opposite, linear to oblance-linear, 6–20 but commonly 10–15 mm. long, 1–2 mm. broad, somewhat cinerescent, appressed hispid-villous, apex rounded,

with somewhat dilated papery ciliate bases; racemes usually glomerate in the upper axils and commonly surpassed by the adjacent leaves, frequently elongating and becoming 1–2(–3) cm. long, leafy-bracted throughout, the bracts 5–10 mm. long and alternate; calyx appressed-villulose, cinerescent or very slightly flavescent, at maturity 2.5–3 mm. long, base rounded, pedicels 0.5–1 mm. long; calyx-lobes linear or linear-lanceolate, erect; corolla white, limb 1–2.3 mm. broad; nutlets ovate with a rounded base and acute apex, 0.9–1.2 mm. long, granulate, irregularly and loosely ridged, with the medial dorsal keel definite only above the middle, scar suprabasal; style equalling the height of the nutlets or definitely surpassed by them.—Contr. Gray Herb. lxviii. 75 (1923). *Eritrichium humile*, var. *congestum* Wedd. Chlor. Andina ii. 88 (1859).

PERU. Puno: Chuquibambilla, gravelly banks of riverlet on puna, 3850–3900 m. alt., April 1925, *Pennell 13397* (G, FM); Occa Pampa, Prov. Huancané, 3700 m. alt., Dec. 1919, *Shepard 107* (G, NY, US). Moquegua: Carumas near Volcano Ticsani, 4000 m. alt., Feb. 1925, *Weberbauer 7325* (G, FM).

BOLIVIA. La Paz: on puna, La Paz, 4100 m. alt., Feb. 1910, *Buchtien 43* (G, US, FM); on puna, La Paz, 4100 m. alt., Jan. 25, 1907, *Buchtien 43* (US); Chuquiaquillo near La Paz, April 1857, *Mandon 381* (G); Omapusa near Achacache, 4000 m. alt., Jan.–March 1859, *Mandon 381* (NY); Copacabana, Jan. 24, 1903, *Hill 330* (Kew). Oruro: between Oruro and Cochabamba, 4000 m. alt., March 17, 1892, *Kuntze* (NY). Tarija: Escayache near Tarija, 3600 m. alt., Jan. 30, 1904, *Fiebrig 3019* (G, US).

ARGENTINA. Tucaman: La Cienega, Sierra de Tucaman, Jan. 1874, *Lorentz & Hieronymus 639* (US, FM).

This species is very closely related to *P. humilis*, but has a more southerly distribution and is smaller and more slender throughout. Its foliage is rather persistently pubescent and cinereous, the racemes are more or less glomerate and the calyx-lobes are not noticeably tawny at the tips. As originally treated by Weddell the present plant was apparently confused with the dwarf states of *P. humilis*. The original description, however, calls for plants differing from *P. humilis* in having congested racemes and stems with more numerous and much shorter branches. This applies completely to the plant here treated as *P. congestus*.

It seems not improbable that the collections of Meyen treated by Walpers, Nov. Act. Acad. Caes. Leop. Nat. Cur. xix. suppl. 371 (1843), as *Amsinckia humifusa* also belong to the present species. However, since the specific name used by Walpers was obviously derived from one of Poeppig's herbarium-names, and since Walpers's brief description is quite ambiguous applying equally well to various species of south central Chile as to the Bolivian *P. congestus*, it seems

best to reserve Walpers's name for the Chilean species including Poeppig's collection number 55 which is cited by Walpers. Just what this species is I am not certain. DeCandolle, Prodr. x. 133, footnote (1846), thought it might be *P. procumbens*.

11. **P. pygmaeus** (HBK.) Johnston. Perennial, repent; stems prostrate, slender, rooting at the nodes, sparsely strigose, sometimes loosely branched but more often densely so and congested, internodes usually short; leaves narrowly oblance-linear, 0.8–1.5 cm. long, 0.8–1.2 mm. broad, all opposite, very sparsely hispid-strigose and frequently so only on the margins, apex obtuse, gradually contracted towards the narrowly connate expanded papery base; flowers solitary in the axils of the opposite cauline leaves, subsessile and strict; calyx sparsely appressed-villous, with erect or loosely spreading lanceolate lobes becoming 2–3 mm. long, subsessile or with very short obscure pedicels 0.3–0.9 mm. long; corolla white, limb 2.5–3.3 mm. broad, tube 1–1.4 mm. long and 0.8 mm. thick; nutlets ovate, with a rounded base and acute apex, 1.2–1.6 mm. long, roughened with rounded irregularly reticulate ridges which are frequently obscure or absent below the middle, medial dorsal keel definite only towards the apex, areola suprabasal; style decidedly shorter than the nutlets.—Contr. Gray Herb. lxviii. 74 (1923). *Anchusa pygmaea* HBK. Nov. Gen. et Sp. iii. 92 (1818). *Eritrichium pygmaeum* Wedd. Chlor. Andina ii. 89 (1859). *Lithospermum alpinum* R. & S. Syst. iv. 742 (1819).

ECUADOR. Loja: Chuquiribamba, Nov. 16, 1876, *André 4442* (G, FM). Azuay: vicinity of Cumbre, Sept. 24, 1918, *Rose, Pachano & Rose 22947* (G, NY). Indefinite: Ecuadorian Andes, *Spruce 5309* (G).

The type of this species was collected at 4100 m. alt. near the summit of Antisana, Prov. Pichincha, Ecuador. It is probably most related to *P. linifolius* but is smaller in all parts and is more slender and more compact in habit.

12. **P. linifolius** (Lehm.) Johnston. Perennial; stems trailing, rooting at the nodes, slender with the internodes usually equalling or surpassing the leaves in length, very loosely branched, not congested into a mat; leaves narrowly oblanceolate or linear-oblanceolate, 1–2.5 cm. long, 1.5–3 mm. broad, all opposite, acute, very sparsely hispid-strigose, usually somewhat ciliate with strict hairs, noticeably contracted towards the dilated papery narrowly connate base; flowers solitary in the axils of the opposite cauline leaves; calyx sparsely appressed-villous, with erect or spreading lance-linear lobes, becoming 2.5–4 mm. long; pedicels becoming evident, 1–1.5 mm. long, spreading; corolla white, 4–6 mm. broad, tube 2–2.3 mm. long and 1.2–1.3 mm.

thick; nutlets ovate with a rounded base and acute apex, 1.5–1.9 mm. long, roughened with rounded irregularly reticulate ridges which occasionally are obscure below the middle, medial dorsal keel usually definite only towards the apex, areola suprabasal; style shorter than the nutlets.—Johnston, Contr. Gray Herb. lxviii. 74 (1923). *Anchusa linifolia* Lehm. Asperif. i. 215 (1818). *Antiphytum linifolium* DC. Prodr. x. 121 (1846). *Eritrichium linifolium* Wedd. Chlor. 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. INDEFINITE: Quitensian Andes, 1855, *Couthouy* (G).
COLOMBIA. NARIÑO: Meneses, April 29, 1876, *André 2906* (G, NY, FM).

This species was based upon collections made in southwestern Colombia, Prov. Nariño, between Pasto and the Ecuadorean border. Weddell reports it from El Quindio apparently upon the basis of a collection by Triana. Though certainly distinct, the species seems to be most related to *P. linifolius* of Ecuador.

13. **P. Macbridei**, sp. nov. Annuus; caulibus gracilibus pluribus prostratis vel laxe ascendentibus 3–7 cm. longis adpresse breviterque villosis; foliis linearibus 2–3 cm. longis 1–2 mm. latis acutiusculis basem versus paullo dilatatis breviter sparseque hispido-villosis inferioribus oppositis; racemis laxe floratis ubique bracteatis; bracteis alternis linearibus 0.5–2 cm. longis; calycibus adpresse villosis maturitate 2–2.5 mm. longis, lobis lanceolatis erectis; corolla inconspicua subtubulari ca. 1 mm. lata; nuculis ovatis plus minusve angulatis ca. 1.5 mm. longis irregulariter tuberculatis vel papillatis obscurissime dorso carinatis; areola suprabasali grandi triangulari concava vel plus minusve excavata.

PERU. LIMA: in short grass, Viso, 2700 m. alt., May 1922, *Macbride & Featherstone 599* (FM, TYPE; G, ISOTYPE).

Clearly related to the Chilean *P. procumbens* and perhaps only a form of it. More collections of this plant are needed before its exact status can be finally decided. In lacking any transverse ridges and being merely tuberculate or papillate its nutlets are readily distinguished from those of *P. procumbens*. The size and general form of the nutlets, however, very much suggest that species as does also the large more or less excavated scar.

14. **P. procumbens** (Colla) Gray. Annual; stems usually several, prostrate or laxly ascending, strigose or appressed short hispid-villous, 5–25 cm. long, usually rebranched; leaves linear or spathulate- or

oblance-linear, 1–3.5 cm. long, 0.8–2.3 mm. broad, obtusish, lowermost opposite; racemes elongate, leafy-bracted; bracts alternate, interrupted, 1–1.5 cm. long; calyx rather densely appressed-villous, somewhat tawny, at maturity 2–4 mm. long with linear or lanceolate erect or loosely ascending lobes, shortly pedicellate; corolla inconspicuous, 1.5–2.5 mm. broad; nutlets ovate, more or less angulate, 1.3–1.7 mm. long, reticulate-rugose and granulate-tuberculate, with the roughenings prominent, frequently (especially on the somewhat heteromorphous axial one) the ridges partially or completely replaced or sometimes surmounted by murications papillae or even subulate frequently glochidiate appendages, medial dorsal keel always definite at least above the middle, margins frequently ridged and hence somewhat angulate, ventral face with a large deltoid more or less excavated suprabasal scar lying usually below the level of the well developed ventral keel; axial nutlet frequently differentiated being usually dulled with minute pubescence-like spicules and having the back more papillate and frequently provided with glochidiate appendages; style short, surpassed by the nutlets; gynobase hemispherical or pyramidal.—Proc. Am. Acad. xx. 283 (1885); Johnston, Contr. Gray Herb. lxviii. 80 (1923). *Myosotis procumbens* Colla, Mem. Acad. Torino xxxviii. 130 (1834). *Eritrichium procumbens* DC. Prodr. x. 133 (1846); Clos in Gay, Fl. Chile iv. 470 (1849); Ph. Anal. Univ. Chile xc. 543 (1895). *Allocarya procumbens* Greene, Pittonia i. 17 (1887); Reiche, Anal. Univ. Chile cxxi. 807 (1908) and Fl. Chile v. 212 (1910). *E. tenuicaule* Ph. Linnaea xxix. 18 (1857). *A. tenuicaulis* Macbr. Proc. Am. Acad. li. 544 (1916). (?) *E. illapelinum* Ph. Anal. Univ. Chile xc. 548 (1895).

ARGENTINA. CHABUT: Rio Palena, March 17, 1900, *Spegazzini* (G).
CHILE. COLCHAGUA: Malloa, Oct. 20, 1883, *no collector given* (MS). VALPARAISO: Viña del Mar, Sept. 15, 1894, *Buchtien 144* (MS); Casa Blanca, May 1856, *Harvey* (G); Valparaiso, *Borchers* (MS); Valparaiso, *Cumings 400* and *433* (G); Valparaiso, 1925, *Claude-Joseph 3620* and *3758* (US); Valparaiso, 1895, *Buchtien* (US). SANTIAGO: San Cristobal, 1917, *Baeza* (IP); San Cristoral, Oct. 1874, *no collector given* (MS); Cerro de Renca, Sept. 1876, *no collector given* (MS); Santiago, *Claude-Joseph 2204*, *2882* and *2886* (US); Nuñoa, Nov. 1922, *Claude-Joseph 2122* (US); Santa Rita, Oct. 12, 1879, *no collector given* (MS); Hacienda de Mercedes, 1888, *no collector given* (MS); Macul, Sept. 1855, *no collector given* (MS); Prov. Santiago, Oct. 1830, *Gay 1624* (MS, TYPE of *E. tenuicaule;* G, photo.); (?) Cordillera de las Arañas, *no collector given* (MS). ACONCAGUA: Quillota, *Germain* (MS); Catapilco, Sept. 1865, *no collector given* (MS); Zapillar, 1908 and 1919, *Johow* (IP); between La Ligua and Los Molles, 1914, *Rose 19376* (US). COQUIMBO: Dept. Illapel, Oct. 1884, *no collector given* (MS, TYPE of *E. illapelinum;* G, photo.); Cerrillos, Dept. Ovalle, 1917, *Baeza* (IP). INDEFINITE: no locality given, *Bertero 445* (G); Quillota and Rancagua, *Bertero 1159* and *443* (NY).

This is a very common and very frequently collected plant of central

Chile and apparently the predominating one of the section *Allocarya* in the Santiago-Valparaiso region. Very clearly it is the *Myosotis procumbens* of Colla. It has been the plant most commonly associated with Ruiz & Pavon's *Lithospermum muricatum*, though in most cases with some doubt. That latter species is said to have been based upon material from Concepcion, which is quite south of the known range of *P. procumbens* in Chile and whence I have seen no material that is satisfactorily covered by Ruiz & Pavon's description. *Lithospermum muricatum* is described as having muricate nutlets which is not the case in *P. procumbens*. Being quite uncertain as to the identity of *L. muricatum* R. & P., I have been forced to list it among the poorly understood and unrecognized species.

Plagiobothrys procumbens is closely related to *P. Greenei* and related forms of California. It is a less robust plant, with small lanceolate calyx-lobes and somewhat smaller nutlets than in *P. Greenei*, but is quite similar and probably conspecific with *P. Piperi* Johnston, cf. Contr. Gray Herb. lxviii. 75 (1923).

The Chilean plants vary in the roughenings of the nutlets. There are two common forms which apparently grow in the same places. In one form the nutlets are alike, all of them being reticulate-rugose. In the other form the axial nutlet is more or less differentiated, usually being duller in color and having rather prominent frequently more or less glochidiate papillae or subulate appendages, which either replace or surmount the reticulate ridging. Practically all the specimens I have seen fall into one or the other of these two forms. These forms most decidedly do not have distinct ranges. In a few cases I have noted that the early flowers on a plant had the axial nutlet differentiated, whereas the later flowers produced only homomorphous nutlets

Another very much rarer variation is represented by Baeza's collection from the Province of Coquimbo. This has nutlets slightly smaller but otherwise quite indistinguishable from those particular forms of *P. Greenei*, sensu lat., which Piper, Contr. U. S. Nat. Herb, xxii. 82 and 89 (1920), treated as *Allocarya Eastwoodae* and *A. Greenei*. In the Chilean form mentioned the nutlets are all alike, 1.5 mm. long, dull and are all armed with abundantly glochidiate subulate-appendages. The scar is very deeply excavated. More of this peculiar form is needed so that its status can be determined.

15. **P. polycaulis** (Ph.), comb. nov. Annual; stems 5–15 cm. tall, one to several, loosely ascending to erect, strigose; leaves linear or oblance-linear, 2–3 cm. long, 1–2 mm. broad, strigose; racemes interruptedly bracteate or bracted only towards base, becoming loosely flowered; calyx usually densely appressed hispid-villous, commonly

fulvescent, becoming 2.5 mm. long with erect or strictly ascending oblong-lanceolate or broadly linear lobes; pedicels short; corolla small, 2–2.5 mm. broad; nutlets ovate often broadly so, ca. 1 mm. long, low reticulate-rugose, keeled dorsally, rounded laterally; scar suprabasal, small, deltoid, solid, on or slightly above level of the ventral keel; gynobase broadly pyramidal; style surpassed by nutlets.—*Eritrichium polycaule* Ph. Anal. Univ. Chile xc. 542 (1895). *E. delicatulum* Ph., l. c. 544. *E. flavicans* Ph. l. c. 544. *E. graminifolium* Ph. l. c. 547. *E. bracteatum* Ph. l. c. 548. *E. vernum* Ph. l. c. 550.

CHILE. VALDIVIA: Valdivia, Oct. 1852, *Philippi* (MS, TYPE of *E. vernum;* G, photo.) BIO-BIO: Coigue, 1915, *Ochoa* (IP). CONCEPCION: San Vicente, Nov. 1887, *Philippi* (MS, TYPE of *E. flavicans;* G, photo.). ÑUBLE: Chillan, 1869, *Man. Ant. de Solis* (MS, TYPE of *E. delicatulum;* G, photo.); "Ñuble ?, col. *Puga*?" (MS, TYPE of *E. graminifolium;* G, photo.). CURICO: Prov. Curico, 1892, *Vidal* (MS, TYPE of *E. bracteatum;* G, photo.). SANTIAGO: (?) between Colina and Batuco, Sept. 1899, *Reiche* (MS). INDEFINITE: specimen without data (MS, TYPE of *E. polycaule;* G, photo.).

This plant apparently replaces *P. procumbens* in south-central Chile. It is clearly related to that species but is distinguished by its smaller nutlets which do not have cristate dorsal margins and have a small solid scar seldom sunk below the level of the ventral keel. The inflorescence is rather less abundantly bracteate and is frequently practically bractless.

16. **P. calandrinioides** (Ph.), comb. nov. Annual; stems several, prostrate or loosely ascending, 5–18 cm. long, strigose; leaves oblong-linear to narrowly linear, obtusish, 1–5 cm. long, 1–2.5 mm. broad; racemes loose or dense, interruptedly pauci- to multi-bracteate; calyx strigose, usually somewhat tawny above, becoming 2–3.5 mm. long, with erect or strictly ascending linear-oblong or lanceolate lobes; pedicels obscure, 0.5–1 mm. long; corolla 1–3 mm. broad, white; nutlets oblong-ovate, 1.5–2.3 mm. long, compressed, dark and somewhat glossy, irregularly rugose with the broad ridges usually low and sinuately transverse, granulose-tuberculate, medial dorsal keel obscure, ventral face broadly angled; scar suprabasal, deltoid to cuneate, about flush with crest of the well developed ventral keel, somewhat oblique; style much surpassed by the nutlets.—*Eritrichium calandrinioides* Ph. Anal. Univ. Chile xc. 541 (1895). *E. nubigenum* Ph. ex. Meigen in Engler, Bot. Jahrb. xvii. 267 (1893), nomen. *Allocarya sessiliflora,* var. *nubigena* Ph. ex Reiche, Anal. Univ. Chile cxxi. 806 (1908) and Fl. Chile v. 212 (1910). *E. albiflorum* of Griseb. Abh. K. Ges. Wiss. Goettingen vi. 131 (1854), as to Lechler's plant, not synonymy. *P. Lechleri* Johnston, Contr. Gray Herb. lxviii. 79 (1923).

CHILE. CURICO: Prov. Curico, 1892, *Vidal* (MS). SANTIAGO: Valle Largo, Cordillera de Santiago, Feb. 1892, *Philippi* (MS, TYPE of *E. nubigenum;* G, photo.); Las Arañas mines, 1861, *Philippi* (MS, TYPE of *E. calandrinioides;* G, photo.). MEGALLANES: sandy strand, Beagle Canal on north shore of Navarino Island, Feb. 1922, *Gusinde 69* (G).

ARGENTINA. Rio Negro: along the river in vicinity of General Roca, Oct. 10, 1914, *Fischer 135* (G, US, FM). SANTA CRUZ: arid subsaline places near Rio Santa Cruz, Feb. 19, 1882, *Spegazzini* (G); Isla Pavon, Rio Santa Cruz, Feb. 9, 1882, *Spegazzini* (G); wet places along Rio Deseado, Jan. 1899, *Ameghino* (G); Patagonia, lat. 50°–53°, *Moreno & Tonini 529* and an unnumbered collection (NY).

This species appears to be the common Patagonian member of the section *Allocarya.* It has been much confused and has been misdetermined as *E. humile, E. uliginosum* and *E. procumbens.* With the exception of a collection of *P. procumbens* from the Cordilleras of Chabut, *P. calandrinioides* is the only species of its section that I have seen from Patagonia or Fuegia. It is very readily recognized by its large oblong-ovate nutlets which are compressed and are marked by broadly spaced wide, low, more or less sinuous transverse ridges. Its nearest relative is *P. oppositifolius.*

The range of *P. calandrinioides* is interesting and perhaps worthy of some comment. The plant, though seeming to be primarily Patagonian, occurs on the western slope of the Cordilleras above Santiago. Although the Cordilleras are highest in this district a number of herbaceous *Boraginaceae,* commonly of low altitudes, appear to cross the continental divide there. The most striking examples of these are *Cryptantha globulifera, Amsinckia tessellata* and *Plagiobothrys verrucosus.*

17. **P. oppositifolius** (Ph.), comb. nov. Annual; stems several, prostrate, 5–15 cm. long, subsimple or loosely branched, loosely appressed short hispid-villous; leaves broadly linear, 1–2 cm. long, 1.5–3 mm. broad, obtusish, sparsely appressed hispid-villous; racemes bracted nearly throughout, becoming loosely flowered and 3–5 cm. long; calyx densely appressed hispid-villous, becoming 2–3 cm. long with lanceolate or oblong-linear erect or strictly spreading lobes; pedicels becoming 1 mm. long; corolla 2–3 mm. broad; nutlets narrowly to broadly ovate, 1.5–1.8 mm. long, thick, not strongly compressed, irregularly rugose with the ridges usually broad and low and frequently absent or obscure particularly below the middle, medial dorsal keel low and usually rounded and obscure below the middle, ventral face prominently angled; scar almost basal, oblique, small and solid; gynobase broadly pryamidal; style much surpassed by the nutlets.—*Eritrichium oppositifolium* Ph. Anal. Univ. Chile xc. 542 (1895). *Allocarya oppositifolia* Reiche, Anal. Univ. Chile cxxi. 807 (1908) and Fl.

Chile v. 212 (1910). *E. cinereum* Ph. l. c. 545. *A. cinerea* Reiche, l. c. 808 and l. c. 213. *E. limonium* Ph. l. c. 546.

CHILE. MALLECO: Ercilla, Araucania, Nov. 1887, *Philippi* (MS, TYPE of *E. limonium;* G, photo.); Araucania, Nov. 1887, *Philippi* (MS, TYPE of *E. cinereum;* G, photo.). CAUTIN: Temuco, 1915, *Baeza* (IP). INDEFINITE: without data (MS, TYPE of *E. oppositifolium;* G, photo.).

A close relative of *P. calandrinioides* differing in its weakly compressed nutlets and more southerly Chilean range.

18. **P. pulchellus** (Ph.), comb. nov. Annual; stems several, prostrate or decumbent, 1–1.5 dm. long, branched, appressed short-villous; leaves linear, 1–3 cm. long, 1.5–2.5 mm. broad, very sparsely strigose, margins sparsely short-ciliate and pustulate; racemes 2–5 cm. long, usually geminate, bractless; calyx densely appressed short-villous, fulvescent especially at tips, becoming 2–3 mm. long, with oblong-lanceolate erect or spreading lobes; pedicels ca. 1 mm. long; corolla 4–5 mm. broad; nutlets ovate, 1.3–1.5 mm. long, obscurely an finely granulate, sparsely papillate, occasionally obscurely transverse-rugose towards the base, medial dorsal keel very sharp above the middle; scar suprabasal, deltoid, concave, clearly below the level of the strong ventral keel; gynobase globose-pyramidal; style just surpassed by nutlets.—*Eritrichium pulchellum* Ph. Anal. Univ. Chile xc. 545 (1895).

CHILE. MALLECO: [Traiguen?] Araucania, Nov. 1887, *Philippi* (MS, TYPE; G, photo.).

I was unable to locate in the Philippi Herbarium any material given as from Traiguen, the locality cited by Philippi when he described the species. The species is represented at Santiago by two plants of the same collection which have been both labeled and determined by Philippi. These have only the following data: "Eritrichium pulchellum Ph., Araucania, Nov. 1887." During Nov. 1887 Philippi was collecting in the province of Malleco, cf. Gartenflora xxxviii. 88–90 (1889). Since Traiguen is in that province perhaps the locality was supplied from memory in an attempt to give a more precise source for the specimen than merely the vague indefinite regional name, "Araucania."

As defined by Philippi his species is an aggregate. The two plants in the herbarium at Santiago represent different species, one being the plant here treated as *P. pulchellus*, the other apparently a phase of *P. corymbosus*. The original description is very ambiguous, though in the majority of points it seems to fit the plant I have described above especially so where the nutlets are described as "mui arrugadas" and the hairs of the calyx as "amarillentos."

The species as here defined is most related to *P. corymbosus*. In having papillate rather than rugose nutlets, however, the plant is so different that it seems best treated as specifically distinct. Although the relationships are patent I have seen no suggestion of the occurrence of transitional forms.

19. **P. uliginosus** (Ph.), comb. nov. Annual; stems usually solitary, weak and slender but apparently erect, becoming 2–4 dm. tall, sparsely and obscurely villous-strigose, branches few and strictly ascending; leaves linear or lance-linear, 1–5 cm. long, 1.5–2.5 mm. broad, obtusish, very sparsely villous-strigose, mostly opposite; racemes usually geminate, bractless, 3–15 cm. long, becoming elongated and loosely flowered; calyx densely appressed tawny-pubescent, becoming 2–3 mm. long, with the narrowly lanceolate lobes erect to spreading; pedicels usually slender, becoming 1–3 mm. long and somewhat spreading; corolla conspicuous, white, 4–6 mm. broad; nutlets ovate, ca. 1.7 mm. long, pale, granulate, reticulate-rugose with the rugae narrow and sharp, medial dorsal keel definite, ventral keel strong, scar nearly basal; gynobase hemispheric-pyramidal; style reaching to tip of nutlets.—*Eritrichium uliginosum* Ph. Anal. Univ. Chile xliii. 519 (1873). *Allocarya uliginosa* Greene, Pittonia i. 14 (1887); Reiche, Anal. Univ. Chile cxxi. 807 (1908) and Fl. Chile v. 213 (1910). *Cynoglossospermum uliginosum* Kuntze, Rev. Gen. iii. pt. 2, 204 (1898). (?) *E. tenuifolium*, var. *pulchellum* Ph. Anal. Univ. Chile xc. 547 (1895). (?) *A. tenuifolia*, var. *pulchella* Reiche, l. c. 805 and l. c. 211.

CHILE. Ñuble: Chillan, *Reed* (G); "Prov. de Chillan," Dec. 1869, *Philippi* (MS, type of *E. uliginosum;* G, photo.). Indefinite: (?) collection without data (MS, type of *E. tenuifolium* var. *pulchellum;* G, photo.).

When *E. uliginosum* was described the type specimens were given as from the province of Colchagua. This was probably a slip of the pen, for the only specimens in the herbarium at Santiago covered by the original description are those labeled, "Eritrichium uliginosum Ph. Prov. de Chillan, Decemb. 1869." The species is closely related to *P. corymbosus* but differs in its more sharply ridged nutlets, and in its more slender, erect and taller habit. It is positively known only from Ñuble, which is some distance north of the range of its relative. The type of *E. tenuifolium*, var. *pulchellum* is doubtfully associated with *P. uliginosus*. It agrees with the present species in the sculpturing of the nutlets, in length of style and in its habit and large flowers, but differs from the Chillan material in its low (only 5–7 cm. tall) stoutish habit and conspicuously rufous pubescence. The source of the type material is not known.

20. **P. pedicellaris** (Ph.) Johnston. Annual; stems solitary or few, trailing, subsimple, 5–10 cm. long, finely and closely short-strigose; leaves linear, 3–5 cm. long, 1–1.5 mm. broad, very gradually contracted towards the acutish apex, finely and closely short-strigose; racemes not much if at all surpassing the leaves, 1–3 cm. long, leafy-bracted at the base, very loosely flowered; pedicels slender, those of the lower flowers elongate and spreading, becoming 8 mm. long; calyx appressed short-villous, fulvescent, becoming 3 mm. long, with erect slender linear lobes; corolla conspicuous, ca. 4 mm. broad; nutlets ovate, ca. 1.3 mm. long, reticulate-rugose, with the ridges narrow but not prominent, medial dorsal and ventral keels fairly well developed; scar just above the base of the nutlet, small, oblique; gynobase low, broadly pyramidal; style elongate, surpassing the nutlets.—Contr. Gray Herb. lxviii. 75 (1923). *Eritrichium pedicellare* Ph. Anal. Univ. Chile xc. 549 (1895). *Allocarya pedicellaris* Reiche, Anal. Univ. Chile cxxi. 809 (1908) and Fl. Chile v. 214 (1910). *E. tenuifolium*, var. *longipes* Ph. Anal. Univ. Chile xliii. 518 (1873). *A. tenuifolia*, var. *longipes* Reiche, l. c. 805 and l. c. 211.

CHILE. INDEFINITE: Pinales de la cordillera de Nahuelbuta, *Volckmann* (MS, TYPES of *E. pedicellare* and *E. tenuifolium* var. *longipes;* G, photo.).

Philippi's species and variety cited above are obviously based on specimens of the same collection and are unquestionably synonymous. The exact type-station is somewhere in the Cordillera de Nahuelbuta, the range of mountains whose crest is the boundary between the province of Arauco and adjacent Bio-Bio and Malleco. The species is closely related to *P. corymbosus*. It appears to differ, however, in its shorter subsimple very leafy stem, racemes which are not projected above the leaves, and very elongate lower pedicels. Before the species can be definitely accepted, however, more material should be studied and some idea gained as to the constancy of the characters here given.

21. **P. corymbosus** (R. & P.), comb. nov. Annual; stems usually several, decumbent, branched, 5–20 cm. long, finely strigose; leaves linear to filiform-linear, 1–5 cm. long, 2–2.5 mm. broad, mostly opposite, finely and sparsely strigose; racemes elongating, slender, bractless, frequently geminate, becoming 4–6 cm. long; mature calyx 2–3 mm. long, usually very tawny with a rather dense appressed pubescence, with the lance-linear lobes erect or ascending; pedicels 0.5–2 mm. long, usually strict and stiffish; corolla evident to conspicuous, white or cream-colored, 4–6 mm. broad; nutlets ovate, 1–1.3 mm. long, finely granulate, irregularly somewhat reticulate-rugose with the ridges low and rather obscure, dorsal keel obscure or definite only towards apex,

ventral keel definite; scar suprabasal, oblong, solid; gynobase pyramidal; style shortly surpassing the nutlets.—*Myosotis corymbosa* R. & P. Fl. Peruv. ii. 5 (1799); Lehm. Asperif. i. 82 (1818); Reiche, Anal. Univ. Chile cxxi. 834 (1908) and Fl. Chile v. 239 (1910). *Cryptantha corymbosa* Johnston, Contr. Gray Herb. lxviii. 54 (1923). *Cynoglossum sessiliflorum* Poepp. in herb. *Eritrichium sessiliflorum* DC. Prodr. x. 133 (1846); Clos in Gay, Fl. Chile iv. 470 (1849). *Allocarya sessilifolia* Greene, Pittonia i. 17 (1887). *A. sessiliflora* Reiche, l. c 806 and l. c. 211. *E. humile*, var. *capitatum* Clos in Gay, l. c. 471; Gray, Proc. Am. Acad. xx. 267 (1885). *E. tenuifolium* Schlecht. ex sched.; Ph. Anal. Univ. Chile xliii. 519 (1873), nomen; Ph. l. c. xc. 546 (1895). *Krynitzkia tenuifolia* Gray, Proc. Am. Acad. xx. 267 (1885). *A. tenuifolia* Greene, Erythea iii. 57 (1895); Reiche, l. c. 805 and l. c. 210. *P. tenuifolius* Johnston, l. c. 78.

CHILE. LLANQUIHUE: playa del puerto de Nahuelhuapi, *collector not given, no. 37* (MS). VALDIVIA: Valdivia, Oct. 1857, *Philippi* (MS); Canelos, *collector not given, no. 295* (MS); Ranco, Jan. 1887, *Otto* (MS); shore of Lago Ranco, Jan. 1860, *Philippi* (MS); Arique, Nov. 1854, *Lechler 255* (MS); Isla Valenzula, Nov. 1850, *Lechler 255* (G); streambank, Valdivia, 1899, *Buchtien* (US); Valdivia, 1896, *Buchtien* (US); Valdivia, 1862, *Bridges 785* (NY); Panguipulli, ca. 140 m. alt., 1924, *Hollermayer 352* (G); Panguipulli, 1924, *Claude-Joseph 2693* (US). MALLECO: Collipulli, 1915, *Baeza* (IP); [? Traiguen] Araucania, Nov. 1887, *Philippi* (MS). BIO-BIO: Trapatrapa, Feb. 1887, *Philippi* (MS). INDEFINITE: collection lacking data, *Poeppig 247* (G, photo of TYPE of *E. sessiliflorum*).

A very variable species that future study may cause to be further enlarged so as to include *P. pulchellus*, *P. uliginosus* and *P. pedicellaris*. As here defined, however, the species includes large-flowered annuals with a sparse usually reddish-brown pubescence, short pedicels and nutlets with low irregularly reticulate ridges. It is one of the more southerly ranging of the Chilean species and appears to be quite common within the area of its dispersal.

I am accepting *Plagiobothrys corymbosus* as the proper name for the present species since Dr. A. Brand, who has seen authentic material, writes me that *Myosotis corymbosa* R. & P. is an *Allocarya* apparently of this relationship. The original description of *M. corymbosa* gives, "corolla calyce triplo major." The species described above is the only large-flowered one growing in southern Chile that seems to fit the original description. The type is said to have come from Concepcion.

I refer *E. sessiliflorum* here after a study of a photograph of the type. The type specimen seems to have evident corollas and the characteristic dark dense pubescence on the calyces. Poeppig, who collected the type, explored in the province of Concepcion and

Bio-Bio and hence within the known range of the species as here defined.

22. **P. pratensis** (Ph.), comb. nov. Annual or perhaps persistent; stems several, prostrate or decumbent, 1–2 dm. long, densely strigose; leaves 1–2.5 cm. long, oblong-spathulate to linear, obtuse, finely strigose; racemes bractless, 2–3 cm. long, densely flowered; calyx densely silky-strigose, becoming 2–3 mm. long with erect lance-oblong or broadly linear obtuse lobes; pedicels 1–2 mm. long; corolla 3–4 mm. broad; nutlets broadly ovate, 1.5 mm. long, finely granulate, roughened with low rather inconspicuous reticulate ridges, dorsal keel rounded but definite to below the middle; areola almost basal, small, oblique, clearly much below the level of the strong ventral keel; style surpassed by nutlets or about reaching to their tips.—*Eritrichum pratense* Ph. Linnaea xxxiii. 192 (1864); Reiche, Anal. Univ. Chile cxxi. 810 (1908) and Fl. Chile v. 215 (1910).

CHILE. LLANQUIHUE: between Roble and Pilmaiquen, Dept. Osorno, Jan. 1861, *Philippi* (MS, TYPE; G, photo.).

Both Philippi and Reiche have described this species as perennial. In the Museo Nacional at Santiago there are two plants of the original collection, both determined as *E. pratense* by Philippi. One of the plants is unquestionably annual, the other has a thickened root, but is otherwise similar. It is evident that Philippi's and Reiche's statements were based upon a study of the plant with the thickened root. This specimen exhibits the upper 1.5 cm. of the root which is about 4 mm. thick and bears at its crown what appears to be vestiges of old stem-bases. I suspect that the plant has been browsed upon and that its root-development is not at all typical of the species.

DOUBTFUL OR EXCLUDED SPECIES.

AMSINCKIA HUMIFUSA [Poepp.] Walp. Nov. Act. Acad. Caes. Leop.-Car. xix. suppl. 371 (1843); A. DC. Prodr. x. 133, note (1846). *Cynoglossum humifusum* Poepp. in sched. ex Walp. l. c. 372; Brand, Pflanzenr. iv. Fam. 252, i. 150 (1921). *Benthamia humifusa* Druce, Rep. Bot. Exch. Cl. Brit. Isl. iv. 298 (1916).—This plant is evidently a member of the section *Allocarya*. Its description, however, is too vague for recognition. See discussion under *P. congestus*.

Plagiobothrys mesembryanthemoides (Speg.) Johnston, Contr. Gray Herb. lxviii. 79 (1923) and l. c. lxxv. 42 (1925). *Eritrichium mesembryanthemoides* Speg. Anal. Soc. Cient. Argentina liii. 136 (1902).—Not a species of the *Boraginaceae*. This appears to be a member of the *Portulacaceae* and perhaps a CALANDRINIA.

PLAGIOBOTHRYS MURICATUS (R. & P.) Johnston, Contr. Gray Herb. lxviii. 79 (1923). *Lithospermum muricatum* R. & P. Fl. Peruv. ii. 4 (1799); Lehm. Asperif. ii. 327 (1818). *Eritrichium muricatum* A. DC. Prodr. x. 132 (1846); Ph. Anal. Univ. Chile xc. 540 (1895). *Allocarya muricata* Reiche, Anal. Univ. Chile cxxi. 809 (1908) and Fl. Chile v. 215 (1910).—The type of *L. muricatum* is said to have come from Concepcion, Chile. It is described as a prostrate annual herb with opposite leaves, small inconspicuous corollas and muricate nutlets. Possibly it is the same as *P. polycaulis* which has been collected near Concepcion. That species is an inconspicuously flowered plant but its nutlets are certainly not muricate.

12. **Amsinckia** Lehm.

Calyx cut to base into erect lanceolate or oblong lobes. Corolla tubular or salverform; tube cylindrical, glabrous, unappendaged; lobes spreading, rounded, imbricate; throat unappendaged; stamens included, affixed in the tube; filaments very short; anthers oblong, obtuse. Style filiform, included; stigma capitate, emarginate. Ovules 4. Cotyledons 2-parted. Nutlets 4, erect, angulate-ovoid, smooth or rough, unmargined, strongly keeled ventrally; areola inframedial, small, carunculate. Gynobase frustate, about half the height of the nutlets.—Annual herbs. Leaves alternate, linear to ovate, usually veinless. Racemes usually bractless.—Del. Sem. Hort. Hamburg 7 (1831). *Benthamia* Lindl. Nat. Syst. 241 (1830), nomen.

A genus of considerable technical difficulty which centers in western North America and has only two South American representatives.

KEY TO SPECIES.

Nutlets tessellate, 3–3.5 mm. long; corolla 6.5–7.5 mm. long; plants rather coarse ..... 1. *A. tessellata.*
Nutlets verrucose, 2–2.8 mm. long; corolla 3–7 mm. long; plants usually slender ..... 2. *A. hispida.*

1. **Amsinckia tessellata** Gray. Rather coarse plants, 8–20 cm. tall, with loosely or strictly ascending stems, shaggy-hirsute with the younger parts also somewhat hispid-villous; leaves firm, obtuse, appressed-hispid, usually densely pustulate; lower leaves somewhat crowded, oblanceolate, 4–6 cm. long, 7–9 mm. broad; middle cauline leaves gradually reduced, oblong to oblong-ovate; racemes usually short and densely flowered, 1–3 cm. long, solitary, bractless or bracted only at base; calyx densely appressed tawny-hirsute as well as short appressed white-villous, at maturity 6–8 mm. long with erect coarse lance-linear obtuse lobes; pedicels ca. 1 mm. long; corolla yellowish, 6.5–