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I. Studies in the Boraginaceae,—VII. By I. M. JOHNSTON.	
1. The South American Species of <i>Heliotropium</i>	3 •
2. Notes on various <i>Boraginoideae</i>	73 •
II. A New Species of <i>Juncus</i> from Colombia. By C. A. WEATHERBY	84
III. Some Undescribed American Spermatophytes. By I. M. JOHNSTON	85 •
IV. The Botanical Activities of Thomas Bridges. By I. M. JOHNSTON	98

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I. STUDIES IN THE BORAGINACEAE,—VII.

BY IVAN M. JOHNSTON

1. THE SOUTH AMERICAN SPECIES OF *HELIOTROPIMUM*.

IN the present paper a provisional treatment is given of the American species of *Heliotropium* known to occur south of Panama. In addition to keys I have provided complete synonymy and detailed citation of specimens. Attention has been given also to the natural groupings of the species. While admitting that certain of these groups have strong claims for generic recognition I have preferred to reserve the discussion of this matter for the present, planning to give it detailed consideration after certain other studies in *Heliotropium* and *Tournefortia*. For convenience, therefore, the genus has been accepted in its broadest sense and *Heliotropium europaeum* L. has been taken as its genotype.

The last critical account of the South American species was in the general revision of the family published by DeCandolle in the *Prodromus*, ix. 531–559, in 1845. The few subsequent works have been of restricted scope. A mediocre account of the Brazilian species was published by Fresenius in the *Flora Brasiliensis*, viii. pt. 1, 31–48, in 1857. The shrubby Chilean species were given special attention by Miers, who published his work in the *Annals and Magazine of Natural History*, ser. 4, ii. 124–133, in 1868 and in his *Contributions to Botany*, ii. 193–202 (1869), in the following year. The Chilean species as a whole were also studied by Reiche. His treatment appeared in 1907 in the *Anales de la Universidad de Chile*, cxxi. 234–245, and was subsequently reprinted as part of his *Flora de Chile*, v. 192–203, in 1910. Except for the mention of South American species in Gürke's compilation in Engler & Prantl's *Die natürlichen Pflanzenfamilien*, iv. Abt. 3a, 92–97 (1893), nothing further, of a general nature has been written on our subject.

In the preparation of this paper I have had the good fortune to see much material. Most of the work has been done at the Gray Herbarium. I have had on loan, however, all the South American collections of *Heliotropium* from the New York Botanical Garden, United States National Herbarium and the Field Museum of Natural History. During the fall of 1927 I visited the Royal Botanic Garden at Kew, the British Museum of Natural History at South Kensington and the Botanical Museum at Berlin. Some critical specimens were also received on loan from these institutions. Also incorporated in the paper are the results of field- and herbarium-studies made in Chile in 1925 and 1926. At that time I examined the material in

the herbarium of R. A. Philippi in the National Museum and the herbarium of the Pedagogical Institute. From Prof. Lorenzo R. Parodi, Dr. Alberto Castillanos, Mr. F. C. Hoehne, and Prof. Miguel Lillo I have received valued material for identification. The sendings of Dr. Lillo were very extensive and have been of great assistance in interpreting the species of Argentina. From Dr. Carl Christensen of the Botanical Museum, Copenhagen, I received photographs of two of Warming's types. Another photograph of a type, that of *H. montevidense* Arechav., was received from Dr. W. Herter of Montevideo. Without the opportunity of studying the material from all the sources mentioned the present paper could not have been written. Appreciating all the help I have received I would here express my hearty thanks to all those who have assisted me.

Every specimen that has been studied during the preparation of this paper has been cited. To the best of my abilities, with the facilities available, the material has been cited under the country and major subdivision of the country from which it came. Following each collection, in parenthesis, are the initials indicating the herbarium in which the collection examined may be found. These initials and the herbarium they indicate are as follows—"BD" for Botanical Museum in Berlin-Dahlem, "BM" for British Museum of Natural History, "FM" for Field Museum of Natural History, "G" for Gray Herbarium, "IP" for Pedagogical Institute of Santiago, "K" for Royal Botanic Garden at Kew, "MS" for National Museum of Santiago, "NY" for New York Botanical Garden, and "US" for United States National Herbarium.

KEY TO SECTIONS.

- Carpels remaining entire, not cleft by longitudinal commissures, at maturity falling away to form biovulate nutlets.
 Carpels with two fertile cells and several empty ones.
 Corolla-throat and -tube villous within VII. § HELIOPHYTUM, 21.
 Corolla-throat and -tube glabrous within.
 Carpels very strongly ribbed; coarse weedy annuals with simple hairs VI. § TIARIDIUM, 18.
 Carpels very obscurely if at all ribbed; plant perennial, usually with some malpighiaceae hairs if not glabrous I. § COELOMA, 5.
 Carpels with two cells, these commonly fertile.
 Corolla-throat and -tube villous; carpels covered with obtuse vesicular dermal appendages II. § SCHOBERA, 10.
 Corolla-throat and -tube glabrous; carpels without vesicular appendages.
 Plant prostrate or spreading, of high altitudes; inflorescence glomerate; carpels frequently maturing only a single seed III. § HYP SOGENIA, 12.
 Plant erect, shrubby; inflorescence racemose; carpels normally 2-seeded.

- Corolla glabrous within.....VIII. § COCHRANEA, 25.
 Corolla villous within.....VII. § HELIOPHYTUM, 21.
- Carpels each breaking in two along a definite dorso-ventral medio-longitudinal commissure, at maturity each falling away to form two uniovulate nutlets (cf. *H. indicum* L. and *H. tiaridioides* Cham. var.).
- Plant a bush 1-2 m. tall; nutlets rough, usually lacunose or sculptured, glabrous or glandular; anthers densely short-ciliate on the back towards the apex.....IX. § HELIOTHAMNUS, 38.
- Plant an herb or small shrub, usually less than 0.5 m. tall; nutlets smooth, pubescent or glabrous; anthers glabrous, or pubescent or glandular at tip only.
- Stigmatic disk thick and narrow, borne commonly on a more or less well developed style; plant annual or perennial, herbaceous or shrubby, usually erect.
 X. § ORTHOSTACHYS, 46.
- Stigmatic disk very broad and relatively thin, saucer-shaped, closely sessile; plant prostrate or very loosely spreading; annual herbs or rarely slightly fruticulose.
- Fruit merely 4-sulcate, the nutlets with plane contiguous sides; plant succulent, glabrous, somewhat glaucous.
 IV. § HALMYROPHILA, 14.
- Fruit deeply 4-lobed, the nutlets rounded and only ventrally united; plant firm-herbaceous, pubescent, not glaucous.....V. § PLAGIOMERIS, 16.

I. Section **Coeloma** (DC.) Johnston. *Heliophytum* § *Coeloma* DC. Prodr. ix. 556 (1845); type-species, *Heliophytum monostachyum* DC. *Valentina* Speg. [Fl. Patag. ii. 36] Anal. Soc. Cien. Argentina liii. 78 (1902); type-species, *V. patagonica* Speg. *Valentiniella* Speg. Anal. Mus. Nac. Buenos Aires ser. 3, ii. 9 (1903); type-species *V. patagonica* Speg.

To this section belong five American species and a few from Africa. It is the most primitive group of American *Heliotropia*. Its most striking feature is the presence of malpighiaceus hairs. Surprisingly the occurrence of this type of trichome has not been previously noted as occurring in the *Boraginaceae*. These hairs are known to be developed in three of the five American species as well as in such African species as *H. longiflorum* Hochst. & Steud., *H. Nelsoni* Wright and *H. lineare* Gürke. The presence of malpighiaceus hairs is not, however, a crucial character of the section. Two Argentine species, *H. Schreiteri* Johnston and *H. patagonicum* (Speg.) Johnston, one very sparingly pubescent and the other completely glabrous, are included in the section, since although they lack malpighiaceus hairs their obvious relatives have them and clearly fall in the present section. Also lacking malpighiaceus hairs are several African species which show affinities in the section *Coeloma*. I should not be surprised, therefore, if such African species as *H. messerschmidoides* Kuntze, *H. zeylanicum* Lam. and *H. tuberculatum* Gürke should

eventually find their way into the section. These species show many characters of *Tournefortia*.

Most of the American species of *Heliotropium* can be derived from the section *Coeloma*. One line from *Coeloma* has given rise to sections *Schobera*, *Hypsogenia*, *Halmyrophila* and *Plagiomeris* and another to *Heliophytum*, *Tiaridium*, *Cochranea* and *Heliothamnus*. *Orthostachys* is the only section whose relation to *Coeloma* is uncertain.

KEY TO SPECIES.

- Plant fruticose, 5–20 dm. tall; leaves 7–25 cm. long; pubescence in large part malpighiaceous.....1. *H. tiaridioides*.
 Plant herbaceous, widely spreading or prostrate, less than 1 dm. tall; leaves 1–5 cm. long.
 Plant perfectly glabrous, somewhat glaucous; leaves fleshy and veinless.....2. *H. patagonicum*.
 Plant more or less obviously pubescent; leaves firm-herbaceous, veins evident.
 Plant with malpighiaceous hairs at least on the stems or in the inflorescence; corolla-lobes linear or subulate-linear.....3. *H. veronicifolium*.
 Plant lacking malpighiaceous hairs; corolla-lobes ovate-oblong, ca. 0.8 mm. long.....4. *H. Schreiteri*.

1. ***Heliotropium tiaridioides*** Cham. *Linnaea* iv. 453, t. 5, fig. 3 (1829); Chodat, *Bull. Herb. Boiss.* ser. 2, v. 483 (1905); Molfino, *Physis* vii. 179 (1924). *Heliophytum tiaridioides* DC. *Prodr.* ix. 555 (1845); Fresen. in *Mart. Fl. Bras.* viii. pt. 1, 47 (1857). *Heliotropium monostachyum*, var. *tiaridioides* Chodat, l. c. ser. 2, ii. 816 (1902). *Tiaridium heliotropioides* Cham. l. c. 453; Don. *Gen. Syst.* iv. 364 (1838).

Var. **genuina**.—Carpels not sulcate down the back and not breaking in two.—Synonymy given above.

Northwestern Argentina, Bolivia, Paraguay and southernmost Brazil.

ARGENTINA. SALTA: Orán, 1916, *Hauman* (G); Orán, *Lorentz & Hieronymus* 460 (G, NY, BD); Orán to Rio Piedras, 300 m., *Rodriguez* 22 (G); Tartagal, 500 m., *Schreiter* 3372, 3467 (G). JUJUY: El Gato, *Lillo* 9877 (G); indefinite, 520 m., 1906, *Dinelli* (BM). INDEFINITE: Arroya Nacanguaru, Puerto Famaren, Alto Paraná, 1883, *Niederlein* (BD); Yacy, Rio Alto Paraná, *Niederlein* (BD); Cuesta de Aguirenda between Itaperenda and Jucaeva, *Hieronymus & Lorentz* 619 (BD).

BOLIVIA. TARIJA: Tarija, *ex. herb. Griseb.* (K). LA PAZ: Guanai, *Rusby* 2464 (NY). BENI: Rurrenabaque, 300 m., *Rusby* 1278 (G, K, NY). SANTA CRUZ: Sierra de Santa Cruz, May 1892, *Kuntze* (NY, FM, BD); Monte de Buenavista, 450 m., *Steinbach* 2045 (BD); Camino de Buenavista, 450 m., *Steinbach* 1243 (BD); Bañados del Piray, 450 m., *Steinbach* 6279 (K, BD); Buenavista, 450 m., *Steinbach* 6179 (G, FM, K, BM, BD).

PARAGUAY: Asuncion, *Balansa* 2038 (K); San Luis between Rio Apa and Rio Aquidamban, *Fiebrig* 5212 (G, K, BM, BD); Valenzuela, *Hassler*

7122 (BM); Sapucay, Hassler 11754 (G, US, BM); Caballero, Morong 409 (NY, K, G).

BRAZIL. RIO GRANDE DO SUL: Neu Württemberg, Bornmüller 505 (BD); Porto Alegre, Tweedie 135 (K); indefinite, Reineck & Czermak 2 (K). SANTA CATHARINA: Blumenau, Ule 853 (US, BD); Desterro, Schenck 442 (BD); St. Catharina, Muller 149 (K). INDEFINITE: no locality given, Sellow (K, BD; ISOTYPES of *H. tiaridioides*).

Var. **schizocarpum**, var. nov., a varietate genuina differt carpello dorsaliter profunde sulcato maturitate in nuculas duas rumpo.—*Heliotropium transalpinum* Vell. Fl. Flum. 68 (1825) and Icones ii. t. 40 (1827). *Heliotropium monostachyum* Cham. Linnaea iv. 455 (1829) and l. c. viii. 116 (1833); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96 (1893); Kuntze, Rev. Gen. iii. pt. 2, 205 (1898); Briq. & Hochr. Ann. Conserv. et Jard. Bot. Genève iii. 162 (1899); Fries, Ark. Bot. vi. no. 11, 23 (1907); Molfino, Physis vii. 179 (1924). *Heliophytum monostachyum* DC. Prodr. ix. 556 (1845); Fresen. in Mart. Fl. Bras. viii. pt. 1, 47 (1857); Warm. Kjoeb. Vidensk. Meddel. 1867: 19 (1868). *Tiaridium monostachyum* Don, Gen. Syst. iv. 365 (1838). *Heliophytum persicariaefolium* DC. l. c. 556; Fresen. l. c. 47. *Heliotropium persicariaefolium* Britton, Ann. N. Y. Acad. Sci. vii. 169 (1892); Gürke, l. c. 96. *Heliophytum monostachyum*, var. *ovatum* Fresen. l. c. 47; Chodat, Bull. Herb. Boiss. ser. 2, v. 483 (1905). *Heliotropium ovatum* Schott ex Fresen. l. c. 47. *Heliotropium monostachyum*, var. *ovatum* Chodat & Hass. Bull. Herb. Boiss. ser. 2, v. 483 (1905).

Northeastern Argentina, Paraguay, and eastern Brazil; also in Ecuador and Central America.

ARGENTINA. FORMOSA: K. 83 along the railroad, Jörgensen 3242 (G, TYPE; US, ISOTYPE). MISIONES: San Ignacio, Vattuone & Bianchi 158 (US); Posadas, Vattuone & Bianchi 12 (US); Posadas, Rodriguez 93 (G). CORRIENTES: Isla Apipé Grande, 1883, Niederlein (BD); Isla de Jupiter, Niederlein (BD); indefinite, Lossen 565 (G, BD).

PARAGUAY: Asuncion, Gilbert 16 (K); near Asuncion, Morong 754 (NY); Chololo, valley of Rio Yaca, Hassler 6709 (G, BM); Cord. Altos, Hassler 3097 (BM); San Estanislao, Sierra de Maracayú, Hassler 4126 (BM); Sierra de Maracayú, Hassler 5721 (BM, BD); near Sapucay, Hassler 11754 (BD); Caballero, Morong 409 (US); southern Paraguay, Sept. 1892, Kuntze (US).

BRASIL. PARANÁ: Jaguariahyva, 740 m., Dusén 15955 (G). SÃO PAULO: Amparo, Araujo 18810 (G); Tres Pantes to Amparo, Hoehne 20578 (G); Pico da Serra Negra, Hoehne 20634 (G); Serra do Itapetinga, Brade & Tamandaré 6476 (G); Ypanema, Loefgren 11246 (G); Nova Europa, Hoehne 13630 (G); indefinite, Burchell 5010 (G, K) and Regnell 200 (US). RIO JANEIRO: Imbuhy, Organ Mts., Gardner 547 (NY, K, BM); Rio Janeiro, Wilkes Exped. (G, NY, US), Gay (NY), Leschenault (NY), Glaziou 14140 (K, BD), Burchell 1262 and 1763 (K), Gardner 5561 (BM). MINAS GERAES: Caldas, Henschen 200 (US); indefinite, Claussen (NY, K). BAHIA: near Bahia, Blanchet 864 (NY); Bahia, Guillos (NY). INDEFINITE: no locality given, Pohl 1582 (K, BD) and 1591 (K), Sellow (K, BM, BD, ISOTYPES of *H. monostachyum*).

ECUADOR. Indefinite: Eggers 15260 (FM, K).

Though apparently indistinguishable otherwise the two varieties given above appear to be readily recognized by striking differences of carpel-structure. Both the varieties occur in Paraguay but I have seen no evidence that intergradation occurs there, even though they have both been distributed under the same number by Hassler and Morong, which suggests that they grow together. The name, *H. tiaridioides*, clearly belongs to the plant with non-sulcate carpels, for Chamisso illustrated this form and a copious suite of specimens at Berlin, collected by Sellow and determined as *H. tiaridioides* by Chamisso, also represent the form with non-sulcate carpels. The application of the name, *H. monostachyum*, is less certain. Chamisso did not describe the fruit which appears to have been unknown to him. In the herbarium at Berlin there are four sheets of a collection by Sellow apparently representing authentic *H. monostachyum*. These have well developed dorsally sulcate carpels and two of the plants have obviously geminate spikes. DeCandolle in describing *H. persicarioides* mentions the fruit but makes no mention of a grooving on the carpels. I have seen no authentic material of this species, but am placing it in the var. *schizocarpum* since it comes from Rio Janeiro whence I have seen only material with sulcate carpels. Similar geographical reasons cause me to place under that variety *H. transalpinum* and *H. monostachyum*, var. *ovatum*, both of which were founded upon only flowering specimens.

2. **H. patagonicum** (Speg.), comb. nov. *Valentina patagonica* Speg. [Fl. Patag. 36] Anal. Soc. Cien. Argentina liii. 78 (1902); Dusén, Ark. Bot. vii. no. 2, 32 (1907); E. & P. Nat. Pflanzenf.; Ergänzungsh. ii. 306 (1908). *Valentiniella patagonica* Speg. Anal. Mus. Nac. Buenos Aires, ser. 3, ii. 9 (1903); Macloskie & Dusén [Rev. Fl. Patag.] Rep. Princeton Univ. Exped. Patagonia viii. sec. 3, 214 (1914).

ARGENTINA. PATAGONIA: SANTA CRUZ: Pan de Azucar near Rio Chico, Dec. 5, 1897, *Ameghino* (G). CHUBUT: Puerto Madryn, 1907, *Dusén* 5377 (K).

A remarkable species which, because of its succulence, somewhat suggests *H. curassavicum*, though in fact only very distantly related to it. Its closest relatives belong to the small group centering around *H. veronicifolium*. It suggests that species in its habit, frequently opposite leaves, saline habitats, and of course flowering and fruiting structures. Certainly *H. patagonicum* is not to be generically separated from these indubitable relatives.

3. **H. veronicifolium** Griseb. [Pl. Lorentz. 184] Abh. K. Ges. Wiss. Göttingen xix. 232 (1874) and [Symb. Argent.] l. c. xxiv. 271

(1879); Hieron. [Pl. Diaph. 181] Bol. Acad. Nac. Cien. Córdoba iv. 375 (1882); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96 (1893). *H. salsum* Griseb. [Pl. Lorentz. 185] l. c. xix. 233 (1874) and [Symb. Argent.] l. c. xxiv. 271 (1879); Gürke, l. c. *H. repens* Griseb. [Pl. Lorentz. 185] l. c. xix. 233 (1874) and [Symb. Argent.] l. c. xxiv. 271 (1879); Gürke, l. c.; Kuntze, Rev. Gen. iii, pt. 2, 205 (1898); Fries, Ark. Bot. vi. no. 11, 22 (1906). *H. repens*, var. *medium* Kuntze, l. c. *H. repens*, var. *stenophyllum* Kuntze, l. c.

Northern Argentina and adjacent Paraguay and Bolivia, usually in saline places.

ARGENTINA. CÓRDOBA: hills near Quinta Santa Ana, Kurtz 8863 (NY); Córdoba, Fielding (BM); Córdoba, 1871, Lorentz 91 and 609 (BD). SANTIAGO: La Banda, Oct. 1892, Kuntze (NY, 2 collections one the TYPE of *H. repens* var. *medium*; G, photo; BD); LaBanda, Lillo 6089 (G); Rio Saladillo, Lorentz 18 (BD); Santiago, Lorentz 142 in pt. (BD); indefinite, Lorentz 59 (BD, ISOTYPE of *H. repens*), Lossen 82 (G, BD). CATAMARCA: Catamarca, Castillon 1091 (G). TUCUMÁN: Tapia, 600 m., Schreiter 920 and 1920 (G); Naranjal, 500 m., Schreiter 202 (G); Parque 9 de Julio, Schreiter 4701 (G); Chañar Pozo, 300 m., Venturi 493 (G); near Manantial, Castillon 198 (G); Leales, La Florida, 270 m., Lillo 15148 (G); Tucumán, 450 m., Lillo 1465 (G); Tucumán, 500 m., Schreiter 1278 (G); Tucumán, 1837, Tweedie (K); Tucumán, Hieronymus & Lorentz 172 (BD); Santiago to Tucumán, Tweedie 1288 (K).

PARAGUAY: Alto Paraguay, Chaco, lat. 21°, Fiebrig 1439 (BD); Concepcion, Oct. 1892, Kuntze (NY, TYPE of *H. repens* var. *stenophyllum*; G, photo.).

BOLIVIA. TARIJA?: Villa Montes, Nov. 20. 1924, 460 m., Pflanz 4040 (US, BD),

A well defined species which is rather variable in leaf-outline. Grisebach's three species appear to represent merely ecological forms of a single species. The luxuriant phase with leaves 2.5–4 mm. long and loosely trailing stems is *H. repens*. *Heliotropium veronicifolium* and *H. salsum* are stunted forms with the leaves 8–20 mm. long and with stems less than a decimeter in length. The extremely reduced phase with leaves only 8–16 mm. long is *H. salsum*. The corolla-lobes in all the forms of *H. veronicifolium* are decidedly elongate although somewhat variable in width. It is practically only this character that serves to distinguish the species from its close relative, *H. glabriusculum* (Torr.) Gray, of northeastern Mexico and adjacent southern Texas. Profesor Lillo's collection from La Banda, cited above, is atypical in several respects. It has narrow leaves and a very sparse pubescence with the malpighiaceous hairs few and confined to the rachis of the spike. The corolla-tube is glabrate rather than densely pubescent. I suspect that the plant merits some nomenclatorial recognition.

4. **H. Schreiteri**, sp. nov., humile herbaceum sparsissime breviterque villosulum; ramis 1-3 dm. longis sparse ramosis inconspicue sparse villosulis decumbentibus apice ascendentibus; foliis firmiter herbaceis planis alternis vel oppositis ovato-oblongis obtusis integerimis 3-4 cm. longis 10-18 mm. latis sparse inconspicue villosulis, basi late angulatis in petiolum 2-4 mm. longum abrupte contractis; spicis scorpioideis solitariis vel geminatis 4-9 cm. longis lateralibus ebracteatis inconspicue villosulis; calycibus sessilibus, lobis ovato-lanceolatis 1-2 mm. longis acutis; corolla alba parva 1.5-2 mm. longa subcylindrica, lobis ovato-oblongis ca. 0.8 mm. longis ca. 0.5 mm. latis apice rotundis, tubo intus glabro; antheris ca. 0.8 mm. longis late lanceolatis subsessilibus medio tubo affixis; stigmatibus sessilibus lato; fructu glabro, carpellis biovulatis ca. 2 mm. longis leviter dorso-sulcatis indivisis apice bidentatis.

ARGENTINA. SALTA: Piguiendo, Orán, 500 m. alt., Feb. 9, 1925, *Schreiter 3603* (G, TYPE).

Evidently related to *H. veronicifolium* but differing in its complete lack of malpighiaceus hairs, small corollas with short broad lobes, and coarse petioles. The fruit much suggests in general form and size that of *H. tiaridioides*, var. *genuinum*. As in that variety the carpels at maturity do not break up into uniovulate nutlets.

II. Section **Schobera** (Scop.) Johnston. *Schobera* Scop. *Introd.* 158 (1777); type-species, *S. angiosperma* Murr. *Synzistachium* Raf. *Sylva Tellur.* 89 (1838); type-species, *S. peruvianum* Raf.

A monotypic American section which is most closely related to the section *Hypsogenia*. It differs, however, in having the corolla glabrous within and in its very different habit of growth. The fruit in the two sections is very similar in structure and general appearance. In section *Schobera*, however, it is covered with unique vesicular dermal-structures. The carpels in *Schobera* are 2-seeded, but in section *Hypsogenia* they are by abortion very frequently only single-seeded. I believe that *Schobera* is a derivative from *Coeloma*.

5. **H. angiospermum** Murray, *Prodr. Stirp. Göttingen* 217 (1770). *Schobera angiosperma* Murray ex Scopoli, *Intr.* 158 (1777); Britt. & Wilson, *Bot. Porto Rico* vi. 134 (1925). *Heliotropium parviflorum* L. *Mant.* ii. 201 (1771); Cham. *Linnaea* iv. 455 (1829). *Heliotropium parviflorum* DC. *Prodr.* ix. 553 (1845). *Heliotropium synzistachyum* R. & P. *Fl. Peruv.* ii. 3, t. 109a (1799). *Tournefortia synsystachya* R. & S. *Syst.* iv. 539 (1819). *Synzistachium peruvianum* Raf. *Sylva Tellur.* 89 (1838). *Heliotropium latifolium* Willd. ex

Lehm. Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 127 (1818) and Asperif. i. 33 (1818); Cham. Linnaea iv. 455 (1829). *Heliotropium scorpioides* HBK. Nov. Gen. et Sp. iii. 89 (1818); Cham. l. c.; not Willd. (1818). ? *Heliotropium patibilcense* HBK. l. c. 87. *Helio-phytum foetidum* DC. Prodr. ix. 553 (1845). *Heliotropium foetidum* Salzm. ex DC. l. c. *Heliotropium rugosum* Mart. & Gal. Bull. Acad. Brux. xi. pt. 2, 336 (1844). *Heliotropium oblongifolium* Mart. & Gal. l. c. 336. *Heliophytum portoricense* Bello, Anal. Soc. Español Hist. Nat. x. 297 (1881).

Northernmost Chile (Tacna) and eastern Bolivia northward through Central America and the West Indies to southernmost United States (Texas and Florida).

CHILE. ARICA: Arica, *Meyen* (BD).

BOLIVIA. LA PAZ: below Chuguiaguillo, east of La Paz, ca. 3750 m., *Hauthal 174* (BD); Beni River, *Rusby 1434* (NY).

PERU. AREQUIPA: Murillo Bay, *Macrae* (K); Arequipa, *Meyen* (BD). ICA: PISCO, ca. 1550 m., *Weberbauer 5394* (BD). LIMA: Atocongo, ca. 400 m., *Pennell 14458a* (G, FM); along Rio Chillón near Viscas, ca. 1900 m., *Pennell 14458* (G, FM); Lurin, ca. 12 m., *Pennell 12217* (G, FM); south of Santa Clara, *Rose 18626* (NY, US); Rio Rimac, 1800 m., 1887, *Safford* (NY); Valley of Rimac, *Barclay 263* (BM); Chosica, 1877, *Savatier* (K); Callao to Lima, 1876, *Savatier* (K); Lima, *Macbride & Featherstone 52* (US), *Ball* (US, BD), *Seemann 692* (G, K), *Cuming 1032* (BM), *André K1395* (K), *Nation* (K), *Mathews 396* (K, BM), *Meyen* (BD), *D'Urville & Lesson* (BD), *Gaudichaud* (BD). HUANCAMELICA: between Pampano and Huaytara, ca. 1500 m., *Weberbauer 5394* (FM). LIBERTAD: Barraneo in valley between Pacasmayo and railhead, 2100 m., 1912, *Forbes* (BM). PIURA: Talara near LaBrea, *Haught 38* (G). INDEFINITE: without data, *Dombey* (FM, BD); Peru, *Ruiz* (BD, ? ISOTYPE of *H. synergistachyum*).

ECUADOR. GUAYAS: Cerro Maglar Alto, 360 m., 1923, *Anthony & Tate 5* (US); Guayaquil, 1926, *Mille 4* (G); Guayaquil, *Sinclair* (K); Chanduy, 1862, *Spruce 1865* (K) and 6489 (BM); Isla de Puná, 1836, *Barclay 407* and 2447 (BM). MANABÍ: Caráques Bay, 1923, *Anthony & Tate 121* (US); Caráques Bay, 1903, *Lehmann BT. 753* (K). GALAPAGOS ISLANDS: Abingdon Island, *Snodgrass & Heller 812* (G); Albemarle Island, *Snodgrass & Heller 80, 160* and 200 (G), *Stewart 3212* (G); Barrington Island, *Snodgrass & Heller 486* (G); Charles Island, *Snodgrass & Heller 463* (G), *Stewart 3218* (G), *Lee* (G), *Andersson* (BD), *Markham 1180* (K), *Cheesman 437* (K), *Belt* (BM); Chatham Island, *Baur 220* and 221 (G), *Agassiz* (G, FM, K), *Andersson* (G), *Snodgrass & Heller 510* (G), *Stewart 3216* (G) and 3217 (K); Daphne Island, *Wheeler, Rose & Beebe 12* (NY); Gardner Island, *Snodgrass & Heller 639* (G), *Stewart 3219* (G); Hood Island, *Baur 222* (G), *Snodgrass & Heller 747* (G), *Stewart 3220* (G); James Island, *Scouler* (K), *Snodgrass & Heller 357* (G), *Stewart 3223* (G); Narborough Island, *Snodgrass & Heller 348* (G); Tower Island, *Snodgrass & Heller 792* (G).

COLOMBIA. CUNDINAMARCA: Girardot, ca. 375 m., *Rusby & Pennell 120* (G, NY, US); Villeta, *Hartweg 1318* (K, BM, BD); La Mesa, 1400 m., 1856, *Triana 3752* (BD); Casas Viejas, 310 m., *André 1847* (K); Tocaima, 436 m., *André 1825* (K). SANTANDER DEL NORTE: vicinity of Cúcuta, ca. 215 m., *Killip & Smith 20958* (G). ATLANTICO: Barranquilla, *Pittier 1565* (US); Puerto Colombia, ca. 5 m., *Pennell 12037* (G, NY). BOLIVAR: Turbaco, ca. 175 m., *Pennell 4757* (G, NY, US); La Popa near Cartagena, ca. 110 m.,

Killip & Smith 14058 (G); Cartagena, Heriberto 10 (US); Cartagena 1857, Schott 27 (NY). MAGDALENA: Santa Marta, 30 m., Smith 873 (G, NY, US, FM, K, BM, BD) and 872 (NY); Santa Marta, Schlim 950 (K). INDEFINITE: no locality given, Karsten (BD); Guarum, Magdalena, André 491 (K).

VENEZUELA. FALCON: Peninsula de Paraguana, Curran & Haman 1167 (US). CARABOBO: Porto Cabello, 1917, Curran & Haman 1167 (US); Porto Cabello, Karsten 29 (BD). ARAGUA: Colonia Tovar, Fendler 910 (G, NY, K); La Trinidad de Maracay, 440 m., Pittier 5853 (NY, US, BD). DIST. FEDERAL: Cabo Blanco, Pittier 10193 (G, US); La Guaira, Curran & Haman 859 (G, US) and 863 (G, NY, US), André 129 (NY), Birschel (K); Lower Cotiza near Carácas, ca. 1000 m., Pittier 7958 (US); Carácas, Moore 12 (G). SUCRE: Cumana, Bonpland 268 (FM, ISOTYPE of *H. scorpioides*); Cumana, Humboldt 268 (Herb. Willd., TYPE of *H. latifolium*); vicinity of Cristobal Colon, Broadway 12, 610 and 647 (G, NY, US). INDEFINITE: without locality, Funcke 41 (BM), Funcke & Schlim 633 (BM).

BRAZIL. PERNAMBUCO: Pernambuco, Gardner 1079 (NY, US, K, BM), Ridley, Lea & Ramage (BM). CEARÁ: Villa do Ico, Gardner 1784 (K, BM). ALAGÓAS: Rio San Francisco near Propia, Gardner 1361 (G, NY, US, BM). BAHIA: Bahia, Blanchet 595, 973 and 1027 (BM), Herb. Martius (BD), Salzmann (K, ISOTYPE of *H. foetida*). INDEFINITE: circa viam Filesbertiana, Herb. Martius (K, BM).

A loosely branched weedy species widely distributed in tropical America. It is very readily recognized by the peculiar vesicular appendages that cover the surfaces of the two carpels. The only noteworthy variation is that represented by the Brazilian material which has the surface of the carpels somewhat roughened and noticeably less vesicular than in the forms of western and northern South America. This Brazilian form has been described as *Heliophytum foetidum*. At most, however, it is worthy only of varietal recognition.

III. Section **Hypsogenia** Johnston; type-species, *Heliotropium microstachyum* R. & P.

A group consisting of merely two very closely related species of the mountains and plateaus of western South America. It is immediately related to the section *Schobera*, but differs sufficiently in habit, flowers and fruit to merit recognition. I believe it to have evolved from the section *Coeloma* and that its closest relatives are in section *Schobera*.

KEY TO SPECIES

Stems and leaves strigose.....6. *H. microstachyum*.
Stems and leaves shaggy villous.....7. *H. abbreviatum*.

6. **H. microstachyum** R. & P. Fl. Peruv. ii. 3, t. 110a (1799); DC. Prodr. ix. 550 (1845). *Heliophytum brachystachyum* DC. l. c. 554. *Heliotropium brachystachyum* Griseb. [Symb. Argent.] Abh. K. Ges. Wiss. Göttingen xxiv. 271 (1879); Hieron. [Sertum Sanjuan.] Bol. Acad. Nac. Cien. Córdoba iv. 64 (1882); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96 (1893); Fries, Nova Acta Reg. Soc. Sc.

Upsala, ser. 4, i. 111 (1905); Rusby, Bull. Torr. Bot. Cl. xxvi. 149 (1899). *Coldenia phaenocarpa* Ph. Cat. Pl. Itin. Tarapacá 56 (1891). *Heliotropium phaenocarpum* Reiche, Anal. Univ. Chile cxxi. 237 (1907) and Fl. Chile v. 195 (1910). *Heliotropium Bangii* Rusby, Bull. N. Y. Bot. Gard. iv. 414 (1907).

Northwestern Argentina northward along the puna and cordilleras to Ecuador.

ARGENTINA. LA RIOJA: Los Berros, Sierra Famatina, *Hieronymus & Niederlein* 591 (BD); Cuesta de la Puerta de Piedra, Sierra Velasco, *Hieronymus & Niederlein* 14 (BD). SAN JUAN: Leoncito, 1871, *Echegaray* (BD). CATAMARCA: Las Namas, 1917, *Jørgensen* 1724 (G, US). TUCUMÁN: Tafí to Lomas de la Banda, *Castillon* 3180 (G); Tafí to Infiernillo, *Castillon* 2075 (G); Tafí, 2000 m., *Lillo* 3106 (G). JUJUY: La Guiaca, Feb. 1916, *Hauman* (G); Volcán, 2078 m., *Schreiter* 2556 (G).

BOLIVIA. POTOSI: Calcalhuay, Jan. 1886, *Rahmer* (MS, TYPE of *C. phaenocarpum*; G, photo.); Porco, Uyuni, 3700 m., *Asplund* 3154 (G); Quechisla, 3425 m., *Bender* 29 (BD). LA PAZ: Tiahuanaco, *Hill* 327 (K); Sur Chichas, Atocha, 3700 m., *Asplund* 3018 (G); Tomarapé to La Paz, ca. 4000 m., *Stübel* 76 (BD); La Paz, 3700 m., *Asplund* 530 (G); La Paz, 3500 m., *Buchtien* 3990 (US) and 604 (FM); La Paz, 3750 m., *Buchtien* 121 (US); near La Paz, 3000 m., *Rusby* 2539 (G, NY, US); Achacachi, 4000 m., *Mandon* 384 (K, BM). INDEFINITE: without locality, *Bang* 1971 (G, NY, US, FM, K, BM, BD), 2505 (G, NY, US, K) and 2847 (NY, TYPE of *H. Bangii*; G, US, FM, K, BD, ISOTYPES).

PERU. MOQUEGUA: Carumas, 3100 m., *Weberbauer* 7484 (BD). PUNO: Puno, 3100 m., *Shepard* 120 (G); Chuquibambilla, ca. 3950 m., *Pennell* 13358 (G, FM); Laguna de Titicaca, *Meyen* (BD); Altos de Toledo, 4650 m., *Meyen* (BD). AREQUIPA: Cotahuasi, ca. 2650 m., *Weberbauer* 6371 (BD). CUSCO: Ollantaitambo, ca. 3000 m., *Pennell* 13660 (G, FM). HUANCANELICA: Huaytará, ca. 2650 m., *Weberbauer* 5427 (G, FM). ICA: mountains above Pisco, ca. 2650 m., *Weberbauer* 5427 (BD). JUNIN: Tarma, ca. 3150 m., *Weberbauer* 2370 (BD). LIMA: Mantucana, 2400 m., *Macbride & Featherstone* 202 (G). HUANUCO: Ambo, 2100 m., *Macbride* 3168 (G); Huanuco, *Kanehira* 258 (G). INDEFINITE: without locality, *Dombey* (FM, BD), *Pavon* (herb. Willd.), *Ruiz* (BD, ISOTYPE of *H. microstachyum*).

ECUADOR. CHIMBORAZO: Riobamba, *Spruce* 5778 (G, K, BM); Riobamba, 2800 m., *Rimbach* 155 (BD). PICHINCHA: Pomasqui, *Sodi* 112-21 (BD).

The well known name, *H. brachystachyum*, is here replaced by the unquestionably synonymous and very much older *H. microstachyum*. The obscurity which has enveloped *H. microstachyum* has no doubt arisen from the confusion in the lettering on the original plate given by Ruiz & Pavon. The upper plant figured on plate 110 is certainly that described in the text as *H. microstachyum* and not *H. pilosum* as the legend indicates. The authentic collection of *H. microstachyum* at Berlin gives further proof that confusion has occurred. *Heliotropium microstachyum* is a plant of the plateaus and higher mountains and has been sometimes confused with the very distinct and more southerly ranging *H. paronychioides*. The segregate, *H. Bangii*, is merely a luxuriant coarse phase of the species.

7. **H. abbreviatum** Rusby, Mem. Torr. Bot. Cl. iv. 224 (1895); Kuntze, Rev. Gen. iii. pt. 2, 205 (1898).

Known only from Bolivia in the western parts of Cochabamba.

BOLIVIA. COCHABAMBA: Rio Tapacari, 3000 m., March 1892, *Kuntze* (NY); Cochabamba, 2600 m., March 1892, *Kuntze* (G, NY, US, BD); Cochabamba, *Bang 924* (NY, TYPE; G, US, FM, K, BD, ISOTYPES). INDEFINITE: no locality, *Bridges* (K, BM).

Very obviously related to *H. microstachyum* and perhaps no more than a pronounced geographical variety of it. It agrees with that species in habit and reproductive characters and differs primarily in its very shaggy-villous rather than short appressed pubescence.

IV. Section **Halmyrophila** Johnston; type-species *H. curassavicum* L.

This section consists of a single species which occurs in saline soils in temperate and tropical America and in scattered localities in the Old World. The plant is a completely glabrous succulent, with the 4-sulcate fruit crowned with a very broad stigma in which the column is very much reduced and the disk extremely broad and well developed. The immediate affinities of the section are uncertain. I am inclined to believe, however, that it is related to sections *Hypsogenia* and *Schobera* and that it is an American development.

8. **H. curassavicum** L. Sp. Pl. i. 130 (1753). *H. glaucum* Salisb. Prodr. 113 (1796). *H. glaucophyllum* Moench, Suppl. Meth. 147 (1802). *H. chenopodioides* H. & B. acc. Willd. Enum. 175 (1809). *H. curassavicum*, var. *chenopodioides* Lehm. Asperif. i. 34 (1818). *H. chilense* Bertero, Mercurio Chileno 1828-9: no. 14, 647 (1829), nomen; Annali Storia Nat. ii. 233 (1829); Bull. Sci. Nat. et Géol. xx. 112 (1830) and Am. Jour. Sci. xxiii. 85 (1833). *H. portulacoides* DC. ex Bello, Anal. Soc. Español Hist. Nat. x. 298 (1881). *H. curassavicum*, var. *parviflorum* Ball, Jour. Linn. Soc. xxi. 227 (1884).

Var. **genuinum**. Corolla small and inconspicuous, 1-2.5 mm. long; column of the stigma scarcely developed, less than 0.2 mm. long.—Synonymy given above.

From central Chile and western Bolivia along the coast to northern South America, thence northward through Central America and the West Indies to the United States; also occurring in scattered localities in the Old World.

ARGENTINA. RIO NEGRO: General Rocas, *Fischer 230* (G, NY, US, FM, BM).

CHILE. SANTIAGO: Batuco, 1913, *Baeza* (IP); Cerro de Renca, *Philippi* (MS); near Laguna de Aculeo, 1818, *Bertero* (G, MS, ISOTYPES of *H. chilense*);

Santiago, *Philippi* (MS); Punta, *Claude-Joseph* 2142 (US); Cartagena, *Claude-Joseph* 977 (US); Montaria, *Claude-Joseph* 1326 (US). VALPARAISO: near Viña del Mar, 1895, *Buchtien* (US); Llai Llai, *Bridges* 318 (K). ACONCAGUA: cordilleras, *Cuming* 267 (BM). COQUIMBO: Algarroba, 1915, *Ochoa* (IP); Coquimbo, *Hastings* 584 (US). ATACAMA: Puerto Huasco, 1860, *Volckman* (MS); Copiapó, *Johnston* 5008 (G). TARAPACÁ: Tamentica, 1899, *Johow* (IP); near Iquique, 1881, *Darapsky* (MS); Tambillo chica, 1885, *Rahmer* (MS). TACNA: Arica, *Buchtien* 4377, 4378 and 4379 (US); Arica, 1882, *Ball* (US); Zapa near Arica, 1880, *Ortiga* (G); Azapa, ca. 150 m., *Werdermann* 711 (G, FM, K, BM); Tacna, 1880, *Ortiga* (G); Tacna, 1890, *Woitschach* (BD).

BOLIVIA. COCHABAMBA: near snow-line, Mt. Tunari, *Bang* 1039 (G, NY, US, FM, K, BM, BD).

PERU. AREQUIPA: Mollendo, *Weberbauer* 388 (BD); near Lomas, *Weberbauer* 5732 (BD). ICA: Paracas Bay near Pisco, 1912, *Forbes* (BM). LIMA: Callao, *Macbride* 5881 (G); Rio Rimac near Lima, 1882, *Ball* (US); Lima, 1830, *Cruckshanks* (G); Lima, 1847, *Seemann* (K); Lima, *Gaudichaud* (BD); Lima, *D'Urville & Lesson* (BD).

ECUADOR. GUAYAS: Chanduy, *Spruce* 6491 (K). MANABÍ: Bahia de Caráques, *Lehmann* BT753 (NY). ESMERALDAS: Esmeraldas, *Barclay* 860 (BM). GALAPAGOS ISLANDS: Abingdon Island, *Stewart* 3196 (G); Albemarle Island, *Stewart* 3197 (G, US), *Belt* (BM); Bindloe Island, *Snodgrass & Heller* 766 (G); Chatham Island, *Agassiz* (G, US), *Snodgrass & Heller* 514 (G), *Andersson* (K), *Baur* 219 (G), *Stewart* 3200 (G, US); Charles Island, *Kicks* 427 (K); Gardner Island, *Stewart* 3201 (G); Hood Island, *Snodgrass & Heller* 725 (G); Indefatigable Island, *Snodgrass & Heller* 660 (G), *Stewart* 3202 and 3203 (G, US), *Belt* 409 (K), *Wheeler, Rose & Beebe* 15 (G, NY, US); Seymour Island, *Snodgrass & Heller* 560 (G).

COLOMBIA. BOLIVAR: Cartagena, *Holton* 528 (NY, K); Cartagena, *Heriberto* 144 (US); Cartagena, ca. 5 m., *Pennell* 12020 (G). ATLANTICO: Puerto Colombia, *Pennell* 12038 (G, NY, US, K, BD) and 12079 (G, NY, US); Puerto Colombia, *Kellhack* 29 (BD); Barranquilla, *Paul* 24 (US). MAGDALENA: Santa Marta, ca. 1 m., *Pennell* 4769 (G, NY); Santa Marta, *Smith* 544 (G, NY, US, FM, K, BM, BD); Santa Marta, *Schlim* 926 (K). GOAJIRA: Goajira, *Daive* 538 (K). INDEFINITE: no locality, *Linden* 1526 (K) and 1586 (BM).

VENEZUELA. FALCON: Paraguana Peninsula, *Curran & Haman* 568 (G, NY, US). DIST. FEDERAL: Playa de Cabo Blanco, *Pittier* 10181 (G, NY, US); Cabo Blanco, 1853, *Gollmer* (BD); near La Guaira, *Fendler* 908 (G, K), *Curran & Haman* 892 (G, US) and 930 (G, US, K), *Kuntze* (NY). SUCRE: Cumana, Punta Araya, *Bonpland* (BD). INDEFINITE: no locality, *Funcke* 541 (K, BM).

BRITISH GUIANA: Georgetown, *Hitchcock* 16572 (G, NY, US); indefinite, *Jenman* 2165 (NY), 4466 (NY) and 5471 (US, BM).

Var. **argentinum**, var. nov., a varietate genuina differt corolla late infundibuliformi conspicua 3-5 mm. longa; columna stigmatis ca. 0.5 mm. longa.

ARGENTINA. BUENOS AIRES: Carhüe, *Lorentz* 131 (G, BD); Pergamino, *Parodi* 7698 (G); Buenos Aires, 1891, *Hauthal* (NY); Buenos Aires, *Tweedie* 85 (BM); Buenos Aires, *Rodriguez* 208 (G). MENDOZA: San Rafael, *Venturi* 16933 (G); Mendoza, 1868-9, *Ortega* (MS). SAN JUAN: San Juan and Jachal, *Jameson* (K); Laguna Guanacache, *Hosseus* 2605 (BD); Rinconada, 1876, *Echegaray* (BD). LA RIOJA: Vinchina, *Hieronymus & Niederlein* 285 (BD); Las Tranquitas, Sierra Famatina, *Hieronymus & Niederlein* 830 (BD). CATA-

MARCA: Yacutula, *Schickendantz* 238 (BD). SAN LUIS: Bajo de Velis, *Kurtz* 8485 (NY); Queb. Salado, 1882, *Galander* (BD); Santa Barbara, 1882, *Galander* (BD). CÓRDOBA: Posta de San Agustín, 1879, *Galander* (NY, BD); Salinas Grandes between Balde de Nabor and the frontier of La Rioja, *Hieronymus & Niederlein* 159 (US, BD). SANTIAGO: Pinto, Oct. 1892, *Kuntze* (NY); indefinite, *Lorentz* 61 (BD). TUCUMÁN: Amaicha, 2090 m., *Castillon* 2489 (G); Tapia, 600 m., *Schreiter* 191a (G); Cadillal, 500 m., *Schreiter* 191 (G); Agua Dulce, *Schreiter* 4549 (G); Cuesta Grande, Trancas, ca. 2250 m., *Schreiter* 344 (G); Rio Salí, 450 m., *Venturi* 997 (G), Tarami, Rio Salí, *Lillo* 2489 (G). JUJUY: Volcán, 2000 m., *Schreiter* 2602 (G); indefinite, *Castillon* 10152 (G). CHACO: Las Palmas, Feb. 1917, *Jørgensen* 2243 (G, TYPE). FORMOSA: Formosa, Feb. 1918, *Jørgensen* 2246 (US). INDEFINITE: Laguna de las Bandurrias, April 24, 1879, *Lorentz* (BD); Las Raluras, Aug. 30, 1892, no collector given, no. 335 (BD).

URUGUAY: Piriapolis, *Smith* 114 (US); Punta del Este, Dept. Maldonado, *Osten* 17676 (BD); Malvin, *Herter* 76710 (FM); Montevideo, 1839, *Isabelle* (K).

PARAGUAY: Asuncion, *Morong* 790 (G, NY, US, FM); Laguna de las Palmas, Pilcomayo River, *Morong* 1058 (G, NY, US); Rio Palado, *Hassler* 3257 (BM, BD); southern Paraguay, *Kuntze* (NY, US, FM); lower reaches of Rio Pilcomayo, *Rojas* 188 (BM); Colonia Risso near Rio Apa, *Malme* 1016 (BD).

BRAZIL. RIO GRANDE DO SUL: indefinite, *St. Hilaire* C2249 (K) and *Malme* 314 (BD). SÃO PAULO: St. Paul, *Glaziou* 19681 (K, BD). INDEFINITE: no locality, *Sellow* (G, BM, BD).

A widely distributed and characteristic species of tropical America, which in our area is represented by two rather well marked varieties. The common form of Argentina, Paraguay, Uruguay and southern Brazil is a large-flowered plant in which the column surmounting the broad stigmatic disk is well enough developed so as to be seen by the naked eye. In the small-flowered typical form, which seems to be practically restricted to the Pacific and Caribbean coasts in South America, the column is so poorly developed that the stigma appears to consist of merely the stigmatic disk. Although large-flowered, the var. *argentinum* seems to be quite distinct from the large-flowered forms of *H. curassavicum* which occur in the United States, i. e. var. *obovatum* DC. (= *H. xerophilum* Cockerell), being less succulent, scarcely glaucous and having a less firm much more decidedly funnel-form corolla.

V. Section **Plagiomeris** Johnston; type-species, *H. paronychioides* DC.

The two species of this section are restricted to southern South America. The section is related to sections *Hypsogenia* and *Halmiophila*, as shown by similarities in habit, inflorescence, calyx, corolla and by its didymous nutlets.

KEY TO SPECIES

- Herbage (especially the younger parts) stipitate-glandular;
 corolla 3–5 mm. broad; leaf-blade orbicular.....9. *H. Geissei*.
 Herbage not at all glandular; corolla 1–3 mm. broad; leaf-blade
 oblanceolate or linear.....10. *H. paronychioides*.

9. **H. Geissei** F. Phil. Anal. Univ. Chile xc. 352 (1895); Reiche, Anal. Univ. Chile cxxi. 237 (1907) and Fl. Chile v. 195 (1910).

Central Chile; rare and local.

CHILE. SANTIAGO: El Alba near Colina, Dec. 1891, *F. Philippi* (MS); dry shore of lake, Bатуco, 1913, *Baeza* (IP). ACONCAGUA: San Lorenzo, 1889–90, *Geisse* (MS, TYPE; G, photo.).

A very distinct species apparently of limited distribution. It is known only from central Chile where it appears to be rare and local. Reiche, l. c., suggests that *H. Geissei* might be one of the European species introduced into Chile. I have, however, been unable to match it among European collections. As it agrees in very many details with *H. paronychioides* I am inclined to believe that it is an indigenous species and a close relative of that species of Chile and Argentina.

10. **H. paronychioides** A. DC. Prodr. ix. 565 (1845); Clos in Gay, Fl. Chile iv. 459 (1849); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96 (1893); Speg. [Fl. Patag. ii. 37] Anal. Soc. Cien. Argent. liii. 79 (1902); Reiche, Anal. Univ. Chile cxxi. 236 (1907) and Fl. Chile v. 194 (1910); Macloskie, [Rev. Fl. Patag.] Rep. Princeton Univ. Exped. Patag. viii. sec. 3, 212 (1914); Hicken, Physis ii. 113 (1916); Hauman, [Veg. Cord. Mendoza 149] Anal. Soc. Cien. Argent. lxxxvi. 303 (1918).

Along the Andes of Argentina and Chile between lat. 28° 30' and 41° S.

ARGENTINA. RIO NEGRO: General Rocas, ca. 300 m., *Fischer 234* (G, NY, US, FM, K, BM); San Carlos de Bariloche, Lake Nahuelhaupi, 800 m., *Buchtien 1338* (G) and *117* (US). NEUQUÉN: Caltrahue, *Nazarre 10* (G); Zapala, *Parodi 2156* (G); Zapala, *Comber 135* (K); Las Lajitas, 1000 m., *Comber 231* (K). MENDOZA: Rio Salado, *Gillies* (K). SAN JUAN: Arroyo Tambillos below Paso Valeriano, 3900 m., *Johnston 6098* (G). LA RIOJA: La Cortaderas between El Peñon and El Jaguel, *Hieronymus & Niederlein 196* and *259* (BD).

CHILE. CONCEPCION: Cabrero, 1913, *Baeza* (IP). ÑUBLE: Cord. de Chillan, 1855, *Germain* (MS, K, BM); Cord. de Chillan, *Philippi* (US, K); Baños de Chillan, 1862 and 1878, *Philippi* (MS); Los Morros, *Soler* (MS); Itata, 1877, *Philippi* (MS); La Cueva, 1887, *Rahmer* (MS); Cord. de Chillan, ca. 1800 m., 1895, *Reiche* (BD). TALCA: Andes de Talca, 1922, *Silva* (IP). CURICÓ: Cord. de Curicó, 2250 m., *Reiche* (BD); Volcán Peteroa, 2500 m., *Werdermann 581* (G, FM, K, BM); indefinite, *Bridges 1220* (K) and *1255* (K, BM, BD). COLCHAGUA: Cuesta Atul, *Reed* (K). SANTIAGO: Cord. de Arañas, *Philippi* (MS); near snow-line above Santiago, 1854, *Germain* (MS);

Cord. de Santiago, *Philippi* 702 (BD). COQUIMBO: Cord. de los Patos, 1844, *Alamos* (MS); Andes of Coquimbo, 1861-2, *Volckmann* (MS).

A small prostrate annual herb with small white corollas that commonly turn bluish in drying. Although somewhat suggesting *H. microstachyum* in gross habit, it is very distinct and is only distantly related to that species.

VI. Section **Tiaridium** (Lehm.) Griseb. Fl. W. Ind. 485 (1861). *Tiaridium* Lehm. Asperif. i. 13 (1818); type-species, *H. indicum* L. *Tiaridium* § *Hieranthemum* Endl. Gen. 646 (1838); type species, *H. elongatum* Lehm. *Hieranthemum* (Endl.) Spach, Hist. Nat. Veg. ix. 31 (1840). *Heliotropium* § *Scorpiurus* Kuntze in Post & Kuntze, Lexicon 271 (1904).

This section consists of two species, one a widely distributed weed in the Tropics of the Old and New World and the other a rare plant known only in eastern South America. The section is a very well defined one because of its coarse weedy habit, coarse pubescence, salverform corollas and especially by its conspicuously ribbed multicellular glabrous carpels. The affinities of the section are uncertain. It appears, however, to be most related to the section *Heliophytum*.

KEY TO SPECIES

- Carpels parallel or only weakly divergent apically, commonly 4-5 mm. long, with entire or obscurely bidentate apices 11. *H. elongatum*.
 Carpels becoming strongly divergent, commonly 2.5-3 mm. long, with strongly bidentate apices. 12. *H. indicum*.

11. **H. elongatum** Hoffm. ex R. & S. Syst. iv. 736 (1819); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96, fig. 39c (1893). *Tiaridium elongatum* Lehm. Asperif. i. 16 (1818) and Icones 10, t. 6 (1821); R. & S. Syst. l. c.; Cham. Linnaea iv. 452, t. 5, fig. 1 (1829). *Heliophytum elongatum* DC. Prodr. ix. 555 (1845); Fresen. in Mart. Fl. Bras. viii. pt. 1, 47, t. 10, fig. 8 (1857); Warm. Kjoeb. Vidensk. Meddel. 1867: 20 (1868).

Var. **genuinum**.—Corolla small, with a tube 3-4.5 mm. long and a limb 2-3 mm. broad.—Synonymy given above.

Brazil and adjacent portions of Bolivia, Argentina, Paraguay and Uruguay.

URUGUAY: Melo, Dept. Cerro Largo, *Herter* 18458 (BD).

ARGENTINA: ENTRE RIOS: Concepcion del Uruguay, 1875, *Lorentz* (G), *Lorentz* 59 (K, BD); shores of Rio Uruguay, *Baez* 132 (G). CORRIENTES: indefinite, *Lossen* 564 (G).

PARAGUAY: streets of Asuncion, *Morong* 56 (NY, US); Cordillera de Altos, *Hassler* 3607 (G, K, BM, DB).

BOLIVIA. LA PAZ: Beni River, *Rusby 1433* (NY). SANTA CRUZ: Buenavista, 500 m., *Steinbach 5100* (NY, FM) and *6188* (K, BD); Bañado del Piráy, 450 m., *Steinbach 7130* (FM).

BRAZIL. MINAS GERAES: Pauso Alegre, 1927, *Hoehne 19208* (G). BAHIA: Joazeiro, *Chase 7913* (G). CEARÁ: Fortaleza, *Rolland* (K). FERNANDO NARONHA: no locality, *Moseley* (K, BM), *Ridley, Lea & Ramage 104 A & B* (BM) and *104* (G). INDEFINITE: Bras. trop., *Sellow* (BD, TYPE?; K, ISOTYPE?).

Var. **Burchellii**, var. nov., a varietate genuina differt corolla conspicua, tubo 5-7 mm. longo, limbo 7-10 mm. lato.

BRAZIL. GOYAZ: between Conceição and Natividade, upper Tocantins River, *Burchell 8191* (G, TYPE; K, ISOTYPE).

A peculiar plant very closely related to, and much resembling *H. indicum* in all details of habit. It differs from that species only in the structure of its fruit. The fruit consists of two strongly ribbed, brown glabrous carpels which each tardily break up into two angulate nutlets. The carpels are more or less parallel or only weakly divergent apically, 3-5 mm. long, and have entire or obscurely bidenticulate apices. In *H. indicum* the carpels are usually 2.5-3 mm. long, become very strongly divergent and have conspicuous bidentate apices.

12. **H. indicum** L. Sp. Pl. 130 (1753). *Tiaridium indicum* Lehm. Asperif. i. 14 (1818). *Heliotropium horminifolium* Mill. Gard. Dict. ed. 8, no. 3 (1768). *Heliotropium cordifolium* Moench, Meth. 415 (1794). *Heliotropium foetidum* Salisb. Prodr. 112 (1796). *Eliopia serrata* Raf. Sylva Tellur. 90 (1838). *E. riparia* Raf. l. c. *Helio-phytum indicum* DC. Prodr. ix. 556 (1845).

From northern Argentina extending northward through the tropics to southern United States; also in the tropics of the Old World. Apparently rare on the Pacific Coast of South America.

ARGENTINA. TUCUMÁN: Las Herreras, *Lillo 14147* (G). SALTA: near Orán, 1873, *Lorentz & Hieronymus 350* (NY, BD); Orán, *Lillo 18098* (G); Aguaray, Orán, 500 m., *Schreiter 3607* (G); Orán to Rio de los Piedras, *Rodriguez 112* (G). CHACO: Las Palmas, *Jørgensen 2244* (G, US). FORMOSA: Formosa, *Jørgensen 2244* (G).

PARAGUAY: Asuncion, Rio Pilcomayo, *Balansa 2040* (K); lower course of the Rio Pilcomayo, *Rojas 26* (BM, BD); central Paraguay, *Morong 56* (NY, BM) and *Hassler 6410* (BM); northern Paraguay, *Hassler 7504* (BM, BD); Alto Paraguay, Chaco, lat. 21°, *Fiebrig 1371* (BD).

BRAZIL. MATTO GROSSO: Caceres, *Hoehne 611* (BD); S. Anna de Chapada, *Sladen 620* (K, BM); Cujabá, herb. *Martius 1224* (US, BM); Rio Pilcomayo betw. S. Cruz and Diamantina, *Moore 633* (NY, BM, BD). SÃO PAULO: near Santos, 1882, *Ball* (US); S. Manoel, 1913, *Luederwaldt 11243* (G). RIO JANEIRO: Rio Janeiro, *Tweedie 1236* (K), *Banks & Solander* (BM), *Gay* (NY), *Gaudichaud* (BD), *Wilkes Exped.* (NY), *Andersson* (US), *Glaziou 4145, 14138, 14139* and *14131* (BD). BAHIA: Cruz de Casma, *Luschnath* (BD); Bahia, *Chase 7880* (G), *Lee* (US), *Blanchet 130* (FM) and *805* (NY,

FM). PERNAMBUCO: Pernambuco, 1838, *Gardner* (K, BM); Fernando Naronha, *Darwin* (K). MARANHÃO: Tury-Assú, *Snethlage* 377 (BD). PARÁ: Amazon at Obidos, *Spruce* 476 (K); Monte Alegre, 1873, *Traill* (K). AMAZONAS: Marary, Rio Juruá, *Ule* 5222 (K, BD). INDEFINITE: Cachambú, 1890, *Moura* (BD); indefinite, *Sellow* (K, BD), *Burchell* 1009 (K), *Pohl* 1592 (K).

FRENCH GUIANA: Iles de Salus, *Sagot* 449 (BM); Cayenne, 1845, *Rothery* (BD); vicinity of Cayenne, *Broadway* 118 (NY); Maroni, *Wachenheim* 287 (US) and 290 (BM).

DUTCH GUIANA: Paramaribo, *Samuels* 160 (G).

BRITISH GUIANA: Kamakusa, upper Mazaruni, *La Cruz* 2748 (G, NY); Mazaruni River, *Jenman* 5476 (US, BM); Lamaha Canal, *Jenman* 4568 and 5044 (NY); Waramuri Mission, Moruka River, Pomeroon District, *La Cruz* 2600 (G, NY, US); Comaca, Moruka River, *La Cruz* 1058 (NY, US); Epuro, Corentyne River, *Jenman* 54 (K); Georgetown, *Hitchcock* 16684 (G, NY, US); Hyde Park, east bank of Demerara River, *Dahlgren* (FM); indefinite, *Schomburgk* 206 (BD) and 600 (K); Tumatumari, *Gleason* 370 (NY).

VENEZUELA. BOLIVAR: Las Batillas, *Passarge & Selwyn* 301 (BD). SUCRE: Cristobal Colon, *Broadway* 120 (G, US). DIST. FEDERAL: Carácas, *Moore* 13 (G), *Moritz* 147 (BM, BD), *Gallmer* (BD). ARAGUA: Colonia Tovar, *Fendler* 911 (G, K). CARABOBO: Puerto Cabello, *Karsten* 30 (BD).

COLOMBIA. MAGDALENA: Santa Marta, 90 m., *Smith* 871 (G, NY, US, FM, BM, BD). ATLANTICO: Barranquilla, *Paul* 16 (US), *Ariste-Joseph* 709 (US); Puerto Colombia, ca. 5 m., *Pennell* 12035 (G) and 12036 (G, US); delta of Rio Magdalena near Barranquilla, *Kailbach* 19 (BD). BOLIVAR: Cartagena, *Heriberto* 6 (US), *Schott* 5 (NY); Tierra Alta, Rio Sinu, ca. 65 m., *Pennell* 4673 (NY); Cañabetal, ca. 95 m., *Pennell* 3871 (NY); Bodega Central, *Rensch* 1 (BD); Turbaco, ca. 250 m., *Killip & Smith* 14219 (G). CUNDI-NAMARCA: La Mesa, *Hartweg* 1317 (NY, K, BD). HEILA: La Plata, ca. 1200 m., *Lehmann BT* 698 (G, NY, FM, K). CAUCA: La Paila, *Holton* 527 (NY, K), *Triana* 3752 (BM); Cauca, 1000 m., *Triana* (BD). ANTIOQUIA: Paso de Caramanta, Rio Cura, ca. 650 m., *Pennell* 10832 (G, US); Boca Regla, along Magdalena River, 125 m., *Pennell* 10987 (G). TOLIMA: Honda, 1919, *Ariste-Joseph* (US). EL VALLE: Carthago, 1833, *Boussingault* (BD); Cisneros, ca. 350 m., *Killip* 5376 (G); Puerto Caldas, ca. 880 m., *Killip & Hazen* 11034 (G, US). INDEFINITE: Rio Magdalena, *Stübel* 107 (BD); indefinite, *Lehmann BT* 707 (G, NY, K), *Linden* 1386 (K, BM), *Cuming* 1222 (K).

ECUADOR. MANABÍ: Recreo, *Eggers* 15539 and 15609 (FM). GUAYAS: Chanduy, *Spruce* 6492 (K, BM); Guayaquil, *Hitchcock* 19924 (G, NY, US), *Mille* 2 (G), *Sinclair* (K). GALAPAGOS ISLANDS: Charles Island, *Snodgrass & Heller* 447 (G), *Lee* (G), *Stewart* 3208 (G); Chatham Island, *Stewart* 3206 (G, NY, US, FM, K, BM).

PERU. LORETO: Soledad, Lower Itaya, Baja Amazonas, 110 m., *Tessmann* 5260 (BD). PIURA: Piura, *Townsend* 1393 (US).

BOLIVIA. LA PAZ: Beni River, *Rusby* 1433 (G, NY, US, K, BM, BD); Tumupasa, 540 m., *Williams* 491 (NY, US, K, BM). SANTA CRUZ: Bañado de Piray, 450 m., *Steinbach* 7130 (BM, BD).

A readily recognized, coarse, weedy annual, which exhibits remarkably few variations, the most striking of these being in the size of the corolla. The species also occurs in the tropics of the Old World and has been accepted by some writers as a weedy immigrant in America. I suspect, however, that the species is indigenous to America, although since the discovery of America its weedy character has permitted

it to extend its original range there. The rarity of the plant west of the Andean Crest is a striking fact. Because of this peculiarity of range and the circumstance that its only close relative, *H. elongatum* (a species more primitive in its fruiting structures), is endemic to eastern South America, I am inclined to believe that *H. indicum* is Brazilian in origin. Certainly none of the *Heliotropium*s of the Old World seem at all closely related to it.

VII. Section **Heliophytum** (Cham.) Griseb. Fl. W. Ind. 485 (1861). *Heliotropium* *** *Heliophytum* Cham. Linnaea iv. 458 (1829); type-species, *H. anchusaefolium* Poir. *Heliophytum* DC. Prodr. ix. 551 (1845).

This section is confined to southern South America east of the Andes. It is most closely related to the section *Cochranea*, from which its villous corolla-throat and -tube, its commonly multilocular carpels and its different habit seem to warrant its recognition as a distinct section, at least provisionally. The species recognized are not clean-cut and must be subjected to extensive field-study before they can be given a satisfactory and detailed treatment.

KEY TO SPECIES.

Cauline leaves sessile or subsessile.

Stem and leaves sordid, tawny-villous, somewhat glandular and oily.....13. *H. amplexicaule*.

Stem and leaves clean white villous, sparingly if at all glandular.....14. *H. phylloides*.

Cauline leaves with a definite petiole, 1-4 cm. long.

Leaf-blade contracted to a cuneate base.....15. *H. nicotianaefolium*.

Leaf-blade very abruptly contracted to a cordate or rarely a rounded base.....16. *H. leiocarpum*.

13. **H. amplexicaule** Vahl, Symb. Bot. iii. 21 (1794); Lehm. Asperif. i. 25 (1818). *Tournefortia sessilifolia* Poir. Encyc. v. 360 (1804). *Heliotropium anchusaefolium* Poir. Encyc. Suppl. iii. 23 (1813); Cham. Linnaea iv. 458, t. 5, fig. 4 (1829); Arechav. Fl. Uruguay iv. 173 (1911); Herz. Medel. Rijks Herb. xlvi. 10 (1922); Prain, Bot. Mag. cxxxix. t. 8480 (1913). *Heliophytum anchusaefolium* DC. Prodr. ix. 554 (1845); Fresen. in Mart. Fl. Brasil. viii. pt. 1, 46 (1857). *Cochranea anchusaefolia* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97, fig. 39n (1893). *Heliophytum lithospermifolium* DC. l. c. 554. *Heliotropium anchusifolium*, var. *lithospermifolium* Griseb. [Pl. Lorentz. 184] Abh. K. Ges. Wiss. Göttingen xix. 232 (1874) and [Symb. Argent.] l. c. xxiv. 271 (1879). *Heliotropium lithospermifolium* Speg. Contr. Fl. Sierra Ventana 44 (1896). *Heliophytum anchusaefolium*, var. *latifolium* DC. l. c. 554. *Heliotropium*

anchusifolium, var. *latifolium* Kuntze, Rev. Gen. iii. pt. 2, 205 (1898). *Cochranea angustifolia* var. *latifolia* Hicken, Apuntes Hist. Nat., Buenos Aires ii. [Chloris Plat. Argent.] 194 (1910). *Heliophytum anchusaefolium*, var. *angustifolium* DC. l. c. 554. *Heliotropium anchusifolium*, var. *angustifolium* Griseb. [Symb. Argent.] l. c. xxiv. 271 (1879); Kuntze, l. c. 205. *Heliotropium anchusifolium*, var. *latifolium*, f. *grandiflorum* Kuntze, l. c. 205. *Heliotropium anchusifolium*, var. *latifolium*, f. *parviflorum* Kuntze, l. c. 205. *Heliotropium anchusifolium*, var. *angustifolium*, f. *grandiflorum* Kuntze, l. c. 205. *Heliotropium anchusifolium*, var. *angustifolium*, f. *medium* Kuntze, l. c. 205. *Heliotropium bolivianum* Rusby, Mem. Torr. Bot. Cl. iv. 225 (1895). *Heliotropium montevidensis* Arechav. Anal. Mus. Nac. Montevideo, ser. 2, i. 66 (1911) and l. c. ser. 1, vii. [Fl. Urug. iv.] 176 (1911). *Heliotropium semiamplexicaule* Larrañaga, Escritos [Inst. Hist. y Geogr. Urug.] ii. 73 (1923).

Known from Uruguay, extreme southern Brazil, northern and central Argentina and southern Bolivia.

ARGENTINA. BUENOS AIRES: Naporta Chica, Bahia Blanca, *Claraz* 119 in pt. (K); Bahia Blanca, 1884, *Mansel* (BM); Sierra Ventana, *Lorentz* 299 and 301 (BD); Sierra Ventana, *Hauthal* (NY); J. A. de Peña, *Parodi* 7710 (G); Tandil, 1892, *Kuntze* (NY, TYPES of *H. anch.* formae *medium* and *grandiflorum*); Arroya del Pavon, *Miers* (BM); "Buenos Aires et Monte Video," *Commerson* (NY, ?ISOTYPE of *H. anchusaefolium*); Buenos Aires, *Hauthal* 643 (NY), *Tweedie* 383 (G), *Floyer* 23 (NY), *Gillies* 1317 (K), *Bettreund & Koester* 339 (BD), *Parker* (G), *Arnott* (NY). MENDOZA: Totoral, *Gillies* (K, BM). CÓRDOBA: Los Caldenes, *Gillies* (K); Las Peñas, *Lorentz* 92 (BD); Pan de Azucar, *Schnyder* 280 (BD); Estancia Germania near Córdoba, 1874, *Lorentz* 51 (G, BM, BD); Córdoba. *Hieronymus* 164 (US, FM, K, BD), *Kurtz* 6949 (NY), *Lorentz* 93, 95, 606 and 608 (BD), *Looser* 5 and 172 (G), 313 (BD). LA RIOJA: Sonagasta, Sierra Famatina, *Hieronymus & Niederlein* 677 (BD); Zapallar, *Hosseus* 1405 (BD); Aguadita, 1600 m., *Hosseus* 538 (BD). CATAMARCA: Andalgalá, *Jørgensen* 1075 (G, US); Rio del Valle, *Castillon* 1096 (G); Valle del Rodeo, *Castillon* 1093 (G); Capillitas, *Schickendantz* 187 (BD); Siguil, *Schunk* 127 (BD); Yacutula, *Schickendantz* 176, 239 and 245 (BD); between Yacutula and Andalgalá, *Schickendantz* 42 (BD). JUJUY: Jujuy, Sept. 1892, *Kuntze* (NY, TYPE of *H. anch.* f. *parviflorum*). TUCUMÁN: Tafí, 2000 m., *Lillo* 4108 (G); Tafí del Valle, *Castillon* 197 (G); betw. Tafí and Mesopotamia, *Castillon* 372a (G); Raco, 1500 m., *Schreiter* 1397 (G); Queb. de Carapunco, Tafí, 3000 m., *Schreiter* 554 (G), Carapunco, Tafí, 3000 m., *Schreiter* 346 (G); Tapia, Cadillal, 500 m., *Schreiter* 921 (G); Parque 9 de Julio, Tucumán, 450 m., *Schreiter* 2058 (G); Tucumán, *Pearce* 605 (K); Playa del Rio Siambón, 1200 m., *Schreiter* 1721 (G); Las Cuchillas, 1100 m., *Lillo* 2900 (G); La Cocha, *Bailetti* 77 (G). SALTA: Rosario de la Frontera, 790 m., *Schreiter* 1435 (G); Salta, Nov. 1892, *Kuntze* (NY); Salta, *Tweedie* (K). SANTA FE: Colonia Humboldt, *Hauziker* 2 and 34 (BD). ENTRE RIOS: Concepcion del Uruguay, *Baez* 88 (G); Concepcion del Uruguay, *Lorentz* 540 (K, BD), 523 (BD), 1090 (US, FM, K, BM, BD); Entre Rios, *Gillies* 132 and 138 (K); indefinite, *Lorentz* 1433 (BD). CORRIENTES: Palmar Grande, *Lorentz* 720 (K); Mercedes, *Parodi* 6312 (G). MISIONES: Santa Ana, no collector given (K). ■

BOLIVIA. TARIJA: Bermejo, 1400–2400 m., *Fiebrig 2052* (BD). COCHABAMBA: Cochabamba, *Bang 926* (NY, TYPE; G, US, K, BM, BD, ISOTYPES). INDEFINITE: Bolivia, *Bridges* (K, BM).

URUGUAY: Ramirez, *Herter 9653* (G); Atahualpa, *Herter 79759* (NY, FM); Arequita, *Herter 81269* (G); Pentarol, *Herter 68106* (BD); La Paz, Canelones, *Filippone 4581* (K); Marincho, *Osten 3227, 3228* (BD); Mercedes near Rio Negro, *Osten 3080* (BD); Montevideo, *Gilbert 20* (K), *Capt. King* (K, BD), *Arechavaleta 3050* (G, photo of authentic material of *H. montevidense*).

BRAZIL. RIO GRANDE DO SUL: Nova Württemberg, *Bornmüller 606* (BD); Rio Grande, 1837, *Tweedie* (K). PARANÁ: Paraná, 1858, *Gilbert 20* (K). SÃO PAULO: São Paulo, *Glaziou 19679* in pt. (K, BD) and 19680 (K, BD). RIO JANEIRO: Botafogo, *Schenck 1370* (BD). INDEFINITE: Brasil, *Sellow* (K, BD).

An extremely variable species as to width of leaves, character of the indumentum on the herbage, and in the size and color of the corolla. So numerous are the various phases of the species that I doubt the wisdom of attempting to name them. The species is closely related to *H. nicotianaefolium* and to *H. phyllicoides*, and appears to intergrade with both. It will probably be extended to include them eventually. *Heliotropium amplexicaule* is the most common species over middle and northern Argentina. It occurs as a weed or as an escape from cultivation in various places beyond its natural range. Perhaps this may account for the specimen in the herbarium at Kew collected by McLean and given as from "Peru."

14. **H. phyllicoides** Cham. *Linnaea* iv. 460 (1829); Griseb. [Symb. Argent.] *Abh. K. Ges. Wiss. Göttingen* xxiv. 271 (1879); Gürke in E. & P. *Nat. Pflanzenf.* iv. Abt. 3a, 96 (1893); Arechav. *Fl. Urug.* iv. 174 (1911). *Heliophytum phyllicoides* DC. *Prodr.* ix. 554 (1845); Fresen. in *Mart. Fl. Bres.* viii. pt. 1, 46 (1857); Glaziou, *Bull. Soc. Bot. France* lvii. Mem. 3, 479 (1910). *Heliotropium phyllicoides* f. *luciliaefolia* Arechav. l. c. 175.

ARGENTINA. ENTRE RIOS: Concepcion del Uruguay, 1877, *Lorentz* (G, US, BD) and 1112 (BD); Concepcion del Uruguay, *Lorentz 58* and 374 (BD); Concepcion del Uruguay, *Baez 84* (G); Parada Chaviyú, 1920, *Denis* (G). MISIONES: between San Carlos and Arroyo Pindapoe, *Niederlein 1748* (BD). BUENOS AIRES: "Buenos Ayres," *Tweedie* (BM).

URUGUAY: Palmira, 1926, *Herter 19010* (BD); El Santa Lucia, *Gilbert 871* (K).

BRAZIL: SÃO PAULO: Serra do Cubatão, *Glaziou 19681a* (BD). INDEFINITE: Brasil. merid. *Sellow* (K, BD, ISOTYPES of *H. phyllicoides*).

A very close relative of *H. amplexicaule* and probably only a phase of it with narrow leaves and a clean white pubescence.

15. **H. nicotianaefolium** Poir. *Encyc. Suppl.* iii. 23 (1813); Kuntze, *Rev. Gen.* iii. pt. 2, 205 (1898); Hicken, *Apuntes Hist. Nat. Buenos Aires* ii. [Chlor. Plat. Argent.] 194 (1910); Molino, *Physis*

vii. 179 (1924). *Heliophytum nicotianaefolium* DC. Prodr. ix. 554 (1845). *Heliotropium sidaefolium* Cham. Linnaea iv. 460 (1829); Hicken, l. c. 194; Archev. Fl. Urug. iv. 174 (1911); Molfino, l. c. 179. *Heliophytum sidaefolium* DC. l. c. 553; Fresen. in Mart. Fl. Bras. viii. pt. 1, 46 (1857). *Tournefortia heliotropioides* Hook. Bot. Mag. lviii. t. 3096 (1831); DC. l. c. 515.

Northern Argentina, southern Paraguay and eastern Bolivia; also reported from Uruguay.

ARGENTINA. BUENOS AIRES: "Buenos Aires," Commerson (BD, ISOTYPE of *H. nicotianaefolium*); "Buenos Aires," herb. Miers (BM). CÓRDOBA: Cruz de Eje, Isler 71 (G); Potrero Arroyo, Cahuayo, Sierra Chica, Kurtz 8760 (NY); between La Calera and La Puesto de Arriba, Sierra Chica, 1881, Galander (BD); Córdoba, 1880, Galander (BD); (?) Dique near Córdoba, Dec. 1891, Kuntze (NY). SANTA FE: Ocampo, Venturi 207 (G). TUCUMÁN: between Rio Chico and La Calera, 500 m., Lillo 15142 (G); Tucumán, 1863, Pearce (BM). CHACO: Las Palmas, Oct. 1917, Jörgensen 2244 (G). SALTA: Rio Campo Blanco, Orán, 500 m., Schreiter 3606 (G); Salta, Nov. 1892, Kuntze (NY, BD). JUJUY: Jujuy, 1200 m., Lillo 5255 (G).

BOLIVIA. SANTA CRUZ: Monte de Santa Cruz, 450 m., Steinbach 1224 (BD); Chacras de Buenavista, 450 m., Steinbach 1270 (BD).

PARAGUAY: Sud Paraguay, Sept. 1892, Kuntze (NY).

BRAZIL: "Brazil," Sellow (BD, ISOTYPES of *H. sidaefolium*).

This is an obvious relative of *H. amplexicaule* from which it differs in its looser habit and definitely petiolate leaves. From its other close relative, *H. leiocarpum*, it differs in having a more southerly and westerly range and in having the leaf-blades gradually rather than abruptly contracted into the petiole. It is quite possible that future study of more copious material will reveal reasons for treating the present species as only a variety of *H. amplexicaule*.

16. ***H. leiocarpum*** Morong, Ann. N. Y. Acad. Sci. vii 168 (1892); Chodat, Bull. Herb. Boiss. ser. 1, vii. suppl. 1, 79 (1899) and l. c. ser. 2, ii. 816 (1902) and l. c. ser. 2, v. 483 (1905); Molfino, Physis vii. 179 (1924). *H. leiocarpum*, f. *minor* Chodat, l. c. ser. 2, ii. 816 (1902). *H. leiocarpum*, f. *albiflora* Chodat, l. c. ser. 2, v. 483 (1905).

Paraguay and adjacent northeastern Argentina.

ARGENTINA. MISIONES: Posadas, 1900, Gerling (G); Santa Ana, Rodriguez 61 (G); between Puerto Monteaguda and San Pedro, Niederlein 17446 (BD); Cerro de Santa Ana, 1884, no collector given 2096 (BD).

PARAGUAY: Villa Encarnación, Bettfreund 216 (BD); Cord. Altos, Fiebrig 72 (G, K, BD) Hassler 3087 (G, K, BM, BD); Cord. Central, Hassler 6188 (BM, BM); Lacus Ypacaray, Hassler 11704 (G, US, BM, BD); Loma Clavel, Gran Chaco, Rojas 2619 (G, BM, BD); San Bernardino, Hassler 382 (K); Asuncion, Morong 634 (NY, TYPE; G, US, BM, ISOTYPE of *H. leiocarpum*) and 786 (G, NY, US, K, BM); Est. de Ybitimi, Balansa 2037 (K, ISOTYPE of *H. leiocarpum* f. *minor*); San Lorenzo de la Frontera, Balansa 2039 (K); Alta Paraná, Fiebrig 5912 (G, US, K, BM, BD); Sud Paraguay, Sept. 1892, Kuntze (NY, BD).

This species is readily recognized by its leaves, which are long-petiolate and have a blade abruptly contracted to form a rounded, or more commonly, a cordate base. It is very clearly related to and probably intergrades with *H. nicotianaefolium*, but appears to range to the north of that species. It is the common member of the section *Heliophytum* in Paraguay. The forma *albiflora* is based upon Hassler 6148. I have seen no material of this collection.

VIII. Section **Cochranea** (Miers) Reiche, Anal. Univ. Chile cxxi. 234 (1907). *Cochranea* Miers, Trav. Chile. ii. 529 (1826), nomen; and Ann. & Mag. Nat. Hist. ser. 4, ii. 124 (1868); type-species, *C. conferta* Miers. *Meladendron* Molina, Saggio, ed. 2, 143 (1810); type-species, *M. chilense* Molina.

This section is known only from the coastal hills of northern and central Chile and adjacent Peru. It is closely related to the section *Heliophytum*, which occurs east of the Andes, differing from it primarily in having the corolla glabrous inside. The fruit of *Cochranea* is superficially very similar to that of *Heliophytum*, but does not have the infertile cavities which are frequently present in the latter section. In habit *Cochranea* is definitely a shrub. *Heliophytum* is at most an undershrub. The section *Cochranea* is of particular interest because of the extreme localization of its species. As would be expected the plants are in need of further field-study.

KEY TO SPECIES

- Leaves sinuate, more or less rugose above with conspicuous impressed veins.
 Nervation of leaves simple; corolla 7-11 mm. broad; tube ca. 2 mm. long.....17. *H. sinuatum*.
 Nervation of leaves forked.
 Mature calyces 3-4 mm. long, densely villous-hirsute, almost tomentose; corolla 4-6 mm. broad with tube 3-4 mm. long.....18. *H. taltalense*.
 Mature calyces 2-3 mm. long, sparsely hirsute; corolla 4-5 mm. broad with tube 2.5-3 mm. long.....19. *H. Krauseanum*.
 Leaves entire, not rugose above.
 Stigma 2-6 times or more as long as the style.
 Corolla 4-5 mm. broad (cf. *H. mysotifolium*)
 Leaves bicolorous, white-strigose beneath, apex rounded or obtuse, contracted towards the base, stigmas 2-2½ times as long as the style.....20. *H. inconspicuum*.
 Leaves concolorous, not contrastedly white-strigose beneath, apex acutish, scarcely if at all contracted towards the base; stigmas 4-6 times as long as the style.
 Plant glabrate, or coarsely short-hirsute or strigose; stigmas 1.5-2 mm. long, disk weakly developed
 21. *H. chenopodiaceum*.

- Plant villous-tomentose; stigmas 1.5-2 mm. long, ring very well developed.....22. *H. sclerocarpum*.
 Corolla (5-)6-9 mm. broad.
 Plant evidently strigose or villous, not glandular; corolla (5-)6-7 mm. broad.....23. *H. mysotifolium*.
 Plant glabrate or puberulent, or finely and obscurely strigose, somewhat glandular; corolla 7-9 mm. broad.
 Stigma practically sessile; leaves glabrate, 4-10 mm. long, spatulate-linear, apex rounded.....24. *H. filifolium*.
 Stigma on a definite style; leaves lanceolate to lance-linear, 2-6 cm. long, apex acute.
 Herbage evidently and abundantly glandular throughout; leaves lanceolate, 3-8 mm. broad.....25. *H. glutinosum*.
 Herbage minutely and sparsely if at all glandular; leaves linear or oblance-linear, 1-3(-4) mm. broad.....26. *H. stenophyllum*.
 Stigma usually shorter than the style, rarely somewhat longer, varying between $1\frac{1}{2}$ and $\frac{1}{2}$ length of style (cf. *H. stenophyllum* and *H. inconspicuum*).
 Plant glabrate or (in *H. megalanthum*) but inconspicuously pubescent; leaf-faces at most only very finely strigose, epidermis usually covered with resinous secretions and somewhat glandular.
 Leaf-margins glabrous; corolla 6-9 mm. broad.
 Leaves obtuse, 1.5-3 cm. long, finely short-strigose; corolla 6-7 mm. broad; anther-tips exerted.....27. *H. huascoense*.
 Leaves acute, 3-6 cm. long, glabrous; corolla 7-9 mm. broad; anther-tips included.....28. *H. longistylum*.
 Leaf-margins pustulate and ciliate; corolla 9-12 mm. broad.....29. *H. megalanthum*.
 Plant coarsely and obviously strigose, not resinous nor glandular.
 Leaves spathulate, somewhat fleshy, with very strongly revolute margins and hence quite thick, usually subterete.....30. *H. pycnophyllum*.
 Leaves lanceolate or oblanceolate, not fleshy, flat, margins only very weakly if at all revolute.
 Shrub erect or semiscandent, 1-2 m. tall; corolla 5-8 mm. broad, white with a conspicuous orange center.....31. *H. Philippianum*.
 Shrub decumbent, 3-6 dm. tall; corolla 8-10 mm. broad.
 Corolla orange-colored.....32. *H. linariaefolium*.
 Corolla white (or ? purplish).....33. *H. floridum*.

17. ***H. sinuatum*** (Miers), comb. nov. *Cochranea sinuata* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 127 (1868) and Contr. Bot. ii. 196 (1869); Ph. Anal. Univ. Chile xc. 342 (1895). *Heliophytum floridum*, var. *Bridgesii* DC. Prodr. ix. 553 (1845). *Heliotropium floridum*, var. *Bridgesii* Clos in Gay, Fl. Chile iv. 457 (1849). *C. conferta*, var. *auriculata* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 126 (1868) and Contr. Bot. ii. 195 (1869); Ph. Anal. Univ. Chile xc. 339 (1895). *Heliotropium rosmarinifolium* Ph. Anal. Univ. Chile xliii. 514 (1873);

not *Heliotropium rosmarinifolium* Bertero, nomen (1845). *C. rosmarinifolia* Ph. Anal. Univ. Chile xc. 349 (1895). *Heliotropium Izagae* Ph. Anal. Univ. Chile xc. 355 (1895).

Northern Chile; southern and western parts of the province of Atacama in the departments of Copiapó, Vallenar and Freirina, lat. 27° 45'–28° 40' S.; reported, probably erroneously, from Coquimbo.

CHILE. ATACAMA: Bandurrias, *Geisse* (MS); Desert of ATACAMA, *Geisse* 173 (NY); Carrizal bajo, Sept. 1885, *Philippi* (MS, BM); Chañarcito near Carrizal, Sept. 1885, *Philippi* (MS, TYPE of *H. Izagae*; G, photo; BD, ISOTYPE); Camino de Huasco, 1883, *Rojas* (BD); Huasco, Oct. 1866, *Philippi* (MS, TYPE of *H. rosmarinifolium*; G, photo; BD, ISOTYPE); Mina Algarrobo, Vallenar, 1000 m., *Werdermann* 145 (G, FM, K, BM); dry hills and valleys between Huasco and Copiapó, *Bridges* 1342 (BM, G, photo.) INDEFINITE: without locality, *Bridges* (BM, TYPE of *C. sinuata*; G, photo.); "Coquimbo," *Pearce* (K); "N. Chile," *Lobb* 442 in pt. (K, TYPE of *C. conf. v. auriculata* BM).

A dark green, erectly branched shrub 1–2 m. tall, growing on dryish rocky hillsides. The corolla is white. The two collections upon which *H. sinuatum* is founded were collected by Bridges and given as from Coquimbo. This geographical data is obviously incorrect. A study of Bridges's plant-list shows that his number 1342 came from between Copiapó and Huasco, and not from Coquimbo or, as one finds in Hooker's Herbarium, from Concepcion. Bridges unnumbered collection which is the type of the species I believe to have been material of his number 1342 that became separated from its data. Lobb's number 442, the type of *C. conferta*, var. *auriculata*, given from "N. Chile," and Pearce's collection from "Coquimbo," probably came from Huasco, since both collections are mixtures containing some material of the very distinctive and local, *H. huascoense*, a species known only from about the port of Huasco.

The type collection of *H. sinuatum* is a form with large leaves (ad 3.5 cm. long) and very pubescent calyces and under leaf-surfaces. In those respects it suggests the common phases of *H. taltalense*. It has, however, the simple leaf-veins and large flowers characteristic of the Vallenar-plant.

18. ***H. taltalense*** (Ph.), comb. nov. *Cochranea taltalensis* Ph. Anal. Univ. Chile xc. 349 (1895). *H. rugosum* Ph. Fl. Atac. 38 (1860) and Viage Des. Atac. 20, 24, 25 and 212 (1860); Reiche, Anal. Univ. Chile cxxi. 239 (1907) and Fl. Chile v. 197 (1910); not *H. rugosum* Mart. & Gal. (1844). *C. rugosa* Ph. Anal. Univ. Chile xc. 351 (1895).

Northern Chile on the coastal hills of the Dept. of Taltal, lat. 24° 30'–25° 30' S.

CHILE. ANTOFAGASTA: Taltal, Oct. 1889, *Darapsky 30* (MS, TYPE of *C. taltalensis*; G, photo.); Taltal, Dec. 1888, *Borchers* (BM); Taltal, 200 m., *Werdermann 837* (G, FM, K, BM); hills southeast of Taltal, *Johnston 5118* (G); Breas, 1888, *Larrañaga* (MS); summit-ridge of Cerro Perales near Taltal, *Johnston 5632* (G); Paposo, Dec. 1853, *Philippi* (MS, TYPE of *H. rugosum*; G, photo.; BD, ISOTYPE); arid shrubby crests, El Rincon near Paposo, *Johnston 5544* (G); ridge above Aguada de Panulcito, *Johnston 5476* (G); rocky quebrada, Aguada Cardon, *Johnston 5293* (G); dry rocky crests, Miguel Diaz, *Johnston 5414* (G).

Although evidently a close relative of *H. sinuatum*, this species is unquestionably distinct, differing as it does in its smaller corolla, longer corolla-tube, forked leaf-veins and detached very natural range. It is an erect dark green bush 1-2 m. tall growing on the dryer, usually upper slopes of the coastal hills. The corolla is white with a little yellow in the throat and occasionally with a rose-tinge outside.

19. **H. Krauseanum** Fedde in Just, Bot. Jahresb. xxxiv. pt. 3, 72 (1908). *H. saxatile* Krause, Bot. Jahrb. xxxvii. 633 (1906); not Brandg. (1905).

Coastal hills of extreme southern Peru and adjacent Chile.

PERU. AREQUIPA: Mollendo, *Johnston 3533* (G); Mollendo, *Weberbauer 1552* (BD, TYPE; G, photo.); between Atiquipa and the port of Chala, 250 m., *Weberbauer 7188* (FM, BD).

CHILE. INDEFINITE: "Cobija, Iquiqui et Arica," 1831, *Cuming 955* (K, BM; G, photo.).

A very interesting species finding its relatives among the shrubby Chilean species rather than among those of Peru as suggested by Krause. In habit of growth and gross aspect it is very much like *H. taltalense*. While obviously a very close relative of that species it is separable by its more slender, more remotely flowered spikes, slightly smaller corollas, smaller less densely pubescent calyces, and smaller fruits. Possibly future study of more numerous collections will give reasons for treating it as no more than a northern smaller-flowered variation of *H. taltalense*. The plant is very resinous and has pleasantly fragrant herbage. In Hooker's Herbarium Cuming's number 955 is labeled as from "Lima." This is obviously incorrect and no doubt is merely another example of the elder Hooker's careless and inaccurate labeling. Cuming's printed label and his plant-lists give the data I have cited above.

20. **H. inconspicuum** Reiche, Anal. Univ. Chile cxxi. 245 (1907) and Fl. Chile v. 203 (1910). *Cochranea parviflora* Ph. Anal. Univ. Chile xc. 350 (1895), not *H. parviflorum* L. (1771).

Northern Chile back from the coast in the southwestern parts of the province of Antofagasta and adjacent Atacama, lat. 25° 20'-26° S.

CHILE. ANTOFAGASTA: Breas, Dept. Taltal, *Larrañaga* (MS, TYPE; G, photo.); Cerro Perales near Ag. Lora, Dept. Taltal, *Johnston 5631* (G). ATACAMA: below Aguada Grande, Dept. Chañaral, *Johnston 5810* (G); gravel and talus, Aguada Grande, Dept. Chañaral, *Johnston 5811* (G).

A loose slender bush 6–10 dm. tall, growing in dry rocky gulches or on sunny slopes of quebradas. The species is quite distinct from the members of the *H. chenopodiaceum*-group which are its closest relatives. The style in relation to the stigma and column is much longer than in the group of *H. chenopodiaceum* and the linear or rarely spatulate-linear leaves are quite characteristic because of their definite petioles and evidently strigose-villulose undersurfaces. The small corolla is white.

21. **H. chenopodiaceum** (DC.) Clos in Gay, Fl. Chile iv. 458 (1849); Reiche, Anal. Univ. Chile cxxi. 243 (1907) and Fl. Chile v. 201 (1910). *Heliophytum chenopodiaceum* A. DC. Prodr. ix. 553 (1845). *Cochranea chenopodiacea* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 132 (1868) and Contr. Bot. ii. 201 (1869); Ph. Anal. Univ. Chile xc. 348 (1895).

Var. **genuinum**.—Plant glabrate, at most usually puberulent only in the inflorescence.—Synonymy given above.

Northern Chile back from the coast, lat. 27° 30'–30° S.

CHILE. COQUIMBO: above Rivadavia, *Johnston 6260* (G); Rivadavia, 1904, *Reiche* (MS); Tres Cruces, 1871, *Philippi* (MS); just above Guanta, *Johnston 6232* (G); "Saruno Serena etc.," Oct. 1836, *Gay 1075* (MS); Coquimbo, *Philippi* (US); indefinite, *Gay* (G) and *Gay 294* (FM). ATACAMA: El Transito, *Johnston 5884* (G); Yerba Buena, Sept. 1885, *Philippi* (MS); Yerba Buena, Oct. 1871, *King* (MS, K); Yerba Buena, *Reed* (G); Queb. Conchas above Cerrillos, *Johnston 4979* (G).

Var. **ericoideum** (Miers) Reiche.—Plant strigose throughout with short stout usually curved hairs.—Anal. Univ. Chile cxxi. 244 (1907) and Fl. Chile v. 202 (1910). *Cochranea ericoidea* Miers, Anal. & Mag. Nat. Hist. ser. 4, ii. 130 (1868) and Contr. Bot. ii. 199 (1869); Ph. Anal. Univ. Chile xc. 344 (1895). *Heliotropium Pearcei* Ph. Anal. Univ. Chile xc. 352 (1895). *Eritrichium glabratum* Ph. Cat. Itin. Tarapacá 56 (1891).

Northern Chile back from the coast, lat. 24° 50'–27° 50' S.; reported from Coquimbo, but no doubt incorrectly so.

CHILE. COQUIMBO: "Coquimbo," *Pearce* (MS, TYPE of *H. Pearcei*). ATACAMA: Chañarcillo, Sept. 1885, *Philippi* (MS, BM); Queb. Serna, 1885, *San Roman* (MS); Queb. Puquios, 1865, *Geisse* (MS); Queb. Puquios, 1885, *Philippi* (MS); Mineral de la Coipa, 1887, *Gigoux* (G); Pabellán, 1885, *San Roman* (MS); "mountains of The Andes, valley of Copiapó," *Bridges 1339* (BM, TYPE of *C. ericoidea*; G, photo; G, K, FM, ISOTYPES); hills north of Copiapó, *Johnston 5003* (G); Tierra Amarilla, *Werdermann 399* (G, FM, K, BM, IP); Caldera, Sept. 1896, *Ortega* (MS); Desert of Atacama, *Morong*

1183 (G, NY, K) and 1188 (NY). ANTOFAGASTA: high dryish ridge, El Rincon near Paposo, Johnston 5545 (G); ridge above Aguada Panulcito, Johnston 5477 (G).

A slender-stemmed, usually loosely branched bush 6–10 dm. tall. The epidermis is more or less resinous. The plant grows in arid situations on rocky points, cliffs or dry gravelly stream ways. The small corolla is white.

The species is very closely related to *H. sclerocarpum* and *H. myosotifolium* and perhaps should be extended to include them. These close relatives, however, seem to have larger flowers and a characteristic habit even though the variation of characters is such that I have been unable to discover any invariably stable and hence universally diagnostic character by which the three species might be decisively separated. It is perhaps significant to note that the other members of the section *Cochranea* are all sharply, readily and obviously delimited. It would seem that the *H. chenopodiaceum*-group is an exception or that I have inconsistently persisted in segregating it more than the actual state of speciation justifies. The true condition can only be determined by field studies.

The var. *ericoideum* is merely the coarsely strigose form of the species which appears to be more northerly in range than the typical glabrate forms. The type of *C. ericoidea* has an indument of coarse appressed falcate hairs but differs from most of the material referred to the var. *ericoideum* in being a more slender plant with more herbaceous slender leaves that are not so broadly attached as in the plant classified with it. Plants quite similar to the type of *C. ericoidea* are, Morong 1342 and Johnston 5003.

It is to be noted that DeCandolle established his *H. chenopodiaceum* on a collection of Gay and upon Bridges's number 1342. Miers, however, restricted the name to the species represented by Gay's collection. Bridges's number 1342 is the original collection of the very distinct *H. filifolium*.

22. **H. sclerocarpum** Ph. Anal. Univ. Chile xliii. 515 (1873). *Cochranea sclerocarpha* Ph. l. c. xc. 351 (1895). *H. chenopodiaceum*, var. *sclerocarpum* Reiche, Anal. Univ. Chile cxxi. 244 (1907) and Fl. Chile v. 202 (1910).

Northern Chile near the coast, lat. 28° 30' S.

CHILE. ATACAMA: Huasco, Dept. Freirina, Oct. 1866, Philippi (MS, TYPE; G, photo; BD, ISOTYPE).

This species is known only from the type-collection. It is a loosely branched shrubby plant 1.5–2 dm. tall and is villous-tomentose throughout. The numerous, commonly fasciculate leaves, which

are 6–15 mm. long and 1–2 mm. broad, have rather strongly revolute margins and are sessile by a broad base. The corolla is white and about 4 mm. broad. The stigma-column, which is borne on the very well developed disk, is 4–6 times as long as the style. The stigma-column is ca. 1 mm. long.

23. **H. mysotifolium** (A. DC.) Reiche, Anal. Univ. Chile cxxi. 243 (1907) and Fl. Chile v. 201 (1910). *Heliophytum stenophyllum*, var. *mysotifolium* A. DC. Prodr. ix. 552 (1845). *Heliotropium stenophyllum*, var. *mysotifolium* Clos in Gay, Fl. Chile iv. 456 (1849). *Cochranea mysotifolia* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 128 (1868) and Contr. Bot. ii. 197 (1869); Ph. Anal. Univ. Chile xc. 343 (1895). *C. hebecula* Miers, l. c. 130 and l. c. 199. *C. hispidula* Miers, l. c. 132 and l. c. 201; Ph. l. c. xc. 347 (1895). *Heliotropium hispidulum* Reiche, l. c. 243 and l. c. 201. *C. sentis* Ph. l. c. 351. *Heliotropium canum* Ph. l. c. 356. *Heliotropium hispidulum* Ph. l. c. 356.

Northern Chile back from the coast, lat. 27° 10'–29° 40' S.

CHILE. ATACAMA: Bandurrias, 1885, *Geisse* (MS); Desert of Atacama, *Geisse 23a* (NY); Valle de Carrizal, Sept. 1885, *Philippi* (MS, TYPE of *H. hispidulum* Ph.; G, photo.); Yerba Buena near Carrizal, Sept. 1885, *Philippi* (MS, TYPE of *H. canum*; G, photo.; US, BM, BD, ISOTYPES); Yerba Buena, 1885, *Rosario G. de Callao* (MS); Chanarcito, Sept. 1885, *Philippi* (MS, BM, BD; G, photo.); Piedra Colgada, Sept. 1885, *Philippi* (MS, TYPE of *C. sentis*; G, photo.; MS, ISOTYPE); hills north of Copiapó, *Johnston 5027* (G); barren and stony hills between Huasco and Copiapó, *Bridges 1338* (BM, TYPE of *C. mysotifolia*; G, photo.; G. K. ISOTYPES). INDEFINITE: Northern Chile, *Lobb 440* (K, TYPE, of *C. hispidula*; BM, ISOTYPES); "Coquimbo," *Bridges* (BM, TYPE of *C. hebecula*; G, photo; FM, ISOTYPE); Quinteros, Feb. 1890, *Albert* (MS; G, photo.).

A small bush becoming 5 dm. tall. It is branched from the base and usually (not always) has simple strict branches 1–4 dm. long. The plant is strigose or villous, frequently very densely so. The corolla is white with a yellowish throat and is about 5–7 mm. in diameter. The stigma-column is 1.5–2.2 mm. long above the disk. The style is 0.5–0.2 mm. long. The leaves are 1–2 cm. long, 2–3(–4) mm. broad, and are linear or oblong-linear in outline. The lower leaves tend to be oblanceolate and to be more or less definitely petiolate.

The species is very closely related to *H. chenopodiaceum*, differing in its usually larger, more herbaceous, whiter corollas, usually larger leaves (the lower ones being somewhat oblanceolate and petiolate), more abundant and finer pubescence, and usually erect habit of growth. None of these characters is invariably crucial although the species does seem to be, for the most part, readily recognizable. A careful field-study is needed before this species can be well understood.

Heliotropium mysotifolium is taken as based upon *Bridges 1338* which has been incorrectly stated to come from "prov. Coquimbo." DeCandolle who first described the plant considered it no more than a variety of *H. stenophyllum* distinguished by its "sericeo-incanis" indument. Miers who also cited *Bridges 1338*, and apparently took his specific name from DeCandolle, considered the plant to be a distinct species. Miers, however, established his *C. hebecula* also upon a collection by Bridges. The types of *C. mysotifolia* and *C. hebecula* are so similar in details that they might well be parts of one collection, as I believe them to be. The type of *C. hebecula* appears to be merely a specimen of *Bridges 1334* which has become dissociated from its number.

There is a rather conspicuous range in the abundance of pubescence among the specimens cited above. One extreme is densely villous, almost tomentose. The type of *H. canum* is such a form. The other extreme, represented by the types of *C. sentis* Ph., *H. hispidulum* Ph. and *C. hispidula* Miers, is rather sparsely strigose or appressed villous and not densely villous. These two extremes I had intended to treat varietally, but upon discovering that the types of *C. mysotifolia* and *C. hebecula* were quite intermediate as to the character of the pubescence, I have thought it best to refrain from publishing the varieties under consideration.

24. **H. filifolium** (Miers), comb. nov. *Cochranea filifolia* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 131 (1868) and Contr. Bot. ii. 200 (1869); Ph. Anal. Univ. Chile xc. 346 (1895). *H. chenopodiaceum*, var. *filifolium* Reiche, Anal. Univ. Chile cxxi. 244 (1907) and Fl. Chile v. 202 (1910). *C. Kingi* Ph. l. c. 350. *H. Kingi* Reiche, Anal. Univ. Chile cxxi. 238 (1907) and Fl. Chile v. 196 (1910).

Northern Chile in the departments of Copiapó and (?) Freirina, lat. 28°-28° 30' S.; incorrectly reported from Coquimbo.

CHILE. ATACAMA: "Vallie Carrizal?," Sept. 1885, *King* (MS, TYPE of *C. Kingi*; G, photo.; BD, ISOTYPE); dry hills and valleys between Huasco and Copiapó, *Bridges 1343* (BM, TYPE of *C. filifolia*; G, photo.; G, FM, K, ISOTYPES); Vallenar, 1900, *Reiche* (BM).

This plant appears to be a shrub about a meter high. It is apparently glabrous, but under a lens seems to be very finely villous-scurfy with stoutish curved hairs. Though not glandular it is somewhat resinous. The flowers, according to Bridges, are white. As Reiche has pointed out the plant, is notable in its section because of its broad sessile or subsessile stigmas. In the material studied the stigma-column is 0.4-0.7 mm. high and short-cylindrical or frustoid, being nearly as thick as it is long. It is seated on a very broad and well

developed disk which in turn is apparently seated directly upon the ovary.

25. **H. glutinosum** Ph. Fl. Atac. 38 (1860) and Viage Des. Atac. 212 (1860); Reiche, Anal. Univ. Chile cxxi. 242 (1907) and Fl. Chile v. 200 (1910). *Cochranea glutinosa* Ph. Anal. Univ. Chile xc. 349 (1895).

Northern Chile in the mountains of the Dept. Chañaral, lat. 26°–26° 30' S.

CHILE. ATACAMA: Queb. de Salado, *San Roman* (MS; G, photo.); Agua Dulce, Feb. 1854, *Philippi* (MS, TYPE; G, photo.); Queb. de Potrerillos, *Johnston* 3698 (G); near Rio Sal Station, Queb. de Salado, *Johnston* 4749 (G); Queb. de Doña Inez Chica, Jan. 1886, *Gigoux* (G); "Atacama," comm. *Philippi* (BM, BD).

A rare and remarkable species known only from the department of Chañaral where it occurs in the quebradas in the mountains east of the port of Chañaral. The type and most of the subsequent collections have been made in the general vicinity of Agua Dulce near Potrerillos, at an altitude of about 2000 m. Outside of this area it is known only from near Doña Inez Chica about 40 km. to the northward. The plant forms a small light-green bush 3–10 dm. tall producing many widely spreading or decumbent branches. It grows in gravel of stream-ways or on the talus at their margin. The herbage is puberulent and is conspicuously provided with extremely numerous glands. The corolla is white with a touch of yellow in the throat.

26. **H. stenophyllum** H. & A. Bot. Beechey Voy. 38 (1830); Clos in Gay, Fl. Chile iv. 456 (1849); Reiche, Anal. Univ. Chile cxxi. 241 (1907) and Fl. Chile v. 199 (1910). *Heliohytum stenophyllum* DC. Prodr. ix. 552 (1845). *Cochranea stenophylla* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 128 (1868) and Contr. Bot. 197 (1869). *Meladendron chilense* Molina, Saggio, ed. 2, 143 (1810); Ph. Anal. Univ. Chile xxii. 714 (1863); not *Heliotropium chilense* Bertero (1829). *Heliotropium rosmarinifolium* Bertero ex Steud. Nom. ed. 2, i. 744 (1840), nomen. *Heliohytum stenophyllum*, var. *rosmarinifolium* DC. Prodr. ix. 552 (1845). *Heliohytum rosmarinifolium* Bertero ex DC. Prodr. ix. 552 (1845). *Heliotropium stenophyllum*, var. *rosmarinifolium* Clos in Gay, l. c.; Reiche, l. c. 242 and l. c. 200. *C. conferta* Miers, Trav. Chile ii. 529 (1826), nomen; Miers, Anal. & Mag. Nat. Hist. ser. 4, ii. 125 (1868) and Contr. Bot. ii. 194, t. 53 (1869). *C. congesta* Miers, Anal. & Mag. Nat. Hist. ser. 4, ii. 126 (1868) and Contr. Bot. ii. 195 (1869), lapsus ?

Central Chile in the provinces of Valparaiso, Aconcagua and Coquimbo, lat. 30°–33° S.

CHILE. VALPARAISO: Viña del Mar, 1863, *no collector given* (US); Calera Quillota, *Bertero 1042* (G, NY, FM, BM, ISOTYPES of *H. rosmarinifolium*); Palos Quimados, 1918, *Gusinde* (IP); Cuesta de Llaillay, *Miers* (BM, TYPE of *C. conferta*); Questa de Pachacuma near Quillota, *Bridges 235* (K, BM); Valparaiso, *Cuming 377* (G, K, BM); Valparaiso, *Calvert* (BM). ACONCAGUA: Cuesta de Ocampo, Sept. 1860, *Philippi* (MS); Los Molles, Sept. 1905, *Reiche* (MS); Illapel, Dec. 1862, *Philippi* (MS, BM, BD); Illapel, *Rose 19346* (NY, US); "Cumbre, Andium Claustum, 1825," *Macrae* (K). COQUIMBO: Frai Jorje, 1917, *Baeza* (IP); Algarrobito, 1915, *Ochoa* (IP); Llano Compania, 1915, *Ochoa* (IP); Vicuña, *Claude-Joseph 4452* (US); Coquimbo, *Philippi* (MS, US, BM), *Hastings 583* (NY, US), *Kuntze* (NY, US, FM), *Harvey* (G, K), *Ball* (G, NY, K), *Gaudichaud 64* (FM, BD), *Werdermann 120* (G, FM, BM), *Coppinger* (K), *Macrae* (K), *Bridges* (K).

A very distinct species well known since it grows near the ports of Valparaiso and Coquimbo. In the collections at Kew there is a collection by Caldclough given as from "Conception" and one from Reed given as from "Yerba Buena." These are, no doubt, incorrectly labeled as is also Macrae's specimen which is said to come from "Cumbre."

27. ***H. huascoense***, sp. nov., fruticosum resinum sparsissime glanduliferum breviter strigosum; foliis paullo congestis anguste spathulatis 1.5–3 mm. longis 1–2 mm. latis, margine revolutis, apice rotundis, basem versus gradatim attenuatis; paniculis terminalibus corymbosis, spicis 4–5 ca. 3 cm. longis; calycibus subsessilibus ca. 1.5 mm. longis fere ad basem in lobos lineares ascendentes incisus; corolla alba 6–7 mm. diametro, tubo 2–2.5 mm. longo calycem superanti, lobis obtusis, antheris paullo extrusis; stigmatibus anguste conico ca. 1 mm. longo; stylo 1–1.3 mm. longo.

Northern Chile near the coast, lat. 28° 30' S.

CHILE. ATACAMA: Huasco, 1920, *Lopez* (G, TYPE); Punta del Huasco, 1889, *Vidal* (MS). INDEFINITE: "Coquimbo," *Pearce* in pt. (K); "N. Chile," *Lobb 442* in pt. (K).

This species is clearly related to *H. stenophyllum*, but differs in its obtuse narrowly spathulate leaves, smaller corolla, shorter style, as well as more northern range. It is with certainty known only from about the port of Huasco. The collection made by Vidal was determined by Philippi as *H. hispidulum*. The specimens obtained by Pearce and by Lobb almost certainly came from Huasco or near there, for both collections are a mixture of *H. huascoense* and *H. sinuatum*. There are no reliable records of the latter species from south of Huasco.

28. ***H. longistylum*** Ph. Anal. Univ. Chile xliii. 515 (1873); Reiche, Anal. Univ. Chile cxxi. 240 (1907) and Fl. Chile v. 198 (1910). *Cochranea longistyla* Ph. l. c. xc. 349 (1895). *H. vernicosum* Ph. l. c. xc. 355 (1895).

Northern Chile near the coast, about lat. 28° 5' S.

CHILE. ATACAMA: Carrizal Bajo, Sept. 1885, *Philippi* (MS, TYPE of *H. vernicosum*; G, photo.; K, ISOTYPE); Carrizal Bajo, Dec. 1871, *King* (MS, TYPE of *H. longistylum*; G, photo.).

Apparently a low decumbent shrub 3–4 dm. tall, which is glabrate or sparsely strigose in the inflorescence. It is inconspicuously glandular. The leaves are numerous, narrowly oblanceolate and acute, being 3–6 cm. long and 2–6 mm. broad. They are very firm in texture with concolorous faces and narrowly revolute margins. The corollas appear to be white.

29. ***H. megalanthum***, nom. nov. *Cochranea corymbosa* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 126 (1868) and Contr. Bot. ii. 195 (1869); Ph. Anal. Univ. Chile xc. 340 (1895). *H. corymbosum* Reiche, Anal. Univ. Chile cxxi. 242 (1907) and Fl. Chile v. 200 (1910), not *H. corymbosum* R. & P. (1799). *H. crassifolium* Ph. Anal. Univ. Chile xliii. 515 (1873); Reiche, l. c. 240 and l. c. 198, not *H. crassifolium* Boiss. & Noë (1856). *C. crassifolia* Ph. l. c. xc. 349.

Northern Chile in southern part of the province of Atacama, ca. lat. 28° 30' S., incorrectly reported from Coquimbo.

CHILE. ATACAMA: Huasco, Sept. 1900, *Reiche* (MS); Huasco, Oct. 1866, *Philippi* (MS, TYPE of *H. crassifolium*; G, photo.; BD, ISOTYPE); Chañarito, Sept. 1885, *Philippi* (G, US, K, BM, BD, MS); dry valleys and hills between Huasco and Copiapó, *Bridges 1341* (BM, TYPE of *C. corymbosa*; G, photo.; G, K, ISOTYPES). INDEFINITE: "near Coquimbo," *Pearce 40* (K).

A striking plant, with certainty known only from the department of Freirina, Chile. It is apparently a weak spreading or decumbent bush 1.5–3 dm. tall which is glabrous or sparsely strigose on the stems. The leaves are broad and coriaceous, being oblanceolate to ovate-spathulate, 2–3.5 cm. long and 3–8(–12) mm. broad. They have an obtuse or rounded apex and a contracted base. The surface of the leaves is quite glabrous but the margins are ciliate and pustulate. The corolla, according to Bridges, is white.

30. ***Heliotropium pycnophyllum*** Ph. Fl. Atac. 38 (1860) and Viage Des. Atac. 15, 17, 18 and 212 (1860); Reiche, Anal. Univ. Chile cxxi. 238 (1907) and Fl. Chile v. 196 (1910). *Cochranea pycnophylla* Ph. ex. Reiche, l. c. *H. breanum* Ph. Anal. Univ. Chile xc. 357 (1895). *H. brevifolium* Ph. Anal. Univ. Chile xc. 357 (1895).

Northern Chile near the coast, lat. 24° 30'–26° 30' S.

CHILE. ATACAMA: Barquito near Chañaral, *Johnston 4807* (G); Cachinal de la Costa, Dec. 1853, *Philippi* (MS, TYPE of *H. pycnophyllum*; G, photo.); below Aguada Grande, *Johnston 5809* (G). ANTOFAGASTA: Taltal, 100 m. alt., *Werdermann 849* (G, FM, K, BM); Quebrada de San Ramon near Taltal, *Johnston 5155* (G); Hueso Parado, Oct. 1887, *Borchers* (MS, TYPE of

H. brevifolium; G, photo.); Breas, 1888, *Larrañaga* (MS, TYPE of *H. breanum*; G, photo.); Punto Colorado, *Johnston 5242* (G); Des. Atacama, *Philippi 703* (BD).

A very distinct and readily recognizable species of the dryish plains and hills of the western parts of the departments of Chañaral and Taltal. The corolla is of a somewhat sordid white with a touch of yellow in the throat. At extreme maturity before drying up the corolla becomes more or less tinged with purplish or violet. The corolla is most certainly not orange-colored as originally given by Philippi and subsequently accepted by Reiche. No doubt Philippi, *Viage Des. Atac.* 14 (1860), confused his notes regarding *H. pycnophyllum* and *H. linariaefolium*, for as I have checked by numerous field observations, some even at the type station (Aguada Grande, i. e. Cachinal de la Costa of Philippi), the latter species has conspicuously orange corollas and the former has white or purplish ones as I have described.

Heliotropium pycnophyllum is a pronounced xerophyte and usually forms very dense globose bushes 5-10 dm. tall. The leaves are thick, almost terete when fresh, a trait due partly to their somewhat fleshy texture and partly to their strongly revolute margins. It is a very difficult plant to dry, in this regard much suggesting the various *Nolanaceae* with which it associates.

31. **H. Philippianum**, sp. nov., fruticosum erectum vel subscandens 1-2 m. altum ascendenter ramosum; foliis firmis planis vel margine paullo revolutis oblanceolatis vel spathulatis 1-3 cm. longis 1-6 mm. latis strigosis apice rotundis vel obtusis basem versus in petiolum gracilem gradatim attenuatis; paniculis terminalibus dichotome ascendenterque ramosis corymbosis ebracteatis; calycibus cylindricis 4-5 mm. longis 1.5-2 mm. crassis sessilibus, lobis linearibus sparse strigosis; corolla fragranti 5-8 mm. diametro alba, faucibus abrupte dilatatis evidente aurantiacis, tubo ca. 4 mm. longo sepalis subaequilongis; antheris inclusis vel non rariter apice paullo extrusis; stylo gracili 2-2.5 mm. longo; stigmatibus 1.5-2 mm. longo bifido columnari basi in anulum stigmaticum angustum incrassato; nuculis laevibus.

Northern Chile on coastal hills, lat. 24° 30'-25° S.

CHILE. ANTOFAGASTA: Paposo, *Philippi* (MS; G, photo.); hills back of Punto Grande near Paposo, *Johnston 5233* (G, TYPE); ridge above Aguada Panulcito, *Johnston 5478* (G); Aguada Cardon, *Johnston 5294* (G); Aguada Miguel Diaz, *Johnston 5415* (G); Miguel Diaz, Dec. 1853, *Philippi* (MS; G, photo.); Des. Atacama, *Philippi 708* in pt. (BD).

A shrub frequent in the fertile, fog-bathed middle-slopes of the coastal hills of the Department of Taltal, from Paposo to Miguel

Diaz, in which area it seems practically to replace *H. linariaefolium*. It is usually a large bush and, often leaning on or growing through other shrubs, reaches a height of one to two meters. The corollas are white with a conspicuous orange center and the flowers are fragrant with the odor of the common garden heliotrope. The species was first collected by Philippi, who obtained material from near Paposo and Miguel Diaz, but who failed to distinguish it from the decumbent plant with larger orange-colored flowers which he obtained at Cachinal de la Costa and to which I have restricted the name *H. linariaefolium*.

32. **H. linariaefolium** Ph. Fl. Atac. 38 (1860) and Viage Des. Atac. 12, 15, 18 and 212 (1860); Ph. Anal. Univ. Chile xc. 354 (1895); Reiche, Anal. Univ. Chile cxxi. 239 (1907) and Fl. Chile v. 197 (1910). *H. linearifolium* F. Ph. Cat. Pl. Vasc. Chile. 212 (1881). *H. longiflorum* Ph. Anal. Univ. Chile xc. 354 (1895).

Northern Chile near the coast, lat. 25°–27° S.

CHILE. ATACAMA: Caldera, Sept. 1900, Reiche (MS); Barquito near Chañaral, Johnston 4750 (G); Las Animas, Dec. 1853, Philippi (MS); Cachinal de la Costa, Dec. 1853, Philippi (MS, TYPE of *H. linariaefolium*; G, photo.); Aguada Grande, Johnston 5808 (G.). ANTOFAGASTA: south of Aguada Cachina, Johnston 5735 (G); southeast of Taltal, Johnston 5119 (G); Breas, 1888, Larrañaga (MS, TYPE of *H. longiflorum*; G, photo.); Taltal, Oct. 1887, Borchers (MS); Taltal, 200 m. alt., Werdermann 767 (G, FM, K, BM); Quebrada Guanillo at Posado, Dec. 1925, Johnston 5600 (G); Des. Atacama, Philippi 708 in pt. (BD).

A plant with loosely decumbent stems, forming a low light-green shrub about 3–6 dm. tall and 6–9 dm. broad. It is readily distinguished by its large orange-colored corollas. It is a very handsome species and merits a place among the cultivated garden plants. The plant usually grows in the coastal hills, where it occurs on dryish rocky slopes or more commonly along dry gravelly stream-ways in the quebradas. Occasionally, with *H. pycnophyllum*, it is found in the very arid country back of the hills facing the ocean. It is known only from the departments of Copiapó, Chañaral and Taltal, extending from about Caldera to Paposo.

33. **H. floridum** (A. DC.) Clos in Gay, Fl. Chile iv. 457 (1849); Ph. Fl. Atac. 38 and Viage Des. Atac. 10 and 212 (1860); Reiche, Anal. Univ. Chile cxxi. 240 (1907) and Fl. Chile v. 198 (1910). *Heliophytum floridum* A. DC. Prodr. ix. 553 (1845). *Cochranea florida* Miers, Ann. & Mag. Nat. Hist. ser. 4, ii. 129 (1868) and Contr. Bot. ii. 198 (1869). *Heliotropium floridum*, var. *latifolium* Ph. Anal. Univ. Chile xliii. 516 (1873) and l. c. xc. 343 (1895).

Northern Chile in the department of Copiapó, ca. lat. 26° 30' to 28° S.; reported, no doubt incorrectly, from Coquimbo.

CHILE. ATACAMA: Caldera, 1922, *Gigoux* (G); Caldera, Sept. 1885, *Philippi* (BM, BD, MS); Caldera, Sept. 1876, *no collector given* (MS); Caldera, Nov. 1853, *Philippi* (MS); Desert of Atacama [? Caldera Region], *Morong 1236* (G, NY, US, FM); Copiapó—Pabellon, Sept. 1885, *San Roman* (MS); Atacama Desert, *Geisse 23b* (NY); Bandurrias, 1885, *Geisse* (MS); Carrizal Bajo, Dec. 1871, *King* (MS, 3 collections one the TYPE of var. *latifolium*); sand hills, desert between Copiapó and Huasco, *Bridges 1340* (G, K, BM). INDEFINITE: "Coquimbo," *Gay 1182* (G, FM, ISOTYPES of *H. floridum*); Coquimbo, *Cuming 858* (G, K, BM); indefinite, *Bridges* (K).

A loosely decumbent shrub with large white corollas. It varies much in the size of the leaves, the var. *latifolium* being a rare extreme in which the leaves attain about a centimeter in width. The type is given as coming from Coquimbo, but came in fact, I feel confident, from the Caldera region. It might be noted that *Bridges 1340* was incorrectly cited as *H. stenophyllum* by Miers.

HELIOTROPIUM sp.—CHILE: open rocky canyon, Antofagasta 100–300 m. alt., April 3, 1925, *Pennell 13022* (G, FM); Iquique, Dec. 1913, *Salinas* (IP; G, frag.). These two collections from the arid north-coast of Chile represent plants related to *H. floridum*, *H. linariaefolium* and *H. Philippianum*, but apparently distinct from all three. The habit seems to be that of *H. floridum* though the corolla is only 6 mm. broad and the calyx noticeably smaller. The flower-color is uncertain. The small leaves have a sparse but loose pubescence. More material is needed before the exact status and relations of this apparently unnamed plant can be properly ascertained.

IX. Section **Heliothamnus** Johnston; type-species, *H. arborescens* L.

With the exception of one species which extends northward to southern Mexico the members of this section are restricted to northwestern South America. It is an extremely well defined group, probably derived from section *Heliophytum* or *Cochranea*, and characterized by having ellipsoid, lacunose or sculptured nutlets, which are attached medially and ventrally by a definite elliptical areola. The anthers are also characteristic. These are very elongate and down from the apex on the back of each anther-cell are crested by a row of short very close-set antrorse hairs. Most of the species are shrubs and have stalked glands, in these regards suggesting *Cochranea* and *Heliophytum*. The flowering specimens of species of the section *Heliophytum* have been frequently confused with *Tournefortia*, although readily recognized by the character of the anthers mentioned. The several species of the section are usually readily distinguished and

recognized by gross habit alone. Strangely, however, they are very difficult subjects to key out. This is particularly the case with the Ecuadorean species. Careful field studies are distressingly needed for the clarifying and the determination of interrelationship of such species as *H. submolle* Kl., *H. Urbanianum* Krause and *H. rufipilum* (Benth.) Johnston.

KEY TO SPECIES

- Style elongate, surpassing the stigma in length (cf. *H. submolle*).
 Leaves plane or but weakly rugose, the veining only weakly impressed, the lower surface glabrate or finely pubescent or somewhat tomentose.
 Leaves large, 20–25 mm. broad, 4–9 cm. long. 34. *H. arborescens*.
 Leaves small, 7–13 mm. broad, 2.5–5 cm. long. 35. *H. lanceolatum*.
 Leaves coarsely rugose with deeply impressed veins, the lower surface usually densely white-tomentose.
 Upper leaf-surface decidedly scabrid with rather sparse ascending bristles, lacking an appressed pubescence; corolla 5–8 mm. broad. 36. *H. incanum*.
 Upper leaf-surface closely and abundantly strigose or even tomentellous, weakly if at all scabrid; corolla 2–3.5 mm. broad.
 Leaves lanceolate, 4–5 cm. long, apex acute. 37. *H. erianthum*.
 Leaves obovate or obovate-oblong, 1–2 cm. long, apex rounded. 38. *H. lippioides*.
 Style reduced, shorter than the stigma.
 Plant decidedly pallid, conspicuously appressed white-villous, not at all glandular; leaves ovate. 39. *H. argenteum*.
 Plant green or at most somewhat cinereous or fulvescent, not white-villous, frequently somewhat glandular; leaves oblong to lanceolate.
 Calyx small, 1–1.5 mm. becoming 1.5–2 mm. long, not conspicuously accrescent in fruit.
 Ovary and nutlets glandular; leaves 2–5 mm. long. 40. *H. adenogynum*.
 Ovary and nutlets not glandular; leaves 7–14 cm. long. 41. *H. Mandonii*.
 Calyx large, 1.5–2 becoming 3–5 mm. long.
 Leaves herbaceous, smooth above with the veins weakly if ever impressed; plant loosely branched; spikes elongate, 5–20 cm. long. 42. *H. rufipilum*.
 Leaves firm, upper surface with impressed veins and hence more or less rugose; plant more erect and loosely branched; spikes 2–6 cm. long.
 Leaves 3–6 cm. long, tending to be broadest at or above the middle; style seldom more than half the length of the stigma. 43. *H. Urbanianum*.
 Leaves (6–)10–15 cm. long, broadest below middle; style usually $\frac{1}{2}$ – $\frac{4}{5}$ as long as the stigma. 44. *H. submolle*.

34. **H. arborescens** L. Syst. ed. 10, 913 (1759). *H. peruvianum* L. Sp. Pl. ed. 2, 187 (1762); Curtis, Bot. Mag. iv. t. 141 (1790–95); Baill. Hist. Pl. x. 353 figs. 269–272 (1891). *H. odoratum* Moench, Meth. 415 (1794). *H. odorum* Salisb. Prodr. 112 (1796). *H. corymbosum* R. & P. Fl. Peruv. ii. 2, t. 107a (1799); Sims, Bot. Mag.

xxxix. t. 1609 (1814); Bonpl. Pl. Rar. Malm. et Nav. 83, t. 32 (1813). *H. grandiflorum* Donn, Hort. Cantab. ed. 6, 42 (1811), nomen; Schrank, Pl. Rar. Hort. Acad. Monoc. i, 2, t. 2 (1819).

Var. **genuinum**. Herbage with an appressed, not very dense pubescence; leaves not conspicuously if at all canescent beneath.—Synonymy given above.

Known only from the Department of Lima, Peru.

PERU. LIMA: Matucana, *Rose* 18639 (NY, US); Matucana, 2400 m., *Macbride* 2938 (G); Matucana, 1877, *Savatier* (K); Canta, ca. 2800 m., *Pennell* 14352 (G, FM.); Canta, *Mathews* (K); Atocongo, ca. 400 m., *Pennell* 14759 (G, FM); San Damian, ca. 2700 m., *Hrdlicka* (US); below Obrajillo, *Wilkes Exped.* (US); Purrochueca, *Mathews* 499 (K); Chrachucos, *Barclay* 2284 (BM); Sauga, *Barclay* 2353 (BM); Amancaes, ca. 500 m., *Weberbauer* 1637 (BD); Rimac Valley, 1882, *Ball* (US, K); Lima, *André* K1397 (K); near Lima, *Nation* 111 in pt. (K); Lima, *Dombey* ex herb. Ruiz (BM). INDEFINITE: no locality, *McLean* (K), *Cuming* 946 (K) and 1077 (K, BM), *Forbes* (BM).

Var. **grisellum**, var. nov., a varietate genuina differt pilis longioribus laxe ascendentibus et magis griseis, foliis subtus saepe evidenter canescentibus.

Southern Peru and adjacent Chile.

CHILE. TACNA: without data, *Shepard* (G).

PERU. MOQUEGUA: Carumas, 2700 m., *Weberbauer* 7272 (FM, TYPE; G, ISOTYPE). AREQUIPA: Cotahuasi, ca. 3150 m., *Weberbauer* 6862 (FM, BD); Posco, ca. 550 m., *Cook & Gilbert* 40 (US); Mollendo, *Hitchcock* 22394 (US); Mollendo, ca. 400 m., *Weberbauer* 1466 (BD). AYACUCHO: below Coracora, 2900 m., *Weberbauer* 5799 (BD).

The var. *genuinum* from the region about Lima appears to be the form from which the polymorphous garden heliotrope has been derived. Miller's plant from the Chelsea Gardens, the type of which is in the British Museum, is clearly this form. The form of the species found in southern Peru differs in its more copious, more spreading pubescence and because of these differences, coupled with its distinct range, the plant has been given varietal recognition. Possibly referable to the variety is a collection made by Weberbauer, no. 2710 (BD), in the Department of Ancash below Oercs at about 2650 m. alt. This is north of the range of the var. *genuinam* but quite separated from the other stations known for the variety. Another very peculiar form comes from river banks near Loja in southern Ecuador where it was collected by Hartweg, no. 810 (K, BM). I doubtfully refer it to the var. *genuinum* since in its small flowers, slender habit and scanty pubescence it is not typical.

35. **H. lanceolatum** R. & P. Fl. Peruv. ii. 4, t. 111a (1799).
Central Peru.

PERU. LIMA: Lurin, 1881, *Ortiga* (G); Lima, *Wilkes Exped.* (G, US); near Lima, 1862, *Nation 111* in pt. (K); Lima-Oroya R. R. between Narquinia and Matucana, ca. 2300 m., *Weberbauer 96* (BD). INDEFINITE: "in Peruvia ad Huanuco Lima etc.," *Ruiz* (BD, ISOTYPE of *H. lanceolatum*).

The original material is given by Ruiz & Pavon as coming from Huanuco and the adjacent village of Pillao. The authentic material of the species from the herbarium of Ruiz now preserved at Berlin gives the source as from "Huanuco Lima etc." All the material with definite data comes from the region about Lima. It agrees remarkably with both the original description and plate. The species is characterized by its small scabrous lanceolate leaves and loose corymb of long-tubed flowers. It is probably most related to *H. arborescens*, but certainly appears to be quite distinct.

36. ***H. incanum*** R. & P. Fl. Peruv. ii. 2, t. 108a (1799).

Central and southern Peru, intermontane region east of the western cordilleras.

PERU. CUSCO: Urubamba Valley, 3000 m., *Herrera 1367* (G, US); Vilcanota Valley, 3000 m., *Herrera 1080* (G, US); Ollantaitambo, 2900 m., *Herrera 231* (BD); Ollantaitambo, ca. 3050 m., *Pennell 13640* (G, FM). APURIMAC: Rio Pampas, Hacienda Cotahuacho, ca. 2950 m., *Weberbauer 5855* (BD). HUANCAVELICA: Mantaro Valley near La Mejorada, ca. 2750 m., *Weberbauer 7604* (G, FM). JUNIN: Cabello above Hertas, 2400 m., *Macbride & Featherstone 1327* (FM); vicinity of Oroya, *Kalenborn 75* (NY, US). HUANUCO: Huanuco, 2100 m., *Macbride 3237* (G, FM); Huanuco, *Ruiz* (BD, ISOTYPE). INDEFINITE: "Colombia," *Lobb 97* (K); indefinite, *Dombey* (FM).

A very characteristic species with ovate, usually conspicuously bicolorous leaves that are very rugose and very scabrous or rough-pubescent above. The type came from Huanuco. Its nearest relative is *H. arborescens* and some forms approach that species closely.

37. ***H. erianthum***, sp. nov., fruticosum canescens 2 m. altum; ramis teretibus canescentibus tomentosis et sparse villosis laxe ramosis longiusculis; foliis lanceolatis alternis 4-5 cm. longis 10-17 mm. latis apice acutis basi in petiolum 5-8 mm. longum attenuatis supra obscure viridibus tomentulosis tessellato-rugosis cum nervis impressis subtus prominenter venosis albescenter tomentosus margine obscure crenulatis paullo revolutis; spicis 2-5 cm. longis ebracteatis tomentosus et villosis in corymbum terminalem vel axillarem dichotome ramosum dispositis congestifloris; calycibus sessilibus dense adpresseque villosis aurantiacis quinquifidis in anthesi 2-3 mm. longis sed demum 4-5 mm. longis, lobis anguste lanceolatis vel subulatis; corolla alba siccata brunnea hypocraterimorpha 4-5 mm. longa extus dense adpresseque villosa intus glabra, tubo cylindrico 2.5-3 mm. longis calyce paullo longiore, limbo ca. 3 mm. diametro, lobis

late ovatis rotundis patentibus; antheris lineari-oblongis ca. 1 mm. longis subsessilibus in medio tubo affixis dorso apicem versus pilis obesis dense obsitis, apice separatis et extrusis; ovario glabro; stigmate ca. 0.8 mm. longo conico; stylo 1-1.3 mm. longo; nuculis ignotis.

PERU. PIURA: edge of cultivated land north of Huancabamba on road to Jicate, ca. 2050 m., May 12, 1912, *Weberbauer 6332* (G, TYPE; FM, BD, ISOTYPES).

Clearly a relative of *H. incanum*, from which it differs in its pubescence and smaller flowers. It is also suggestive of *H. argenteum* of southern Ecuador but differs in its longer style and narrow strongly rugose bicolorous leaves. Prof. Weberbauer, who collected the type, notes that the corollas are white with a yellowish throat and that they were fragrant with an odor similar to that of "*H. peruvianum*."

38. *H. lippioides* Krause, Bot. Jahrb. xxxvii. 632 (1906).

PERU. CAJAMARCA: Santa Cruz, ca. 1650 m., 1904, *Weberbauer 4122* (BD, TYPE; G, photo.).

A very distinct species known to me only from the type-specimen. It is characterized by its small obovate silky-strigose leaves and small white corollas. The relationships of the plant are with *H. erianthum* and *H. incanum*, as its rugose leaves with deeply impressed veins suggest.

39. *H. argenteum* Lehm. Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 139 (1818) and *Asperif.* i. 73 (1818). *H. lanatum* HBK. Nov. Gen. et Sp. iii. 89 (1818) and l. c. 451 (1820).

Southern Ecuador.

ECUADOR. AZUAY: Paute, ca. 2400 m., *Lehmann 6547* (G, US, K, BD); Paute, 2100 m., *Jameson* (K); Nabón, Cuenca, ca. 2600 m., *Lehmann 7884* (G, US, K, BD); Gualaceo, *Jameson 155* (K). LOJA: "Loxa locis calidis," *Humboldt* (BD, ISOTYPE of *H. lanatum*); "Am Merid.," *Humboldt* (Herb. Willd. TYPE of *H. argenteum*). INDEFINITE: "Colombia," *Lobb 44* (K).

The type material came from Ecuador in the province of Loja, near Loja and Gonzanama. The latter is a town situated ca. 35 km. southwestward of Loja, about equidistant from that city and the Peruvian boundary. A very distinct species readily recognized by its ovate white-villous leaves.

40. *H. adenogynum*, sp. nov., frutescens; ramis teretibus laxeramosis longiusculis breviter villosis rariter subvelutinis plus minusve glanduliferis; foliis alternis sparsis herbaceis venosis integris ovatis vel oblongo-lanceolatis 2-5 cm. longis 6-28 mm. latis sparse villosis saepe glanduliferis, apice acutis, basi acutis vel obtusis in petiolum 3-8 mm. longum attenuatis, subtus paullo pallidioribus, margine

integris vix revolutis; spicis gracilibus 4-10 cm. longis ebracteatis multifloris in corymbum laxum terminalem dispositis; calycibus sessilibus globosis 1-1.5 mm. longis demum ad 2 mm. longis villosulis saepe glanduliferis ad medium vel ultra in lobis triangularibus vel elliptico-lanceolatis erectis vel conniventibus divisis maturitate plus minusve deciduis; corolla alba hypocraterimorpha ad 4 mm. longa extus sparse villosula et non rariter glandulifera intus glabra, tubo quam calyce 2- ad 3-plo longiori, limbo ad 4 mm. diametro, lobis orbicularibus patentibus; antheris oblongo-linearibus 1-1.3 mm. longis subsessilibus infra medium tubi affixis, apicem versus cum pilis crassis dense obsitis separatis inclusis; ovario glandulifero; stigmatate conico ca. 0.8 mm. longo; stylo subnullo; nuculis 4 ovatis rugosis 1-1.5 mm. longis stipitato-glanduliferis.

PERU. LIMA: Chosica, 900 m., *Macbride & Featherstone 495* (FM, TYPE; G, photo.; US, ISOTYPE); Chosica, ca. 1050 m., *Weberbauer 5312* (FM, BD); Chosica, *Rose 18543* (US); near Lima, *Wilkes Exped.* (G, NY, US); Lima, *Gaudichaud* (BD).

A remarkably distinct species characterized by its small flowers, glandular fruit and ovary, and small scarcely accrescent more or less deciduous calyces. The fruit is covered with long-stiped glands. In age the glands tend to become broken and the fruit appears to be sparsely villous. The species is most closely related to *H. Mandonii* but also has an evident relative in *H. rufipilum*. According to Professor Weberbauer, *in sched.*, the plant is a small shrub a half-meter high and has flowers which are at first pale violet but later become white. He also adds that the odor of the corolla is entirely different from that of "*H. peruvianum*."

41. **Heliotropium Mandonii**, sp. nov., fruticosum 1-2 m. altum; ramis teretibus laxe ramosis longiuscule dense retrorse fulvo-villosis demum sparse villosis vel glabrescentibus; foliis alternis sparsis 7-14 cm. longis 2.5-6 cm. latis late lanceolatis vel oblongo-ellipticis, apice acutis, basi in petiolum ca. 1 cm. longum fulvo-villosum attenuatis, margine obscure erosis vix revolutis, supra scabridis et sparse villosis-hispidis saepe cum nervis impressis plus minusve tessellato-rugosis, subtus pallidioribus dense velutinis fulvo-canescensibus vel vere canescensibus; spicis 5-12 cm. longis gracilibus ebracteatis breviter villosis multifloris in corymbum terminalem dichotome ramosum dispositis; calycibus sessilibus sparse villosis non rariter glanduliferis globosis ca. 1.5 mm. longis demum 2-2.5 mm. longis, lobis lanceolatis vel ovato-lanceolatis acuminatis maturitate ovatis sinibus rariter paullo plicatis; corolla alba 3-4.5 cm. longa extus pubescenti et non rariter sparse glandulifera intus glabra, tubo cylindrico ca. 2 mm.

longo calyce 1.5–2-plo longioribus, limba 3–5 mm. diametro, lobis ovatis obtusis patentibus; antheris lineari-oblongis ca. 1 mm. longis, apice extrusis libris, dorso apicem versus cum pilis congestis crassis ascendentibus obsitis; filamentis perbrevibus paullo infra medium tubi affixis; stigmatibus sessilibus ca. 0.5 mm. longis; ovario glabro; nuculis 4 glabris lacunosus ca. 1.5 mm. longis compressis late affixis.

BOLIVIA. LA PAZ: Cerro Iminapi, vicinity of Sorata, 2690 m., *Mandon 387* (G, TYPE; NY, K, BM, ISOTYPE); Sorata, 1920, *Holway 589* (G, NY, US).

PERU. CUSCO: Hacienda Potrero, Valle de Santa Ana, Prov. Convencion, ca. 1100 m., *Herrera 899* (BD). HUANUCO: Yanano, 1800 m., 1923, *Macbride 3660* (US, FM); Rio Huallaga below Rio Santa Domingo, 1200 m., 1923, *Macbride 4206* (US, FM; G, photo.).

A coarse plant somewhat suggesting a *Tournefortia* in gross habit. It is most related to *H. adenogynum* and *H. rufipilum*, but quite distinct from both. It is characterized by its small scarcely accrescent calyces, and its large more or less velutinous leaves; a very well marked and distinct species.

42. **H. rufipilum** (Benth.), comb. nov. *Tournefortia rufipila* Benth. Bot. Sulph. 140 (1844). *H. physocalycium* Donn. Sm. Bot. Gaz. xlix. 457 (1910). *H. jaliscense* Macbr. Proc. Am. Acad. li. 542 (1916) and Contr. Gray Herb. xlix. 17 (1917).

Var. **genuinum**. Nutlets bearing numerous long-stiped glands.—Synonymy given above.

Southern Mexico (Jalisco and Oaxaca) to Salvador; Ecuador where not common.

ECUADOR. GUAYAS: Milagro, 50 m., *Hitchcock 20200* (G, NY, US); Chanduy, *Spruce 5983* (G, K, BM); Guayaquil, *Orton* (G); Baleo, *Eggers 14443a* (US). MANABÍ: Salango, 1842, *Sinclair* (K, TYPE of *T. rufipila*; G, photo.). PICHINCHA: silv. suband. M. Carazon etc., *Sodirol 112/20* (BD); in reg. subtrop. Mindo, Gualea, etc., *Sodirol 112/16* (BD). INDEFINITE: Rio Suquibí, west slope of cordilleras, 500 m., *Rimbach 30* (BD).

Var. **anadenum**, var. nov., a varietate genuina differt nuculis maturitate glabris nullo modo vel sparsissime glanduliferis.

Ecuador and adjacent Peru with an outlying station in Bolivia.

BOLIVIA. LA PAZ: near Yungas, 1200 m., *Rusby 1437* (G, NY, US).

PERU. PIURA: Talara, *Haught 70* (G); Pariñas Valley ca. 18 km. inland, *Haught 169* (US).

ECUADOR. AZUAY: Cuenca, *Rose, Pachano & Rose 22905* (G, NY, US). CHIMBORAZO: vicinity of Huigra, *Rose & Rose 22131* (G, NY, US); Huigra, *Holway 818* (G, US); Pallatanga, *Spruce 5534* (G, K, BM); Pallatanga valley, *Sodirol 112/18* (BD). BOLIVAR: in silv. trop. prop. Balsapamba, *Sodirol 112/19* (BD). PICHINCHA: Quito, 2100 m., *Jameson 428* (K, BM). GUAYAS: Guayaquil, *Mille 3 and 5* (G), 55 (NY); Guayaquil, 1923, *Hitchcock 19932* (G, TYPE; NY, ISOTYPE); Guayaquil, *Sinclair* (K), *Jameson 406* (K, BM), *Hartweg 681* (NY, K, BD), *Barclay 2473* (BM). MANABÍ: El Recreo, *Eggers 14850* (US, FM, K, BD). INDEFINITE: Rio Cristal, Cord. Occid.,

July 10, 1876, *André 4037* (NY, K); village of Lasarauga, Aug. 1874, *Seemann 790* (K); Central Andes, *Barcley* (K); indefinite, *Fraser* (BM), *Jameson* (US).

The typical form of the species is known from San Salvador, Guatemala and southern Mexico where it is practically confined to the Pacific slope. It reappears in Ecuador but seems to be much less common there than the endemic South American variety, *anadenum*. In habit and gross aspect the material of *H. rufipilum* from Central and South America seems quite the same, although the var. *genuinum* has the fruit provided with coarse gland-tipped villous hairs and the var. *anadenum* has the fruit glabrous and usually quite devoid of glands. The form with glandless fruit is apparently absent north of Panama, although it appears to be overwhelmingly the prevailing one to the south. The species is very well marked by its lax habit of branching, glandular pubescence, and broad inflated mature calyces with almost cordate lobes. It seems to be rather variable in the character of pubescence and in size of flower.

43. **H. Urbanianum** Krause, Bot. Jahrb. xxxvii. 633 (1906).
Temperate Ecuador and adjacent northern Peru.

PERU. AMAZONAS: Chachapoyas, *Mathews* (K, NY). INDEFINITE: no locality, *Lobb 262* (K).

ECUADOR. CHIMBORAZO: Alausi, 1864, *Jameson* (US); Prov. de Alausi, *Jameson 154* (K). TUNGURAHUA: betw. Pelileo and Quero, ca. 2550 m., *Lehmann 5779* (BD, TYPE; G, K, ISOTYPES). PICHINCHA: Quito, *Jameson 183* (K); Pomasqui, ca. 2600 m., *Jameson* (NY); Pomasqui, *Jameson 318* (K, BM); Pomasqui, 2400 m., *Jameson 570* (NY); San Antonio, 2700 m., *Jameson 84* (K). IMBABURA: Rio Chota, Ibarra, ca. 1650 m., *Lehmann 6238* (K, BD); Betw. La Porta and Rio Chota, 2600 m., *André 3640* (NY, FM, K); Arenales de Salinas, ca. 1650 m., *Stübel 130a* (BD). INDEFINITE: near Ambato and Calicali (Quito), ca. 2800 m., *Lehmann 379a* (BM); reg. temp. interand., *Sodirol 112/17* (BD); indefinite, *Fraser* (BM) and *Hartweg 1316* (NY, K, BM BD).

Most closely related to *H. rufipilum* but although distinguished from it at a glance, characters by which it may be said to differ constantly are singularly lacking. The present species usually differs in having much less elongate spikes, its flowers have less elongate tubes, the calyx does not become globose and the lobes are not conspicuously broad. The leaves of *H. Urbanianum* are smaller than in its relative, usually rugose with impressed veins and tend to be broadest at or above the middle. The pubescence on the foliage is usually more copious and the hairs frequently have bulbous bases.

44. **H. submolle** Klotzsch, Allgem. Gartenzeitung xx. 89 (1852); Regel, Gartenfl. ii. 259, t. 63 (1853). *H. incanum*, var. *glabra* [Masters?], Garden. Chron. ser. 2, xxii, 809, fig. 140 (1884). *Tournefortia stenosepala* Krause, Bot. Jahrb. xxxvii. 631 (1906).

Colombia to Peru; not common.

PERU. AYACUCHA: above Yanamonte, ca. 2550 m., *Weberbauer 5600* (G, FM); road between Tambo and Rio Apurimac, ca. 2550 m., *Weberbauer 5600* (BD). HUANUCO: Huacachi near Muña, ca. 2000 m., *Macbride 4187* (G, US, FM). LIBERTAD: Hacienda Llaguen, Prov. Otuzco, 2600 m., *Weberbauer 6990* (BD). CAJAMARCA: below San Pablo, ca. 2300 m., *Weberbauer 3873* (BD).

ECUADOR. CHIMBORAZO: Pallatango and Panza, ca. 1750 m., *Lehmann 5780* (BD), TYPE of *T. stenosepala*; G, K, ISOTYPES).

COLOMBIA. CAUCA: Canaan, Mt. Purace, ca. 2950 m., *Killip 6665* (G, NY, US).

The above cited plants seem to be conspecific and to represent the plant figured by Regel and by Masters. I could not find any authentic material of the var. *glabrum* at Kew, nor any material so labeled. Lobb's collection, no. 41, mentioned by Masters was not to be found. At Berlin I saw a specimen of apparently authentic *H. submolle*. This was from the Botanical Gardens and was grown from seeds provided by Warszewicz. This appeared to be the same as the plants I have cited.

I doubtfully place under *H. submolle* four other collections at Berlin. These are as follows,—“Peru,” *Pavon* (Herb. Willd); *Alausi, Humboldt* (Herb. Kunth); Prov. Loxa, *Warszewicz*, and “in suband. m. Pich. prp. Chiquilpe,” *Sodirol 112/18b*. These specimens have firm hairy foliage 6–8 cm. long and 2.5–4.5 cm. broad. In varying degrees these specimens suggest *H. rufipilum*, *H. Urbanianum* and *H. submolle*.

Weberbauer's two collections cited above can only be referred here. They are noteworthy, however, because of their very short styles and conspicuously glandular corolla-tubes.

The relationship of *H. submolle* seems to be strongest with *H. arborescens*. In fact the species seems to be one of the intermediate forms connecting the group of *H. arborescens* with that of *H. rufipilum*. In the latter group it approaches *H. Urbanianum* most closely.

X. Section **Orthostachys** R. Br. Prodr. 493 (1810); DC. Prodr. ix. 539 (1845); Benth. & Hook. Gen. Pl. ii. 844 (1876); type-species, *H. foliatum* R. Br. *Orthostachys* Spach, Hist. Veg. ix. 32 (1840). *Preslaea* Mart. Nov. Gen. et Sp. ii. 75 (1826); type-species, *P. paradoxa* Mart.; not *Preslia* Opiz (1824). *Euploca* Nutt. Trans. Am. Philos. Soc. ser. 2, v. 189 (1837); type-species, *E. convolvulacea* Nutt. *Schleidenia* Endl. Gen. Pl. 646 (1838); type-species, *P. paradoxa* Mart. *Pioctonon* Raf. Sylva Tellur. 88 (1838); type-species, *P. antillanum* Raf. *Sarcanthus* Anderss. Vet. Akad. Handl. Stockh. 1853: 209 (1855); type-species, *S. asperrimus* Anderss.; not Lindl. (1821).

The section *Orthostachys* is the largest section in the genus and probably the most difficult. It contains about fifty American species, approximately half of which occur in South America. In the Old World the section is also represented by species in southern Asia, Australia and Africa. As a group it is recognized by its ovate or linear anthers which are glandular or hairy at the narrowed, frequently coherent apices. In most of the species one of the inner faces of each nutlet is marked by a circular or elliptical pit. When present, this latter development is very characteristic of the section. The section breaks up into at least three subsections.

The subsection *Axillaria* is characterized by having the flowers borne along the leafy stem and not aggregated into a definite spicate or racemose inflorescence. The fruit is not lobed, but is merely sulcate and is usually drawn up into a beak. The faces of the nutlets are not pitted. The five species of the section all occur in South America, although some of them range northward to the Greater Antilles and Mexico.

The subsection *Ebracteata* consists of over a dozen species, practically all of them American and the majority of them from South America. It is a very natural group characterized by having its flowers in completely bractless spikes or racemes. All the species have pitted nutlet-faces.

The subsection *Bracteata* has bracted spikes or racemes. It is cosmopolitan and contains the most of the species of the section. Among American *Heliotropia* at least, it presents to the systematist most puzzling and difficult problems. The species are very variable and illdefined and seem to be singularly lacking in stable differences. Although extremely unsatisfactory the classification and keys to the subsection presented here are the best I have been able to work out with the time and materials available. Rather than omit the subsection completely the provisional treatment of it is, therefore, published for I suspect that despite its inadequacy it may be found useful.

Most species of the subsection *Bracteata* have equally lobed fruit and nutlets with pitted inner faces. In the North American *H. convolvulaceum* Gray and in the South American *H. chrysanthum* Ph. and *H. catamarcense* Johnston the fruit is strongly compressed and the nutlets not pitted. The fruit of these three species is peculiar in the section but I do not believe that it should be unduly stressed. To do so would result in the separation of such closely and unmistakably related species as *H. chrysanthum* Ph. and *H. catamarcense* Johnston from *H. mendocinum* Ph. and *H. Greggii* Torr.

KEY TO SUBSECTIONS

- Flowers borne along leafy stems. 1. AXILLARIA.
 Flowers borne in spikes or racemes
 Inflorescence completely bractless. 2. EBRACTEATA
 Inflorescence bracted, the bracts usually evident but some-
 times filiform, caducous and inconspicuous. 3. BRACTEATA.

KEY TO SPECIES OF SUBSECT. AXILLARIA

- Plaits at corolla-sinuses at most developed into inconspicuous
 tooth-like lobules; corolla 2-4.5 mm. long.
 Plant glabrate or covered by an inconspicuous appressed
 pubescence.
 Corolla 2-3 mm. long; fruit with a conical apex; plant
 usually annual. 45. *H. lagoense*.
 Corolla 3-4.5 mm. long; fruit usually beaked; plant usually
 perennial. 46. *H. antillanum*.
 Plant villous, the hairs spreading and conspicuous. 47. *H. humistratum*.
 Plaits at corolla-sinuses developed upwardly into linear falcate
 lobules; plant usually perennial.
 Corolla small, 4-6 mm. long. 48. *H. parciflorum*.
 Corolla large, 8-11 mm. long. 49. *H. paradoxum*.

KEY TO SPECIES OF SUBSECT. EBRACTEATA

- Anthers ovate or ovate-oblong, glabrous, acute or acuminate,
 terminated by a conical or subulate prolongation of the
 connective; a widely distributed prevailing annual weedy
 species. 50. *H. procumbens*.
 Anthers linear, obtuse, more or less pubescent or glandular
 at apex.
 Stigma-column evidently penicillate with long white hairs;
 Brazilian. 51. *H. barbatum*.
 Stigma-column not penicillate, glabrous or sparingly and
 inconspicuously strigose.
 Corolla-lobes rounded.
 Corolla large, 4-5 mm. broad.
 Plant canescent; foliage densely white-strigose;
 stigma ca. 1 mm. long; corolla sparsely long-
 strigose inside above the middle; northern Peru. 52. *H. Lobbiai*.
 Plant green; foliage inconspicuously strigulose; stigma
 ca. 0.5 mm. long; corolla glabrous inside; southern
 Peru. 53. *H. toratense*.
 Corolla small, 1-3 mm. broad.
 Plant a loosely branched shrub 5 dm. tall; corolla
 glabrous within, yellow. 54. *H. polyanthellum*.
 Plant an annual herb or a spreading herbaceous peren-
 nial; corolla somewhat hairy in throat and in
 tube above the middle, white. 55. *H. pilosum*.
 Corolla-lobes acute or acuminate.
 Corolla-tube not surpassing the calyx; insular. 56. *H. Anderssonii*.
 Corolla-tube at least twice surpassing the calyx; conti-
 nental.
 Inner surface of corolla coarsely and sparsely villous
 above insertion of stamens; herbage with closely
 appressed-strigose pubescence; Peru. 57. *H. oxylobum*.
 Inner surface of corolla glabrous; herbage with a loose
 strigose pubescence; Argentina and Bolivia. 58. *H. campestre*.

KEY TO SPECIES OF SUBSECT. BRACTEATA

- Calyx-lobes linear, not noticeably unequal; Argentine species.
 Fruit not compressed; nutlets very obscurely didymous, densely hispid-villous, 1-2 mm. long, commissural faces pitted.....59. *H. mendocinum*.
- Fruit strongly compressed; nutlets conspicuously didymous, sparingly villous-strigose, 2.5-3 mm. long, commissural faces not pitted.
 Corolla white, funnelform, the tube not conspicuously surpassing the calyx.....60. *H. catamarcense*.
- Corolla yellow or very rarely white, salverform, the tube obviously much surpassing the calyx.....61. *H. chrysanthum*.
- Corolla-lobes lanceolate to ovate, evidently unequal.
 Stigma sessile or subsessile.
 Corolla large, 6-8 mm. long.....62. *H. Purdiei*.
- Corolla small, 2-4 mm. long.
 Anthers not at all coherent; bracts subulate or filiform.....63. *H. filiforme*.
- Anthers coherent at apices; bracts oblong or elliptical, contracted at their bases.
 Bracts inconspicuous, 1-2(-3) mm. long; upper surface of leaves glabrous except for appressed hairs along the impressed midrib.....64. *H. margaritense*.
- Bracts conspicuous, 2-6(-7) mm. long; upper surface of leaves evidently strigose.....65. *H. ocellatum*.
- Stigma borne on a definite though occasionally short style
 Leaves very closely strigose above or glabrous or subglabrous; leaf-margins usually weakly if at all revolute.
 Plant prostrate; central Venezuela and eastern Brazil.....66. *H. polyphyllum*.
- Plant erect or rarely decumbent; Paraguay and adjacent Brazil.
 Leaves lanceolate to ovate, if strigose on both surfaces then elliptical or ovate; plant erect or decumbent.....67. *H. Hasslerianum*.
- Leaves narrow and elongate, strigose on both surfaces
 Pubescence very fine and obscure.....68. *H. pallescens*.
- Pubescence coarse and obvious.....69. *H. distantiflorum*.
- Leaves with ascending or merely appressed hairs above; leaf-margins usually more or less strongly revolute.
 Plant herbaceous, annual, with foliaceous bracts.....70. *H. fruticosum*.
- Plant frutescent, usually perennial, with inconspicuous bracts.
 Plant drying dark-colored; Colombia to Argentina.....71. *H. salicoides*.
- Plant drying light-colored.
 Foliage more or less scabrous, appressed-hirsute, not densely nor abundantly strigose; Caribbean.....72. *H. ternatum*.
- Foliage not scabrous, densely and abundantly strigose; Brazil and adjacent Guiana.....73. *H. Fumana*.

45. *H. lagoëense* (Warm.) Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *Schleidenia lagoënsis* Warm. Kjoeb. Vidensk. Meddel 1867: 15 (1868). *H. trinitense* Urban, Symb. Ant. vii. 350 (1912).

Eastern Bolivia northward through Brazil to Venezuela and Trinidad.

BOLIVIA. SANTA CRUZ: Portochuelo, Prov. Sara, 400 m., 1924, *Steinbach* 6610 (BD); Laguna secas de Buenavista, Prov. Sara, 450 m., 1916, *Steinbach* 3184 (BD).

BRAZIL. GOYAZ: betw. Cavalcante and Conceição, *Burchell* 8190 (G, K); betw. Natividade and Porto Real, *Burchell* 8323 (G, K); indefinite, *Glaziou* 21961 (K, BD) and 21962 (K, BD). MINAS GERAES: lake-shore. Lagoa Santa, *Warming* (G, photo. and frag. of TYPE). AMAZONAS: Rio Sapo, 1874, *Traill* 571 (K). INDEFINITE: without locality, *Sellow* 190 (BD) and 3649 (BD).

VENEZUELA. COJEDES: Culebra Lagoon near San Carlos, 1925, *Pittier* 11703 (G, US, K).

A slender usually annual herb, which has been frequently confused with *H. filiforme*, which it somewhat resembles in gross habit and from which it is readily separable by its axillary flowers and different fruit. The species is most closely related to *H. humistratum*, from which it differs in scarcely more than lack of conspicuous spreading pubescence. It is also related closely to *H. antillanum*. Through the kindness of Dr. Christensen I have been able to examine a fine photograph as well as fragments of the type of Warming's *H. lagoense*. The plant is unquestionably conspecific with *H. trinitense*, from the Island of Trinidad, the type of which I studied at Berlin.

46. ***Heliotropium antillanum*** Urban, *Symb. Ant.* iv. 528 (1910).

Colombia, Panama and the Greater Antilles; apparently also in Mexico.

COLOMBIA. MAGDALENA: near Lake Sapatora, Chiriguana, 1924, *Allen* 162 (K).

Very closely related to *H. lagoense* and perhaps intergrading with it. It appears to differ, however, in its larger corolla, usually beaked hirsute fruit, perennial root and more northern range. It is best known from Cuba, Isle of Pines and Porto Rico.

47. ***H. humistratum*** Cham. *Linnaea* iv. 462 (1829). *Schleidenia humistrata* Fresen. in *Mart. Fl. Bras.* viii. pt. 1, 34 (1857). *S. pullulans* Fresen. l. c. *H. pullulans* Gürke in *E. & P. Nat. Pflanzenf.* iv. Abt. 3a, 97 (1893).

Eastern Brazil; perhaps also in Mexico.

BRAZIL. GOYAZ: Manoel Alvez, Oct. 1839, *Gardner* 3359 in pt. (K, BM). MINAS GERAES: Faz. de Piedade, 1818, *Sellow* 1578 (BD, ISOTYPE of *H. humistratum*); between Ouro Preto and Marianna, *Glaziou* 13822 (K, BM, BD). INDEFINITE: without locality, *Sellow* (K), *Pohl, herb. Vind.* 1756 in pt. (BD), *herb. Vind.* 1757 in pt. (K), *Ferreira* 967 (BD).

The original collection of *H. humistratum*, by Sellow, is conspicuously villous and canescent on the basal portions of the plant, becom-

ing sparsely pubescent and glabrescent towards the upper extremities of the stems. The cited specimens of Gardner and Ferreira are quite typical. The other specimens cited are villous throughout and are apparently referable to *H. pullulans*. The collection by Glaziou is rather robust and except for unbeaked fruit quite like a collection by Palmer, no. 466, from Acapulco, Mexico.

48. ***H. parciflorum*** (Mart.) Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *Preslaea parciflora* Mart. Herb. Fl. Bras. 183 (1837). *Schleidenia parciflora* DC. Prodr. ix. 557 (1845).

Known only from southcentral Brazil in the states of Goyaz and Matto Grosso.

BRAZIL. MATTO GROSSO: Cujabá, herb. Mart. 277 (NY, K, ISOTYPES); near Cujabá, 1899, Meyer 827 (BD). GOYAZ: Manoel Alvez, Oct. 1839, Gardner 3359 in pt. (K, BM); Natividade, Dec. 1839, Gardner 3358 (K); betw. Cavalcante and Conceição, Burchell 7958 (K).

A species related to *H. paradoxum* from which it differs primarily in its smaller corollas. It has been much misunderstood and has been confused even with such distinct species as *H. lagoense* and *H. antillanum*.

49. ***H. paradoxum*** (Mart.) Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *Preslaea paradoxa* Mart. Nov. Gen. et Sp. ii. 76, t. 164 (1826). *Schleidenia paradoxa* DC. Prodr. ix. 557 (1845). *S. macrodon* Fresen. in Mart. Fl. Bras. viii. pt. 1, 35 (1857). *H. macrodon* Gürke, l. c. *S. Gardneri* Fresen. l. c. *H. Gardneri* Gürke, l. c.

Eastern Brazil in the states of Piauhly, Bahia, Goyaz and Minas Geraes.

BRAZIL. BAHIA: near Rio San Francisco, Joazeiro, 300 m., Chase 7912 (G); Tamandua, betw. Jacobina and St. Thomé, Blanchet 71 (BM); Serra Jacobina, Blanchet 2653 (NY, K, BD); Taboleiro near Remanso, 1906, Ule 7412 (BD); indefinite, Martius (BD, ISOTYPE of *P. paradoxa*?). GOYAZ: betw. Natividade and Porto Real, Burchell 8184 (G). PIAUHY: near Boa Esperança, Feb. 1839, Gardner 2263 (NY, US, K, BM); Paranaguá, Aug. 1839, Gardner 2685 (BM, K, ISOTYPE of *S. Gardneri*); betw. Canabrava and Boa Esperança, Feb. 1839, Gardner 2262 (NY, US, K, BM). INDEFINITE: without locality, Pohl, herb. Vind. 1756 in pt. (BD); herb. Vind. 1757 in pt. (K).

The material cited above from the state of Bahia is evidently conspecific and exhibits only a little variation in the abundance of pubescence and in the development of the beak on the fruit. The other collections differ from those from Bahia in having the corolla-lobes drawn down into a broad though definite claw which makes them appear to be more elongate. *Heliotropium Gardneri* from southern Piauhly and *H. macrodon* from northwestern Minas Geraes seem to

be indistinguishable. They are villous and canescent plants very similar to typical *H. paradoxum*, in fact appear to differ from it only in the more elongate corolla-lobes. Although *Gardner 2262* was one of the three plants cited under the original description of *S. dasycarpa* it is clearly a close relative of *H. paradoxum* and is here referred to that species. Except for the size of the corolla *Gardner 2262* and *2263* and *Burchell 8184* seem to differ little from the typical material of *H. paradoxum*. They do, however, seem to have more slender wiry stems than any of the other specimens I have referred to the species.

50. **H. procumbens** Mill. Dict. ed. 8, no. 10 (1768). *H. inundatum* Sw. Prodr. 40 (1788) and Fl. i. 343 (1797); Cham. Linnaea iv. 456 (1829); DC. Prodr. ix. 539 (1845). *Schleidenia inundata* Fresen. in Mart. Fl. Bras. viii. pt. 1, 43 (1857). *H. decumbens* Lehm. Neue Schr. Naturf. Ges. Halle iii. pt. 2, 16 (1817); Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 129 (1818); Asperif. i. 39 (1818); Kunth, Flora i. 603 (1818); HBK. Nov. Gen. et Sp. iii. 451 (1820). *H. canescens* Lehm. Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 128 (1818) and Asperif. i. 38 (1818); R. & S. Syst. iv. 730 (1819). *H. procumbens* HBK. l. c. 88 (1818). *H. canescens* HBK. l. c. 88 (1818). *H. cinereum* HBK. l. c. 89, t. 206 (1818). *H. Humboldtianum* R. & S. Syst. iv. 737 (1819); HBK. l. c. 452 (1820). *H. simplex* Meyen, Reise i. 436 (1834); Walp. Nov. Act. Acad. Caes. Leop. Nat. Cur. xix. suppl. 1, 371 (1843). *H. Willdenowii* Don, Gen. Syst. iv. 359 (1838). *H. Houstoni* DC. l. c. 549. *H. inundatum*, var. *cubense* DC. l. c. 540. *S. elliptica* Fresen. l. c. 42. *H. ellipticum* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *S. longepetiolata* Fresen. l. c. 42. *H. longipetiolatum* Gürke, l. c. 97. *H. Bridgesii* Rusby, Mem. Torr. Bot. Cl. iv. 224 (1895). *H. riparium* Mart. ex Chodat, Bull. Herb. Boiss. ser. 2, ii. 817 (1902), nom. subnud. *H. inundatum* f. *elliptica* Chodat, l. c. v. 483 (1905). *H. inundatum*, var. *chacoëense* Fries, Ark. Bot. vi. no. 11, 22 (1906). *H. Eggersii* Urban, Symb. Ant. v. 481 (1908). *H. inundatum*, f. *elliptica*, subf. *pusilla* Hassler, Trab. Mus. Farmacol. Buenos Aires xxi. 100 (1909).

Northern Argentina northward through tropical America to southern United States; rare and local on the Pacific Coast of South America.

ARGENTINA. ENTRE RIOS: Rio Cupalen, *Niederlein 184* (BD); islands in Rio Uruguay, *Baez 133* (G). MISIONES: Posadas, *Vattuone & Bianchi 36* (US). SANTA FE: Ocampo, *Venturi 154* (G). FORMOSA: Formosa, *Jørgensen 2245* (G, US). CHACO: Rio de Oro, *Niederlein 333* (BD). SANTIAGO: Tintina, March 1917, *Hauman* (G); La Banda, *Lillo 6136* (G). CATAMARCA: Queb. de Tala, *Castillon 1100* (G). TUCUMÁN: Meñecas, 500 m., *Schreiter 252* and *1719* (G); Tucumán, 450 m., *Lillo 2172* (G); Tucumán, *Hieronimus &*

Lorentz 172 (G, BD), 151a (BD), 1151 (G), 1108 (G), 1182 (BD); Villa Nouzues, 1000 m., Venturi 2415 (G); Rio Salí, 600 m., Venturi 1052 (G); Leales a Chañar Pozo, 300 m., Venturi 501 (G); Siambon, Lorentz & Hieronymus 848 (BD); Dique de la Aguadita, 700 m., Lillo 7317 (G); Vipos, 780 m., Schreiter 1718 and 4702 (G); Cadillal, 500 m., Schreiter 754 (G); Tapia, 500 m., Schreiter 301 (G). SALTA: Orán, Feb. 1916, Hauman (G); Metán, 850 m., Dinelli (BD); Rio de las Piedras, Rodriguez 45 (G); San José, 1873, Lorentz & Hieronymus (BD); Kilom. 1390, F. C. Embarcación a Yacuiba, Orán, 500 m., Schreiter 3605 (G); Salto, 1864, Pearce (K). JUJUY: San Lorenzo, Lorentz & Hieronymus 357 (BD); Jujuy, 1892, Kuntze (NY); Jujuy, Castillon 366b (G).

BOLIVIA. TARIJA: along Rio Pilcomayo near Ft. Crevaux, Fries 1614 (US, ISOTYPE of *H. inund.* v. *chacoense*); Bermejo, 1600 m., Fiebrig 2034 (BD). LA PAZ: Cotaña, 2450 m., Buchtien 150 (G, NY, FM, BD); Mapiri, 750 m., Rusby 1435 (NY); Guanai, Williams 712 (NY, US, K, BM); Isapuri, 450 m., Williams 367 (NY, K); Milluhuaya, 1300 m., Buchtien 4681 (US); Chimari near Chulumani, 1400 m., Buchtien 2450 (US); Munaypata near Sorata, ca. 2650 m., Mandon 385 (G, NY, K, BM); between Munaypata and Espada, ca. 2650 m., Mandon 389 (NY); indefinite, Bang 2848 (NY, US, K). EL BENI: Rurrenabaque, 300 m., Rusby 1569 (NY, K); junction of rivers Beni and Madre de Dios, Rusby 1438 (G, NY, US, K, BM). COCHABAMBA: Chilispe, Steinbach 6004 (FM); Torata, 1800 m., Steinbach 6004 (BD); Cochabamba, Bang 950 (NY, TYPE of *H. Bridgesii*; G, US, K, BM, BD, ISOTYPES). SANTA CRUZ: Velasco, July 1892, Kuntze (NY); Canton de Buena-vista, 450 m., Steinbach 1207 (BD); Bosque de Palometillas, Steinbach 3140 (BD), 6801 (FM, K, DB). INDEFINITE: Villamontes, Agua Blanco, 500 m., Pflanz 2107 (BD), 4047 (US); no locality given, Bridges 19 (K).

PARAGUAY: Lacus Ypacari, Hassler 3893 (G, K, BM, BD), 11490 (G, US, BM, BD), 12374 (G, US, BM, BD); Salines de Lambari, Balansa 2033 (K); Paraguari, Balansa 2032a (K); between Rio Apa and Rio Aquidaban, Fiebrig 4364 (K, BM); Alto Paraguay, Chaco, lat. 21°, Fiebrig 1380 (BD); Cord. Altos near Kolonieberg and Siedelung, Fiebrig 532 (BD); Gran Chaco, Morong 77a (NY); Asuncion, Morong 77 (G, NY, US, BM); near Concepcion, Hassler 7341 (BM, BD; ISOTYPES of *H. inund.* v. *elliptica*); lower course of Rio Pilcomayo, Rojas 12 (BD), 13 (BM), 23 (BM, BD); indefinite, Hassler 1437 (K).

URUGAY: Rio Negro near Mercedes, Gilbert 228 (K).

BRAZIL. MATTO GROSSO: Corumbá, Robert 787 (BM); Santa Cruz, Moore 354 (BM) and 603 (BM, BD); Ierere, Paraguay River, Robert 853 (K, BM); Falls of the Madeira, Rusby 1436 (G, NY, US, K, BM, BD). SÃO PAULO: S. Joao da Montanha, Piracicaba, Puttemans 11276 (G). RIO JANEIRO: Rio Janeiro, Glaziou 11292 (BD), 13032 (K, BD). MINAS GERAES: indefinite, Glaziou 14137 (BM, BD), St. Hilaire B1567 (K). BAHIA: Serra Jacobina, Blanchet 2666 (K, BM, COTYPE of *H. rigidulum*); near Bahia, Blanchet 3609 (FM, BM); Rio San Francisco near Joazeiro, Martius (K), Chase 7908 (G). GOYAS: Barra de Lagoa Feia, Glaziou 21778 (NY, K, BD); indefinite, Burchell 7571 (G, NY, K), 7670 (G, K) and 8894 (K). PIAUHY: indefinite, Gardner 1983 (BD). PERNAMBUCO: Olinda near Pernambuco, Brenning 20 (BD); Pernambuco, Gardner 1077 (K, BM). CEARÁ: indefinite, Gardner 1983 (K, BM). PARÁ: below Santarem, Spruce (K); Prainha, Traill (K); Alemquer, Spruce (K). AMAZONAS: Rio Jurnoi near Bom Fim, Ule 5192 (K, BD). INDEFINITE: no locality given, Sellow (G, US, K, BM, BD), Herb. Mus. Vind. 1593 (K, BD, COTYPE of *S. longipetiolata*), Hoffmannsegg (BD, TYPE of *H. canescens*); Rio Belmonte, Martius (K, BM).

BRITISH GUIANA: indefinite, Appua 1762 (K); Schomburgk 1024 (K, BM, BD) and 1026 (K).

VENEZUELA. SUCRE: Cumana, Humboldt 57 (BD, TYPE *H. decumbens*); Cumana, Humboldt 58 (BD, ISOTYPE of *H. canescens*); Cuēana, Bonpland 57

(FM, ISOTYPE of *H. procumbens*); Cumana, *Humboldt 58* (BD, ISOTYPE of *H. cinereum*) and *5202* (BD); "Rio Apure, Cumana," *Bonpland 58* (FM). ARAGUA: St. Mathio, Valle del Araguas, *Otto 812* (BD); Valle Aragua, *Moritz 786* (BM, BD). BOLIVAR: Cuchivero, Playa Urané, *Passarge & Selwyn 824* (BD); Isla Degrero near Ciudad Bolivar, 60 m., *Bailey 1877* (US). GUÁRICO: La Rubiera near Calabozo, *Pittier 27* (BD). CARABOBO: Rio Chico, *Jahn 1255* (G, NY, US). COJEDES: between San Carlos and San Rafael de Onoto *Pittier 11723* (US). PORTUGUESA: Portuguesa River, *Pittier 12035* (NY, US).

COLOMBIA. BOLIVAR: Barro Blanco on Rio Sinu, ca. 65 m., *Pennell 4168* (G, NY); Tierra Alta on Rio Sinu, ca. 65 m., *Pennell 4671* (G, NY, US); Cartagena, *Heriberto 338* (US). INDEFINITE: Queb. Quaymaro, ca. 20 m., *Schultze 419* (BD).

ECUADOR. GUAYAS: Milagro, 50 m., *Hitchcock 20170* (G, NY, US); Bodegas, *Sodirol 11215* (BD); Rio Daule near Guayaquil, *Spruce 6490* (K, BM).

PERU. PIURA: Piura, *Spruce* (K). LORETO: middle Rio Ucayali, ca. 160 m., *Tessmann 3111* (BD).

CHILE. TACNA: Arica, *Meyen* (BD, TYPE of *H. simplex*).

A widely distributed and somewhat variable weedy species which is the American counterpart of *H. ovalifolium* Forsk., of tropical Asia and Africa. The most important variation is that involving the size of the flower, the plants from the southern part of the range appearing to have flowers almost twice the size of those from further north. Some of the plants from the Bolivian Plateau appear to become perennial. Typically, however, the plant is annual.

51. ***H. barbatum*** DC. Prodr. ix. 541 (1845). *Schleidenia barbata* Fresen. in Mart. Fl. Bras. viii. pt. 1, 43 (1857). *S. leptostachya* Fresen. l. c. *H. leptostachyum* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893).

Eastern Brazil, State of Bahia.

BRAZIL. BAHIA: Serra Jacobina, *Blanchet 2726* (FM, K, BM, BD, ISOTYPES of *H. barbatum*); near Jacobina, *Blanchet 3610* (BM, COTYPE of *S. leptostachya*); pr. Bahia, *Martius* (BD, ISOTYPE of *S. leptostachya*).

A well marked species most related to, though quite distinct from *H. inundatum*. It also appears to have affinities with the Peruvian *H. Lobbiai* and *H. toratense*. The species is well marked by the copious, erect, white bristles produced upon the stout column of the stigma. The white corolla has a slender tube evidently surpassing the calyx and expanded above into the funnelform limb and throat 3-4 mm. broad. Except for a sparser pubescence on the foliage I can see no difference between *H. barbatum* and *S. leptostachya*. In all other details they seem to be quite the same.

52. ***H. Lobbiai***, sp. nov., fruticosum canescens dense adpresseque villosa-hispidum; ramis ascendentibus ad 1.5 dm. longis; foliis alternis numerosis 6-17 mm. longis 2.5-6.5 mm. latis oblanceolatis vel ellip-

tico-ob lanceolatis firmis conspicue costatis sed inconspicue nervatis basem versus in petiolum 1-2 mm. longum gradatim contractis apice acutis margine revolutis subtus conspicue pallidioribus tomentosis; spicis geminatis multifloris ebracteatis 1-2 cm. longis; calycibus ascendentibus 2.5-3 mm. longis dense strigosis, lobis lineari-lanceolatis ca. 0.5 mm. latis paullo inaequalibus; pedicellis crassis 0.5-1 mm. longis; corolla 4-5 mm. longa infundibuliformi extus strigosa intus in faucibus sparsissime longeque strigosa, tubo cylindrico ca. 3 mm. longo ca. 0.8 mm. crasso calyce subduplo longiori, limbo 2.5-3 mm. diametro concavo lobis ovatis ascendentibus; staminibus medio tubo affixis; antheris linearibus ad. 1 mm. longis sessilibus apice obtusis glandulari-puberulentis leviter coherentibus; ovario glabro; stigmato cylindrico ad 1 mm. longo, disco crasso et angustissimo; stylo stigmatate 2-3-plo breviori; nuculis ignotis.

PERU. AMAZONAS: Chachapoyas, *W. Lobb* (K, TYPE).

A very distinct species most related to *H. pilosum*, with which it agrees in habit but differs conspicuously in the size and form of the corolla.

53. *H. toratense*, sp. nov., suffruticosum laxe decumbens 1.5-2 dm. altum; caulibus pluribus ad 3 dm. longis sparse ascendenter ramosis villosulis infra medium cum pilis patentibus instructis supra medium cum pilis adpressis ornatis; foliis oblanceolatis 3-6 cm. longis 4-8 mm. latis herbaceis enervatis inconspicue strigulosis, margine anguste revolutis, subtus paullo pallidioribus, apice acutis, infra medium basem versus gradatim attenuatis; spicis geminatis vel ternatis terminalibus scorpioideis 3-7 cm. longis 4-6 cm. longe pedunculatis cum bracteis sparsis filiformibus ca. 2 mm. longis ornatis; calycibus subsessilibus 3-4 (demum ca. 5) mm. longis sparse strigosis, lobis lineari-acuminatis inaequalibus sparse strigosis ascendentibus vel recurvatis; corolla alba hypocraterimorpha ca. 4 mm. longa extus sparse strigosa intus glaberrima, tubo ca. 2-3 mm. longo ca. 0.8 mm. crasso quam calyce breviori, limbo ca. 4.5 mm. diametro convexo; antheris subulatis ca. 1 mm. longis sessilibus medio tubo affixis, apice attenuatis sparse et obscurissime granulatis distinctis; stigmatate 0.3-0.6 mm. longo 4-lobato subsessili disco crasso; ovario sparse villosulo; nuculis villosis ca. 1.7 mm. longis dorso convexis in facie interiori angulatis.

PERU. MOQUEGUA: Torata, ca. 2250 m., March 17-18, 1925, *Weberbauer* 7407 (FM, TYPE; G, ISOTYPE).

A very well marked species of uncertain relationship. It is known only from extreme southern Peru.

54. **H. polyanthellum**, sp. nov., fruticosum 5 dm. altum dense strigosum siccatum paullo fulvescens; ramis numerosis gracilibus ascendentibus; foliis alternis 8–20 mm. longis 1.5–4 mm. latis firmis costatis sed enervatis anguste lanceolatis vel oblanceolatis acutis basem versus in petiolum ad 1 mm. longum gradatim attenuatis margine paullo revolutis; spicis solitariis vel geminatis gracilibus multifloris ebracteatis 4–6 cm. longis; calycibus subsessilibus ascendentibus 1–2.5 (maturitate 1.5–3) mm. longis, lobis anguste lanceolatis obscure inaequalibus; corolla sordide flava crassiuscula hypocraterimorpha extus dense strigosa intus glaberrima, tubo cylindrico 2–2.5 mm. longo 0.7–0.8 mm. crasso calyce saepius ca. duplo longiori, limbo 2–2.5 mm. diametro subplano, lobis ovatis; staminibus medio tubo affixis; antheris linearibus ad 1 mm. longis sessilibus, apice obtusis glandulari-puberulentis leviter coherentibus in faucibus prominentibus; ovario sparse villosulo; stigmatate cylindrico ca. 0.8 mm. longo cum disco crasso et angustissimo in fructus maturitate ut videtur sessili; stylo brevissimo quam stigmatate 3–4-plo breviori; nuculis strigosis ca. 1 mm. longis dorso convexis intus angulatis.

PERU. CAJAMARCA: between Jaen and the valley of the Rio Shumba, ca. 750 m., April 25, 1912, *Weberbauer 6184* (FM, TYPE; BD, ISOTYPE).

An extremely well marked species which appears to be without close relatives. It is known only from northwestern Peru. According to *Weberbauer*, who collected the type and only known specimens, the plant has sordid yellow corollas and is a loose light green bush a half meter tall.

55. **H. pilosum** R. & P. Fl. Peruv. ii. 3, t. 110b (1799).

Var. **genuinum**.—Herbage slightly grayish with a sparse appressed pubescence, only the growing parts conspicuously canescent.—Synonymy given above.

Middle western Peru.

PERU. LIMA: open sandy slopes, Atoconga, ca. 375 m., *Pennell 14786* (G, FM); stony slopes in the mountains north of Chosica, 1350 m., *Weberbauer 5319* (FM, BD); [Amancaes], *Ruiz* (BD, ISOTYPE); limy clays in hills near Barranco, ca. 450 m., *Weberbauer 1649* (BD); sandy hills along the sea, Lurin, ca. 60 m., *Macbride 5922* (BD); indefinite, *Dombey* (FM).

Var. **albatum**, var. nov., a varietate genuina differt foliis et caulibus dense albideque tomento-strigosis.

Middle western Peru.

PERU. LIMA: hills around Lima, 1862, *Nation* (K); along the Rio Rimac near Lima, 1882, *Ball* (K, TYPE); rocky slopes near Surco, ca. 1950 m., *Weberbauer 5204* (FM, BD).

The lower plant on Ruiz & Pavon's plate, that lettered "b" and not "a" as cited in the text, is obviously that described in their text and represents the plant in Ruiz's herbarium which is labeled as *H. pilosum*. The illustration of the flowering and fruiting parts are quite incorrect in the original plate. The four nutlets in the authentic material at Berlin are 1 mm. long, with a sparsely hirsute-strigose strongly convex back and a decidedly acute face. The corolla is subsalverform with the stout cylindrical tube not surpassing the calyx lobes. The var. *albatum* is merely a form with an abundant appressed white pubescence. In gross aspect it is reminiscent of coarse forms of *H. procumbens*. The collectors of both varieties speak of the corolla as white or sordid white and of the plant as prostrate or as a spreading perennial.

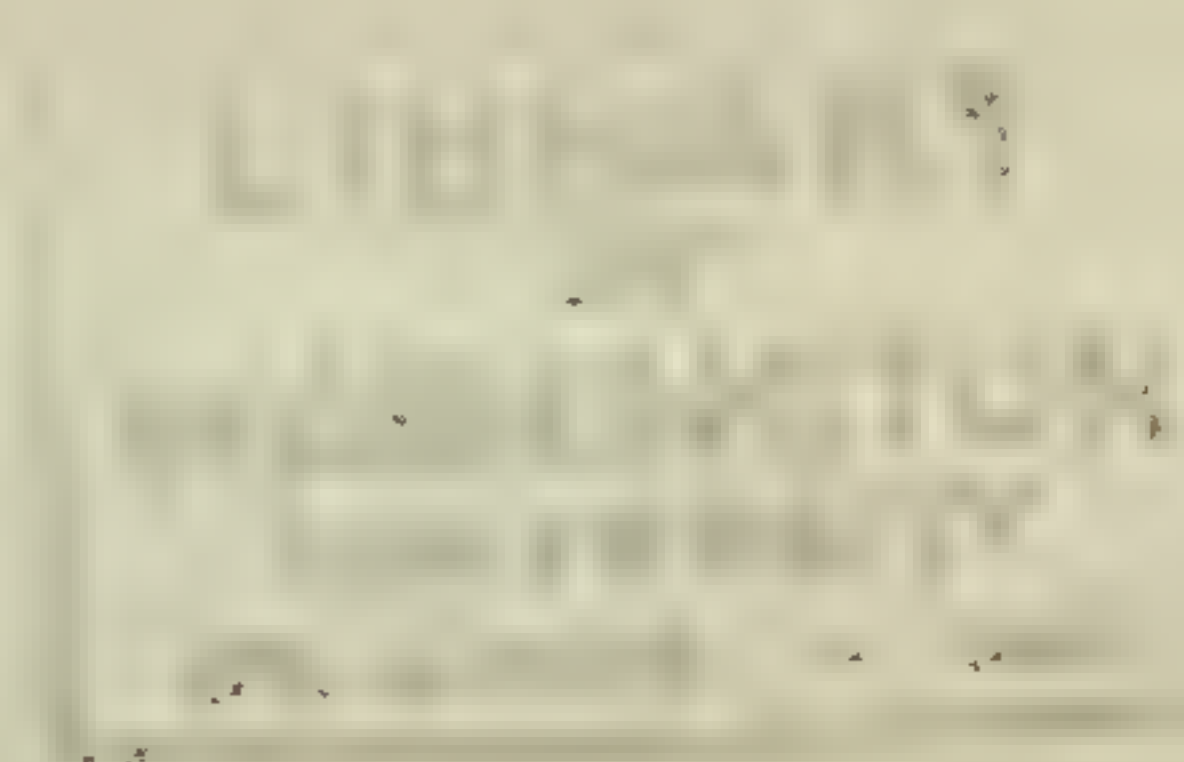
56. **H. Anderssonii** Robinson, Proc. Am. Acad. xxxviii. 192 (1902). *Sarcanthus asperrimus* Anderss. Stockh. Akad. Handl. 1853: 209 (1854). *H. asperrimum* Anderss. Freg. Eugenies Resa, Bot. 86 (1861); not R. Br. (1810).

ECUADOR. GALAPAGOS ISLANDS: Indefatigable, 1852, *Andersson* (G, FM, K, BD; ISOTYPES).

Endemic to the Galapagos Islands whence it is known only from a single collection.

57. **H. oxylobum**, sp. nov., fruticosum 3-6 dm. altum sparse strigosum cum pilis arcte adpressis; ramis gracilibus numerosis; foliis alternis lanceolato-linearibus vel oblanceolatis 1-2.5 cm. longis 1.5-4.5 mm. latis firmis costatis sed enervatis margine paullo revolutis basem versus in petiolum brevem ad 1 mm. longum attenuatis apice acutis subtus pallidis; spicis solitariis vel geminatis ebracteatis gracilibus 2-6 cm. longis; calycibus ascendentibus 1-2 mm. longis; pedicellis ca. 0.5 mm. longis, lobis linearibus vel lineari-lanceolatis subaequalibus; corolla flavescenti hypocraterimorpha extus dense strigosa intus supra medium sparse breviterque villosa 4-5 mm. longa, tubo cylindrico 3-4 mm. longo 2-2.5 mm. diametro, lobis ascendentibus ovato-deltaideis conspicue acutis; staminibus medio tubo affixis inclusis; antheris linearibus ad 1 mm. longis sessilibus apice obtusis glandulari-puberulentis leviter coherentibus; ovario glabro vel puberulento; stigmato ca. 1 mm. longo cylindrico hispidulo cum disco crasso et angustissimo ornato quam stylo ad 2-plo longiori; nuculis strigosis ca. 1 mm. longis dorse convexis intus angulatis.

PERU. APURIMAC: Bridge of Apurimac, Jan. 1867, 2400-2700 m., *Pearce* (K, TYPE; BM, ISOTYPE). HUANCVELICA: Rio Mantaro below Surcubamba, ca. 1250 m., 1913, *Weberbauer 6486* (BD).



Very closely related to *H. campestre*, a species extending north to La Paz in Bolivia, from which, however, it differs in its more slender habit, smaller leaves, more appressed pubescence and pubescent inner surface of the corolla. Weberbauer gives the flower-color as sordid yellow.

58. **H. campestre** Griseb. [Pl. Lorentz. 186] Abh. K. Ges. Wiss. Göttingen xix. 234 (1874) and [Symb. Argent.] l. c. xxiv. 271 (1879); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893); Kuntze, Rev. Gen. iii. pt. 2, 205 (1898); Fries, Ark. Bot. vi. no. 11, 23 (1906). *H. andinum* Rusby, Mem. Torr. Bot. Cl. iv. 224 (1895).

Central Argentina to middle western Bolivia, and apparently also in northern Paraguay.

ARGENTINA. SAN LUIS: Queb. Salado, 1882, *Galander* (BD). CÓRDOBA: Capello del Monte, *Kurtz* 6625 (NY); Alto Gracia, *Parodi* 7443 (G); Sierra de Achala, *Parodi* 7643 (G); Los Altos near Córdoba, 1877, *Hieronymus* (K); Córdoba, *Lorentz* 96, 150 and 607 (BD), *Hieronymus* (G, NY, US, FM, BM, BD), *Fielding* (BM), *Kuntze* (NY, US, BD). CATAMARCA: Fuerta de Andalgalá, *Schickendantz* 92 (G, K); Andalgalá, 1917, *Jørgensen* 1076 (G, US); Andalgalá, 1915, *Jørgensen* 1076 (US); Andalgalá, *White* 94 (BM); Rio del Valle, *Castillon* 1097 (G). TUCUMÁN: San Pedro de Colalao, 1200 m., *Ventura* 3731 (G); Cerro de Medina, 1400 m., *Lillo* 15999 (G); Trancas, 786 m., *Schreiter* 4703 (G); Vipos, 786 m., *Schreiter* 1720 (G); Lomas de Vipos, 786 m., *Schreiter* 1749 (G); Tapia a Vipos, 650 m., *Schreiter* 1546 (G). SALTA: Pasaje del Rio Juramento, *Lorentz & Hieronymus* 368 (BD); Campo Chica near Orán, *Lorentz & Hieronymus* 426 (BD); Orán, Feb. 1916, *Hauman* (G); Cafayate, 2800 m., *Rodrigues* 1278 (G). JUJUY: Loma del Tambo, Volcán, 2200 m., *Schreiter* 2600 (G); indefinite, *Castillon* 9644 (G). INDEFINITE: Andes, *Arnott* (NY).

BOLIVIA. TARIJA: Huayavilla, 1800 m., *Fiebrig* 2506 (G, US, K, BM, BD); along Rio Pilcomayo near Ft. Crevaux, *Fries* 1593 (US). COCHABAMBA: Parotani, 2400 m., March 20, 1892, *Kuntze* (NY, US); Tunari, 1600 m., 1892, *Kuntze* (NY); Cochabamba, *Bang* 929 (NY, TYPE of *H. andinum*; G, US, FM, K, BM, BD, ISOTYPES). LA PAZ: San Pedro near Sorata, 2690 m., *Mandon* 386 (G, NY, K, BM); Cotaña am Illimani, 2550 m., *Buchtien* 3237 (US). INDEFINITE: no locality given, *Fiebrig* 3215 (K, BM, BD).

PARAGUAY: between Rio Apo and Rio Aquidaban, *Fiebrig* 4016 (US, BD) and 4016a (G, BD).

A very characteristic, though somewhat variable species most nearly related to the Peruvian *H. oxylobum*. It also approaches though less closely *H. angustifolium* Torr. Bot. Mex. Bound. 137 (1859), of northeastern Mexico and adjacent United States.

59. **H. mendocinum** Ph. Anal. Univ. Chile xxi. 400 (1862), *Linnaea* xxxiii. 186 (1864) and *Anal. Univ. Chile* xxxvi. 190 (1870); Griseb. [Pl. Lorentz. 186] Abh. K. Ges. Wiss. Göttingen xix. 234 (1874) and [Symb. Argent.] l. c. xxiv. 271 (1879); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893); Kuntze, Rev. Gen. iii. pt. 2, 205 (1898); Hicken, *Physis* i. 30 (1912); Sanzin, *Physis* iv. 43 (1918).

Middle western Argentina.

ARGENTINA. MENDOZA: Monte Gorman near Ramacaida, Rio Diamante, Kurtz 7217 (NY); Paso Cruz, lat. 34°, 1500 m., Kuntze (NY, US); Travesia, Miers (BM); Corral del Desaguadera, Travesia, Miers (BM); Mendoza, ca. 1250 m., King (BM); Mendoza, Gillies 528 (K); Mendoza, Stübel (BD); Mendoza, Diaz (MS, TYPE; G, photo.); Mendoza, 1885, Goldsack (MS; G, photo.). SAN JUAN: northeast of Marayes, Hosseus 2657 and 2658 (BD); Pie de Palo, Hosseus 2011 (BD); Puesto de las Chaves, Hosseus 2636 (BD); Jachal, Jameson (K). LA RIOJA: Chilecito, Parodi 7771 (G); La Rioja, Giacomelli 6003 (G); Los Hornillos, Hieronymus & Niederlein 180 (BD); Tambillos, Hosseus 1453 (BD); San Lucia, Vichigasta, Urriche (D). CATAMARCA: Tinogasta, 1863, Pearce (K, BM); Chacarita de los Andes, Queb. del Tala near Catamarca, Lorentz & Hieronymus 396 (NY, US, BM, BD); Fuerte Quemado, 2000 m., Schreiter 590 (G); Andalgalá, Jörgensen 1074 (G, US); near Fuerte de Andalgalá, Lorentz 363 (BD) and 364 (G, BD); Campo de Pilciao, Schickendantz 172 (NY, K, BD) and 222 (G, BD); Campo de Pilciao, White 95 in pt. (BM); Catamarca, Castillon 1105 (G). TUCUMÁN: Amaicha, Valle Catchaquies, 2000 m., Schreiter 559c (G); Valle de Amaicha, 2090 m., Castillon 2450 (G); Arenal de las Arquitas to las Arcas, Dept. Trancas, 2000 m., Schreiter 2517 (G); Tucumán, 1837, Tweedie (K). SANTIAGO: La Banda, Lillo 6090 (G); Santiago, Gillies 1238 (K). CÓRDOBA: entre Córdoba and Las Salinas Grandes, 1876, Stübel (BD). INDEFINITE: Villavicencio, Gillies (K); no locality, Hosseus 1258 and 1263 (BD).

This species is characterized by its white, or occasionally rosy or yellowish, funnelform corollas and 4 equidistant non-didymous very hairy nutlets. It is very closely related to *H. Greggii* Torr., Bot. Mex. Bound. 137 (1859), of northeastern Mexico and adjacent United States.

60. *H. catamarcense*, sp. nov., strigosum; ramis 1-1.5 dm. longis gracilibus ramosis laxe ascendentibus pallide strigosis; foliis lanceolatis 1-3.5 cm. longis 2-5(-6) mm. latis strigosis 1-3 mm. longe petiolatis, margine paullo revolutis, apice acutis, basi abrupte contractis, infimis oppositis ceteris alternis; floribus racemosis vel rariter axillaribus; racemis lateralibus 2-5 cm. longis cum foliis non suffultis ebracteatis vel pauci-bracteatis; bracteis caducis filiformibus 2-3 mm. longis dum adsunt juxta vel evidenter infra pedicellos lateralibus; pedicellis ascendentibus 2-6 mm. longis; lobis calycis anguste lanceolatis 3-5 mm. longis ca. 1 mm. latis fructum valde superantibus parce strigosis; corolla alba infundibuliformi 7-12 mm. longa, lobis oblongis ascendentibus, faucibus plicatis, tubo intus pubescenti; antheris inclusis medio tubo affixis subsessilibus acuminatis ca. 1 mm. longis; stylo 0.5-0.9 mm. longo stigmatate subaequilongo; fructu lateraliter compresso ca. 3 mm. alto et lato ca. 1.8 mm. crasso strigoso sed maturitate glabrescenti; carpellis in nuculas duas angulatas valde compressas ruptis.

ARGENTINA. CATAMARCA: low and spreading on the dunes, Pilciao, 700 m., April 20, 1917, Jörgensen 1868 (G, TYPE; US, ISOTYPE); Campo de Pilciao, Jan. 1876, Schickendanz 172a (G, BD).

This plant most suggests *H. mendocinum* in flowers and habit, but has the fruit of *H. chrysanthum*. It seems to be most closely related to the latter, as shown by its pubescence, fruit and non-thickened root, although its white, not very firm, short-tubed funnellform corollas are quite different from those of that species. I do not believe that it is a hybrid.

61. **H. chrysanthum** Ph. Anal. Univ. Chile xxi. 401 (1862) and *Linnaea* xxxiii. 187 (1864); Griseb. [Pl. Lorentz. 187] Abh. K. G. Wiss. Göttingen xix. 235 (1874) and [Symb. Argent.] l. c. xxiv. 21 (1879); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893); Hicken, Physis ii. 113 (1916). *H. auratum* Ph. Cat. Pl. Itin. Tarapacá 56 (1891). *Tournefortia ? aurata* Ph. Anal. Univ. Chile xc. 352 (1895).

Western Argentina.

ARGENTINA. RIO NEGRO: vicinity of General Roca, *Fischer 101* (G, NY, US, FM, K, BM). MENDOZA: Mendoza, 1868-9, collector not given (MS; G. photo.); "Mendoza?" *Diaz* (MS, TYPE of *H. chrysanthum*; G, photo.; US, ISOTYPE). LA RIOJA: Vichina, *Hieronymus & Niederlein 289* (BD) betw. Vichina and El Jaquel, Sierra de Troya, *Hieronymus & Niederlein 291* (BD). CATAMARCA: C. del Arenal, 1917, *Jørgensen 1723* (G, US); San José, *Lorentz 372* and *349* (BD); Campo de Pilciao, *White 95* in pt. (BM). TUCUMÁN: Sierra del Cajon, 2100 m., *Venturi 4223* (G); Tipunco, 2000 m., *Schreiter 559b* (G). LOS ANDES: Antofagasta, 1885, *F. Philippi* (MS, TYPE of *H. auratum*; G, photo; K, BD, ISOTYPE).

Schreiter's plant from the province of Tucumán is given as having white corollas. The other collections listed evidently have golden yellow flowers. In all the material examined the corolla is more elongate than in *H. mendocinum* and has a firmer texture with the color of the inner surface more vivid than the outer.

62. **H. Purdiei**, sp. nov., annum 2.5-4 dm. altum; caulibus solitariis erectis sparse adpresseque villosis supra medium ascendenter ramosis rariter ad basem brevissime ramosis; foliis lineari-oblongatis acutis 2-5 cm. longis 2-6 mm. latis laxe ascendentibus enervatis sparse adpresseque hispidis basem versus in petiolum 1-2.5 mm. longum gradatim attenuatis margine revolutis subtus pallidioribus; spicis 1-1.5 dm. longis rigidis terminalibus cum bracteis lanceolatis vel lanceolato-linearibus 4-5 mm. longis strictis hispidis ornatis; calycibus maturis ascendentibus, lobis inaequalibus herbaceis sparse hispidis lanceolatis vel lanceolato-linearibus conniventibus 3-4 mm. longis, pedicello ad 1 mm. longo; corolla alba infundibuliformi 6-8 mm. longa intus dense villosa, tubo 1 mm. crasso cylindrico calycem paullo superanti, faucibus dilatatis, lobis ascendentibus ligulatis obtusis 2-2.5 mm. longis, antheris ovatis acutis ca. 0.8 mm. longis apice penicillatis paullo coherentibus basem versus tubi affixis; ovario

glaberrimo; stigmatate 0.3–0.6 mm. longo subsessile, columna brevi a pilis sparsis rigidis erectis longi-penicillata, disco ca. 0.6 mm. lato; nuculis ca. 1.5 mm. longis in rostrum breve attenuatis dorso valde convexis sparse hispido-villosis in utroque facie fovea elliptica notatis.

COLOMBIA. MAGDALENA: Valle Dapur, Santa Marta, July 1844, Purdie (K, TYPE); Santa Marta, 1845, Purdie (K); Santa Marta, 1849, Purdie (K); Santa Marta, Purdie (G); Chiriguana near Lake Sapatora, Allen 24 (K); Aguachica, Dawe (K). NORTE DE SANTANDER: Ocaña, 1850, Schlim 189 (K, BM).

In gross habit suggesting *H. ternatum* Vahl, but differing in its annual duration, large differently shaped corolla and subsessile hirsute stigmas.

63. **H. filiforme** Lehm. Göttingische gelehrte Anzeigen 1817: 1515 (Sept. 1817); Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 128 (1818) and Asperif. i. 37 (1818); Kunth, Flora i. 603 (1818); HBK. Nov. Gen. et Sp. iii. 86 and 451, t. 204 (1818); Cham. Linnaea iv. 456 (1829); DC. Prodr. ix. 545 (1845); Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893); Chodat, Bull. Herb. Boiss. ser. 2, v. 483 (1905); Pulle, Enum. Pl. Surinam 399 (1906); Herz. Medel. Rijks Herb. xlvi. 10 (1922). *Schleidenia filiformis* Fresen. in Mart. Fl. Bras. viii. pt. 1, 40 (1857). *H. tenue* R. & S. Syst. iv. 737 (1819); Cham. l. c.; Fresen. l. c. 41. *Preslea stenostachya* St. Hil. Voy. Dist. Diam. ii. 434 (1833). *Schleidenia stenostachya* DC. l. c. 558. *H. stenostachyum* Gürke, l. c. 97. *H. helophilum* Mart. Herb. Fl. Bras. 165 (1837); DC, l. c. 544; Schomb. Faun. et Fl. Brit. Guiana 961 (1848); Miquel, Stirp. Surinam 136, t. 40 mal (1850). *H. heliophytum* Gürke, l. c.

Eastern Bolivia and Paraguay northward through Brazil to Venezuela and the Guianas; also in British Honduras and on Trinidad.

BOLIVIA. EL BENI: Reyes, Amazon Basin, 300 m., Cardenas 1381 (G, NY, K). SANTA CRUZ: Yapacani, June 1892, Kuntze (NY, US); Buenavista, 1916, Steinbach (FM); Lagunas Secas de Buenavista, 450 m., Steinbach 3181 (BD); Portachuelo, 400 m., Steinbach 6609 (FM, K, BM, BD); Rio Palometillas, 450 m., Steinbach 6621 (FM, K, BM, BD).

PARAGUAY: Igatimi, Hassler 5452 (G, K, BM, BD); betw. Rio Apa and Rio Aquidaban, Fiebrig 4965 (G, K, BM, BD); upper Rio Apa, Hassler 7760 (BM, BD) and 8114 (G, BM, BD); Rio Apa, Hassler 10992 (BM).

ARGENTINA. MISIONES: Rio Alto Paraná, Niederlein (BD).

BRAZIL. MATTO GROSSO: Santa Cruz, Moore 589 (NY, BM, BD); Serradão near Cujabá, Meyer 812 (BD); Rio Ipicacuarha, Moore 428 (BM); Cujabá, Apr. 1839, Herb. Martius 634 (NY, US, K, BM, BD); indefinite, Nov. 1908, Hoehne 822 (BD). GOYAZ: Natividade, Gardner 3361 (NY, US, BM, K); indefinite, Weddell 3015 (NY); indefinite, Burchell 7901 (US, K), 8311 (G, US, K), 8163 (K), 9085 (G, US, K), 9805 (K). MINAS GERAES: indefinite, St. Hilaire B1492 (NY), Claussen (NY, K) 302 (BM). RIO JANEIRO: indefinite, St. Hilaire B228 (K) and Glaziou 8110 (K, BD), 9982 (BD), 13031 (K, BD). PARÁ: Monte Alegre, Traill 570 (K); Rio Trombetas, Lag. Caypurú, Traill 568 (K); Santarém, Spruce 400 (K); Tapajoz, Spruce

400 (K). AMAZONAS: Manáos, *Traill* 569 (K); Barra, *Spruce* 1115 (G, K). INDEFINITE: no locality given, *Claussen* (G, NY), *Sellow* (G, US, K, BD), *Martius* (BD), *Herb. Mus. Vind.* 1587 (K), *Hoffmannsegg* (Herb. Willd, TYPE of *H. tenue*).

BRITISH GUIANA: Essequibo River, 1881, *Jenman* 1095 (K); Essequibo, *Schomburgk* 321 (BD); indefinite, *Schomburgk* 228 (K) and 351 (US, K, BM, BD).

VENEZUELA. BOLIVAR: Tigrito, *Passarge & Selwyn* 515 (BD); Las Botillas, *Passarge & Selwyn* 302 (BD). INDEFINITE: Orinoco, *Humboldt* 1202 (Herb. Willd, TYPE of *H. filiforme*); ad rivos Orinoco prope Guayaracura, *Humboldt* (Herb. Willd).

A very distinct species which somehow has been frequently confused with *H. procumbens* and *H. fruticosum*. From both species it is readily separated by its sessile stigmas and subulate or filiform bracts. It is a slender annual herb which commonly dries dark. The pubescence is usually fine and closely appressed. The type came from Venezuela along the Rio Apures between El Diamante and San Fernando.

64. ***Heliotropium margaritense*** Hassler, in herb., gracile laxe ramosum sparse strigosum ut videtur annuum; ramis 5–15 cm. longis ca. 1 mm. crassis; foliis linearibus vel lineari-oblongatis 1–2 cm. longis 1–2.5 mm. latis costatis sed enervatis paullo supra medium latissimis basem versus gradatim attenuatis imam ad basem in petiolum 0.7–1 mm. longum abrupte contractis apice acutis margine paullo revolutis subtus pallidioribus strigosis supra in sulca costae strigosis aliter glaberrimis; spicis 5–10 cm. longis densifloris distanter parvibracteatis; calycibus sparse strigosis juventate 1–1.5 mm. longis, maturitate globosis ca. 2 mm. longis, lobis lanceolatis vel elliptico-lanceolatis acutis inaequalibus; pedicellis ascendentibus 0.5–1 mm. longis; corolla infundibuliformi alba (?) ca. 3 mm. diametro ca. 3 mm. longa extus sparsissime strigosa intus in faucibus cum areolis 5 villosis ornata, tubo cylindrico ad 1 mm. longo ca. 0.7 mm. crasso, lobis deltoideis acutis; antheris medio tubo affixis ovatis ad 0.4 mm. longis basi leviter cordulata apicem versus in appendiculam ligulatam brevem puberulentem attenuatis coherentibus; filamentis gracilibus ad 0.1 mm. longis; ovario glabro; stigmatibus sessilibus ca. 0.4 mm. longo, disco ad 0.4 mm. diametro, columna ad 2 mm. longa; nucellis ca. 0.8 mm. longis dorso convexis sparse strigosis, ventre angulatis perforatis.

PARAGUAY: Calcareous region on the upper Rio Apa, *Hassler* 10992 (BD, TYPE; K, ISOTYPE).

Obviously related to *H. filiforme* Lehm., but differing in its coarser pubescence, coherent anther-tips, oblong rather than subulate bracts and nearly glabrous upper leaf-surfaces. In addition the leaves of

H. filiforme are gradually tapered to the petiole whereas those of *H. margaritense*, while tapering toward the base are abruptly contracted just above the petiole. The derivation of the specific name is uncertain. It is to be noted, however, that Hassler, Fedde, Repert. xi. 167 (1912) has used the name for a plant collected near "Cerro Margarita."

65. **Heliotropium ocellatum** Cham. Linnaea iv. 463, t. 5, fig. 5 (1829). *Schleidenia ocellata* Fresen. in Mart. Fl. Bras. viii. pt. 1, 41 (1857).

BRAZIL. INDEFINITE: "Bras. merid.," Sellow (US, K, BD, ISOTYPES). ARGENTINA. MISIONES: Posadas, Barranca del Rio Alto Paraná, 1884, Niederlein 100 (BD).

A rare plant, apparently most nearly related to *H. fruticosum* and perhaps only a southern variety of that species, but differing in its sessile stigma, nearly glabrous corolla-throat and copiously bracted spikes.

66. **Heliotropium polyphyllum** Lehm. Neue Schrift. Naturf. Ges. Halle iii. pt. 2, 9 (1817), Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 136 (1818), Asperif. i. 63 (1818) and Icones 11, t. 8 (1821); Cham. Linnaea iv. 462 (1829). *Schleidenia polyphylla* Fresen. in Mart. Fl. Bras. viii. pt. 1, 36 (1857). *H. foliosum* R. & S. Syst. iv. 737 (1819).

Var. **genuina**. Leaves oblanceolate, usually broadest above the middle; corolla-lobes somewhat ligulate.—Synonymy given above.

Venezuelan Guiana.

VENEZUELA. BOLIVAR: sandbank, Tigrito, Passarge & Selwyn 514 (BD). GUÁRICO: sandy places, La Rubiera near Calabozo, Grisol 17 and 27 (NY). APURE: Rio Apure, Humboldt 808 (Herb. Willd., TYPE of *H. foliosum*); Rio Apure, Bonpland (BD); Orinoco, no collector given (BD).

Var. **Blanchetii** DC. Leaves lanceolate, usually broadest below the middle; corolla-lobes deltoid-ovate.—Prodr. ix. 544 (1845). *Preslea linifolia* St. Hil. Voy. Dist. Diam. ii. 162 and 433 (1833). *Schleidenia linifolia* DC. l. c. 558. *H. linifolium* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *H. bahiense* DC. l. c. 544. *S. bahiensis* Fresen. in Mart. Fl. Bras. viii. pt. 1, 37 (1857). *S. pubescens* Fresen. l. c. 35. *H. pubescens* Gürke, l. c.

Eastern Brazil, usually at no great distance from the coast.

BRAZIL. RIO JANEIRO: Cabo Frio, Ule 4761 (BD), Schenck 3812 (BD), Rose & Russell 20697 (US), Glaziou 8823, 11291 and 13039 (K, BD), Mus. Rio Jan. 14835 (US); Praia do Portal, Cabo Frio, St. Hilaire 11433 (BD, ? ISOTYPE of *P. linifolia*); betw. Campos and Vittoria, 1815, Sellow (BD); Rio Janeiro, Gaudichaud (BD, TYPE of *S. pubescens*); Rio Janeiro, Wilkes Exped. (G, NY). MINAS GERAES: ? Santa Luiza, Glaziou 20424 (NY). BAHIA: Taboleiro near Remanso, Ule 7413 (K, BD); Serra Jacobina, Blanchet 2551 (G, NY,

US, FM, K, BD; ISOTYPE of var. *Blanchetii*); Bahia, *Lockhart* (BD), *Saltzman* (FM, K; ? ISOTYPE of *H. Bahiense*), *Blanchet 92* (NY). ALAGÓAS: near Maceió, *Gardner 1360* (G, NY, US, K, BM). PERNAMBUCO: Pernambuco, 1887, *Ridley, Lea & Ramage* (BM). CEARÁ: Ceará, *Brenning 938* (BD); near Aracaty, *Gardner 1783* (NY, K, BM). MARANHÃO: Maranhão, *Gardner 6073* (K, BM), *Snethlage 162* (BD). INDEFINITE: no locality given, *Sellow* (US), *Gardner 1365* (K), *Blanchet 977* (BM).

All the South American material referable to *H. polyphyllum* appears to be prostrate-spreading and to frequent sandy places. The Brazilian var. *Blanchetii* differs from the typical plant of the Orinoco Valley only in the form of its leaves and corolla-lobes and seems to be most common on dunes along the coast. Its type is said to have come from Serra Jacobina in Bahia, some 300 km. inland. One wonders, however, if the plant actually came from that place since all the other material from Brazil has been collected on or very near the coast. Perhaps they may have been some confusion of data in this particular collection of Blanchet's. The color of the corolla in *H. polyphyllum* seems to be either white or yellow. The corolla-lobes of the Brazilian variety are broader than in the typical form but similar to those plants of Cuba and Florida, cf. *Addisonia* iv. t. 133 (1919), which pass as *H. polyphyllum*. I suspect that *H. bursiferum* Wright, from Cuba, as well as *H. Leavenworthii* Torr. and *H. horizontale* Small from Florida all represent northern forms of *H. polyphyllum* and that they will eventually be treated as varieties of that species.

67. **Heliotropium Hasslerianum** Chodat, Bull. Herb. Boiss. ser. 2, ii. 817 (1902).

PARAGUAY: near Igatimi, Sierra de Maracayú, *Hassler 4761* (G, K, BM, BD; ISOTYPES).

Clearly related to *H. Hasslerianum* and for the present, at least, referred to it are three puzzling collections also from Paraguay. A collection from Sierra de Amambay, *Hassler 11349* (G, K, BM, BD), differs from typical *H. Hasslerianum* in its larger corolla, erect habit, coarse knotty rootstock and large oblong or elliptical leaves which are sparsely strigose underneath and practically glabrous above. The name *H. ovalifolium* Hass., Add. Pl. Hass. i. 18 (1917), nomen nudum, has been applied to it. Another collection, *Hassler 9827* (G, BM, BD), also from the Sierra de Amambay is similar to the preceding but is densely strigose throughout and has smaller flowers. Also associated with *H. Hasslerianum* is *Fiebrig 6325* (G, BM, BD), collected "in regione fluminis Alto Paraná" having small flowers and lanceolate leaves which are sparsely strigose beneath and glabrous above. In habit this last collection is slender and decumbent and

in these regards quite similar to *H. Hasslerianum*. I have not seen the underground parts of *Fiebrig 6325* nor of *Hassler 4761*. *Heliotropium Hasslerianum*, var. *rigida* Chodat & Hass., Bull. Herb. Boiss. ser. 2, v. 483 (1905), based upon *Hassler 7109* from Valenzuela is unknown to me. It is said to be distinguished from *H. Hasslerianum* by having rigid, lanceolate and narrower leaves with blades 2.5–3 mm. broad and 12–15 mm. broad. Fiebrig's collection mentioned is the only material from Paraguay which I have seen that fits the description of the variety. The three collections which I have associated with *H. Hasslerianum* are so different from one another and from the type of *H. Hasslerianum* that one naturally wonders if they do not each represent a distinct species. Since, however, they are intimately related and we have no idea as to the extent of variation which they exhibit in the field, I feel it is best to leave the collections at least temporarily associated with *H. Hasslerianum*. Certainly they are much closer related to that species than to any other.

68. ***Heliotropium pallescens***, sp. nov., erectum; caulibus 2–7 dm. altis solitariis vel pluribus pallidis inconspicue strigosis simplicibus vel supra medium laxe ramosis herbaceis vel rariter basem versus frutescentibus saepissime annuis; foliis caulinis alternis enervatis 1–4 cm. longis 1.5–4 mm. latis ascendentibus lanceolato-linearibus vel oblanceolato-linearibus acutis basi rotundis vel in petiolum ca. 1 mm. longum abrupte contractis, margine integris paullo revolutis supra sparse strigosis vel rariter glabratis, subtus strigosis pallidioribus; spicis 1–4 dm. longis lateralibus et terminalibus cum bracteis ovato-oblongis vel ellipticis acutis 3–5 mm. longis distantibus ornatis; calyce tubo corollae vix breviori breviter pedicellato, lobis valde inaequalibus lanceolatis vel oblongo-lanceolatis strigosis; corolla alba infundibuliformi ca. 7 mm. longa extus sparse minuteque strigosis, lobis ovatis ascendentibus, intus in faucibus sparse villosis; antheris medio tubi insertis apice coherentibus; ovario glabro; stylo 0.3–0.7 mm. longo; stigmatibus 0.5–0.8 mm. longo, disco lato, columna cylindrica; fructibus depresso globosis ca. 2 mm. diametro minute strigosis; nuculis dorso convexis apice non rariter breviter acuminatis ventre in utraque facie medio punctato-ocellatis.

PARAGUAY: Loma Clavel, Gran Chaco, lat. 23° 20' S., Nov., *Rojas* in Pl. Hassler. Parag. no. 2477 (G, TYPE; BM, BD, ISOTYPES); Colonia Risso near Rio Apa, *Malme 1072* (BD); Alto Paraguay, Chaco, lat. 21° S., *Fiebrig 1210* (K, BD); Puerto Esperanza, Sept. 1892, *Kuntze* (NY, BD); Estancia Quatorzede de Maio, Paraguay River, *Robert 841* (K, BM, BD); lower course of the Rio Pilcomayo, *Rojas 199* (BM, BD); Rio Pilcomayo near Asuncion, *Balansa 2035* (K); Pilcomayo River, *Morong 1528* (NY, FM).

This is a very readily recognized species that is related to, and has been confused with, *H. polyphyllum* Lehm. It differs not only in its detached southern occurrence, but also in its pale-green herbage, elongate leaves, erect habit and apparently short-lived root. The plant is annual or at most biennial. The collection made by Balansa, however, is somewhat fruticose below. Unfortunately the root of this collection has not been seen. Most of the specimens seen have dried a very light color. None of them has become dark-colored as is generally the case with *H. polyphyllum*. The plant is very finely and rather sparsely strigose throughout, though in consequence of the light color of the plant this pubescence is not conspicuous. Some of the hairs on the leaves have minute bulbous bases.

69. ***Heliotropium distantiflorum*** Hassler, Add. Pl. Hass. i. 17 (1917).

PARAGUAY: vicinity of Caaguazú, Hassler 9023 (G, BM, BD; ISOTYPES); Sierra de Amambay, Hassler 9777 (BM, BD), 9777a (BD) and 10094 (BM, BD).

The name *H. distantiflorum* Hassler, is a nomen nudum published by Hassler in a pamphlet entitled "Addenda ad Plantas Hasslerianas" which I examined at the British Museum of Natural History. The name is merely associated with two of Hassler's collection-numbers, viz, 9023 and 9777. The plant dries a light brownish and is erect with one to several stems from a thickened perennial or biennial root. The stems and leaves are covered with short stiff very closely appressed hairs, most of which have thickened bases. The nearest relative of the species seems to be *H. pallescens*, also from Paraguay, from which it differs in its coarser pubescence, firmer revolute-margined leaves, smaller flowers and less elongate spikes.

70. ***Heliotropium fruticosum*** L. Syst. ed. 10, ii. 913 (1759) and Amoen. Acad. v. 394 (1759); Lindm. Ark. Bot. ix. no. 6, 3 (1909). (?) *H. humile* Lam. Tab. Encyc. i. 393 (1791); Poir. Encyc. Suppl. iii. 25 (1813); Lehm. Neue Schr. Nat. Ges. Halle iii. pt. 2, 11 (1817) and Asperif. i. 43 (1818); R. & S. Syst. iv. 38 (1819). *H. campechianum* Lehm. Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 137 (1818) and Asperif. i. 69 (1818); HBK. Nov. Gen. et Sp. iii. 86 (1818); Urb. Symb. Ant. iv. 527 (1910) and l. c. viii. 589 (1921). *H. campechiense* Willd. ex R. & S. Syst. iv. 731 (1819). *Schleidenia ovalifolia* Fresen. in Mart. Fl. Bras. viii. pt. 1, 41 (1857). *H. ovalifolium* Fresen. ex Gürke. l. c. 97; not Forsk. (1775). *H. phyllostachyum* Torr. Bot. Mex. Bound. 137 (1859). *H. myosotoides* Chapm. Fl. So. U. S. 330 (1860), not Lehm. (1817). *H. piauhiense* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a. 97 (1893).

Colombia and Venezuela northward in the West Indies and Central America and Mexico to southernmost United States; local in eastern Brazil.

BRAZIL. PIAUHY: dry sandy fields near Boa Esperança, 1839, *Gardner 2261* (K, BM; ISOTYPES of *S. oratifolia*), 2250 (NY).

VENEZUELA. CARABOBO: Hacienda de Cura near San Joaquin, ca. 750 m., *Pittier 7977* (US). TRUJILLO: vicinity of Dividive, *Pittier 10831* (G, NY, US). ZULIA: Veras Altas, road from Maracaibo to Machiques, *Pittier 10501* (G, NY, US); Maracaibo, *Moritz 1312* (K, BM, BD).

COLOMBIA. TOLIMA: Honda, ca. 275 m., *Pennell 3620a* (NY); Mariquita, Llano de Ibaque, 1750 m., *Triana 3751* (BM); Ibaque, 1200 m., *Triana* (BM); betw. Toiama and Ibaque, *Stübel 194* in pt. (BD). HUILA: Altamira, Valle de Rio Magdalena, ca. 800 m., *Lehmann 8682* (NY, K). EL VALLE: Cali, ca. 1060 m., *Pennell 5849* (G, NY, US); Epinal below Dagua, ca. 650 m., *Killip & Hazen 11062* (G, NY); La Paila, *Holton 533* (G, NY, K). CAUCA: Mercaderes, April 29, 1876, *André 2920* (NY, K). NARIÑO: La Union, April 27, 1876, *André 2920* (NY, K). CUNDINAMARCA: Tequendama, 700 m., 1853, *Triana* (BM); Anapoima, 700 m., *Triana* (BM). MAGDALENA: Cienaga, 1926, *Salt* (US); Rio Frio betw. the Cienaga de Santa Marta and foothills, ca. 50 m., *Pittier 1613* (US); Santa Marta, 120 m., *Smith 543* (G, NY, US, FM, K, BD); Rincon Hondo, Magdalena Valley near Lake Saporata, *Allen 196* and *422* (K). ATLANTICO: Barranquilla, *Bertero* (BM); Salgar, ca. 5 m., *Pennell 12063* (G, NY, US, K, BD). INDEFINITE: Das Rio, *Lehmann BT. 685* (NY, K); Patico, Rio Panz, ca. 1200 m., *Lehmann 4547* (K, BD); indefinite, *Lehmann 4044* (BM).

Although quite inappropriate, the specific name *H. fruticosum* L. obviously belongs to the present species. The name was founded upon a description of a collection made by Browne in Jamaica. This collection, now in the Linnean Herbarium, clearly represents the small annual treated here. Linnaeus also referred to a figure given by Sloane in his Natural History of Jamaica. A study of Sloane's herbarium shows that his representation of "*Heliotropium minus, Lithospermi foliis*" is a mixture consisting of two plants of the present species and one of the perennial, *H. ternatum* Vahl. Sloane's illustration is obviously drawn from one of the two plants representing the species here treated. Since both the specimens and the illustration studied by Linnaeus unquestionably belong to the weedy annual herb and not to the coarse perennial plant (*H. ternatum* Vahl), as supposed by past writers, it seems clear that the name *H. fruticosum* should be taken up for the annual species just as Britton & Wilson, Bot. Porto Rico ii. 136 (1925), have recently done.

The name *H. humile* Lam., the subject of very diverse interpretations, I doubtfully refer here. It has been frequently assumed that it is based upon *Tournefortia humilis* L., but this I believe to have been incorrect since only a few pages beyond that on which *H. humile* is established, Lam. Tab. Encyc. i. 393 and 417 (1791), the name, *T. humilis* is maintained as a distinct valid species. The plant from

the Royal Gardens upon which Lamarck, Encyc. iii. 94 (1789), apparently based his *H. humile* was first described two years earlier as representing *H. fruticosum*. A consideration of this description makes me suspect that the plant is the herbaceous annual which I am calling *H. fruticosum*.

The material from the interior of Colombia differs from the typical Caribbean form in usually drying darker, being slightly coarser in habit, in having a loosely appressed or somewhat spreading pubescence and in having less conspicuous bracts. Eventually it will be given some sort of taxonomic recognition, but first its relations to *H. strictum* HBK. must be determined. In many details it seems to be intermediate between *H. fruticosum* and the form of *H. ternatum* called *H. strictum*.

71. **Heliotropium salicoides** Cham. Linnaea viii. 117 (1833). *Schleidenia salicoides* Fresen. in Mart. Fl. Bras. viii. pt. 1, 38 (1857). *H. Claussenii* A. DC. Prodr. ix. 543 (1845). *S. Claussenii* Fresen. l. c. 38 t. 11. *H. rigidifolium* A. DC. l. c. 543. *H. strictissimum* Moric. ex DC. l. c. 544; Moric. Pl. Nouv. Amer. 146, t. 87 (1846). *S. strictissima* Fresen. l. c. 39. *H. glomeratum* A. DC. l. c. 550. *S. glomerata* Fresen. l. c. 39. *S. macrantha* Fresen. l. c. 40. *H. macranthum* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *S. incana* Fresen. l. c. 38. *H. incanum* Fresen. ex Gürke, l. c. 97; not R. & P. (1799). *S. subracemosa* Warm. Kjoeb. Vidensk. Meddel. 1867: 16 (1868). *H. Fresenii* Gürke l. c. 97. *H. Claussenii*, f. *robustior* Chodat, Bull. Herb. Boiss. ser. 2, ii. 816 (1902). *H. maximum* Chodat & Hass. Bull. Herb. Boiss. ser. 2, v. 482 (1905). *H. hispidum*, var. *maximum* Hass. Add. Pl. Hass. i. 17 (1917).

Eastern Bolivia, and northeastern Argentina to Paraguay, Brazil and Colombia.

ARGENTINA. CORRIENTES: Saladas, Feb. 25, 1917, Hauman (G). MISIONES: Santa Ana, Rodrigues 628 (G). ENTRE RIOS: indefinite, Tweedie 134 (K).

BOLIVIA. SANTA CRUZ: Yapacani, 400 m., Kuntze (NY, US); Buena-vista, 500 m., Steinbach 5178 (NY, FM) and 6153 (K, BD); Campo de Buena-vista, 450 m., Steinbach 1998 (BD); Canton de Buenavista, 450 m., Steinbach 1103 (BD).

PARAGUAY: Sierra de Maracayú, Hassler 4940 (K) and 5300 (G, K, BM, BD); Rio Tapiraguay, Sierra de Maracayú, Hassler 5954 (G, K, BM, BD); Igatimí, Sierra de Maracayú, Hassler 5617 (G, K, BM, BD; ISOTYPES of *H. hisp.* v. *robustior*); Yerhales, Sierra de Maracayú, Hassler 5225 (BM); Rio Yhú, Hassler 9528 and 9528a (G, BM, BD); Sierra Amambay, Hassler 12024 (K, BM, BD); Centurion, betw. Rio Apa and Rio Aquidaban, Fiebrig 4388 (G, K, BM, BD); Cerro Chochi, Cord. de Altos, Fiebrig 432 (FM, K, BM, BD); north of the Cordilleras, Fiebrig 884 (FM, K, BD); upper Rio Apa, Hassler 7988 (BM) and 7980 (BM, BD; ISOTYPES of *H. maximum*); Cordillera Central, Hassler 6416 (BM).

BRAZIL. MATTO GROSSO: Serradão near Cujabá, Meyer 815 (BD). RIO GRANDE DO SUL: Porto Alegre, 1837, Tweedie (K). SÃO PAULO: indefinite, Regnell III 911 (US, BD). RIO JANEIRO: indefinite, Glaziou 13033 (NY, K, BM, BD), 13034 (K, BD). MINAS GERAES: Uberaba, Regnell III 911 (US); Diamantina, Schwacke 8201 (BD); betw. Valle fondo and Melancias, Schwacke 8199 (BD); betw. Barreiras and Valle fondo (Sertas), Schwacke 8200 (BD); Lagoa Santa, Warming (G, photo of TYPE of *S. subracemosa*); indefinite, Claussen 229 (G, NY, FM, K), Glaziou 19678 and 20423 (K, BD), St. Hilaire B. 1374 (K), B. 1278 (NY), B. 2138 (K). GOYAZ: betw. Palmital and Amoreiras, Glaziou (NY); indefinite, Gardner 3911 (NY, US, K, BM), 4293 (K), 4294 (K), 4295 (NY, K, BM, BD; ISOTYPE of *S. incana*); indefinite, Glaziou 21774, 21775, 21776, 21777 (K, BD). BAHIA: near Bahia, Blanchet 996 (BM), 3402 (NY, FM, K, BM, BD; ISOTYPES of *H. strictissimum*), 3606 (FM, BM); Tamandia betw. Jacobina and St. Thomé, Blanchet 3843 (BM, ISOTYPE of *H. glomeratum*), 3845 (BM, ISOTYPE of *H. rigidifolium*). PIAUHY: Parnaguá, Gardner 2684 (K). INDEFINITE: no locality given, Burchell 5613 (K), "5910-2" (K), 6664 (G, K), 8051 (K); Sellow (US, K, BD; ISOTYPE of *H. salicoides*); Herb. Vind. 1583, 1586, 1589 (K, BD), 1590 (K, BD; ISOTYPE of *S. macrantha*). COLOMBIA. SANTANDER: Mesa de los Santos, 1500 m., Killip & Smith 15228 (G).

This is a variable assemblage, which can not be sharply separated from *H. ternatum* nor *H. Fumana*, although specimens referable to it are recognizable with scarcely more than a glance. Most of the material dries a dark color and has lanceolate to oblong, thickish, hirsute or strigose-hirsute leaves. This is particularly the case with the material from the southern parts of the range. Typical *H. salicoides* is a form with a dense plush-like somewhat aureate pubescence. *Heliotropium Clausseni* has a coarse, not dense, hirsute pubescence and thickish leaves. It is a common form. *Heliotropium strictissimum*, *H. rigidifolium*, *H. glomeratum* and *H. subracemosum* are all slender forms with spreading pubescence, and small slender, not thickish leaves. *Heliotropium macranthum* is a coarse form of *H. Clausseni* with very large corollas. *Schleidenia incana* is a form with the younger leaves densely appressed white-hirsute. A collection by Gardner, no. 4295a, is also canescent but it has a soft felt-like pubescence and may be only a broad-leaved phase of *H. Fumana*. *Heliotropium Clausseni* f. *robusta* and *H. maximum* are very coarse southern forms of *H. Clausseni*.

72. **Heliotropium ternatum** Vahl, Symb. Bot. iii. 21 (1794); Poir. Encyc. Suppl. iii. 25 (1813); Lehm. Asperif. i. 61 (1818). *Pioc-tonon ternatum* Raf. Sylva Tellur. 88 (1838). *H. fruticosum*, var. *ternatum* DC. Prodr. ix. 542 (1845). *Tournefortia humilis* L. Sp. Pl. ed. 1, 141 (1753) and l. c. ed. 2, 202 (1762); Lam. Tab. Encyc. i. 417 (1791); R. Br. Prodr. 497 (1810). *H. humile* R. Br. acc. R. & S. Syst. iv. 37 (1819), not Lam. (1791). *H. hirtum* Lehm. Neue Schr. Naturf. Ges. Halle iii. pt. 2, 10 (1817), Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 135 (1818), and Asperif. i. 62 (1818); R. & S. Syst. iv.

38 (1819). *H. Ottoni* Lehm. Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 134 (1818) and Asperif. i. 59 (1818). *H. Ottonis* DC. Prodr. ix. 545 (1845). *H. strictum* HBK. Nov. Gen. et Sp. iii. 87 (1818); DC. Prodr. ix. 545 (1845). *H. hispidum* HBK. l. c. 87 (1818) and l. c. 451 (1820). *H. fruticosum*, var. *hispidum* DC. l. c. 543. *Schleidenia hispida* Fresen. in Mart. Fl. Bras. viii. pt. 1, 37 (1857). (?) *H. demissum* R. & S. Syst. iv. 37 and 733 (1819). *T. monostachya* Willd. ex R. & S. l. c. 540; HBK. l. c. 452 (1820). *H. Ottonianum* R. & S. Syst. iv. 733 (1819). *P. antillanum* Raf. Sylva Tellur. 88 (1838). *H. fruticosum*, var. *confertum* DC. l. c. 542. *H. fruticosum*, var. *angustilobum* DC. l. c. 543.

Northern South America northward to Mexico and the Greater Antilles.

VENEZUELA. MÉRIDA: Laderas de San Pablo, 600 m., *Jahn 1090* (US); Lagunillas, 1000 m., *Jahn 671* (G, US). LARA: north of Barquisimeto, *Saer 6* (US). CARABOBO: vicinity of Valencia, ca. 600 m., *Pittier 8890* (G, NY, US, BD); Hacienda de Cura near San Joaquin, ca. 800 m., *Pittier 8229* (US). ARAGUA: Colonia Tovar, *Fendler 907, 909* (G, K). DIST. FEDERAL: La Guaira, 1874, *Kuntze* (NY); Cabo Blanco, *Gollmer* (BD); Playa de Cabo Blanco, *Pittier 10189* (G, NY, US); Gamboa savannas, Carácas, 1000 m., *Pittier 9629* (US); Middle Cotiza near Carácas, ca. 1200 m., *Pittier 7052* (US); Savanna Grande near Carácas, 1855, *Birschel* (K); Carácas, 950 m., *Bailey 111* (US); Carácas, *Humboldt* (Herb. Willd.; TYPE of *T. monostachya*). SUCRE: Cumana, *Moritz 505* (BM, BD); Cumana, *Humboldt* (Herb. Willd. as *H. hispidum*). INDEFINITE: no locality given, *Funcke 543* (BM).

BRITISH GUIANA: near Kamakot, Treng River, 1884-5, *Jenman 3* (US).

This is the common fruticose species of the West Indies which has passed as *H. fruticosum*. In its typical form it is known from South America only in Venezuela and British Guiana. It is distinguished from its numerous and commonly ill-defined relatives by its range, pale color and in being somewhat scabrid and closely though not densely strigose. The plant from the region about Cumana, which was collected by Humboldt and named *H. hirtum* and *H. hispidum*, is typical of the Caribbean form. The form common about Carácas appears to be also the West Indian plant. Material collected there by Humboldt, however, differs slightly from the typical form and shows transitions to the Brazilian *H. salicoides*. It also suggests aberrant material from the interior of Colombia which I have tentatively referred to true *H. fruticosum*. The names *H. Ottoni*, *H. strictum*, *H. Ottonianum* and *T. monostachya* were all based upon Humboldt's collection from Carácas. The most striking variation within the species, as defined here, is a form with elliptical rather than lanceolate leaves. This is known from Venezuela and comes from the region about Carácas. It is represented by *Fendler 909*, *Pittier*

8890, 10189 and by the collections by *Kuntze* and *Gollmer* cited above. No name has been applied to it.

73. **Heliotropium Fumana** (Fresen.) Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *Schleidenia Fumana* Fresen. in Mart. Fl. Bras. viii. pt. 1, 40 (1857).

Brazil and adjacent British Guiana.

BRAZIL. MINAS GERAES: Uberaba, *Regnell III 912* (US, K, BD); indefinite, *Glaziou 20424* (K, BD), *St. Hilaire B. 1952 bis* (K), *St. Hilaire* (K). BAHIA: Jacobina, *Blanchet 3903* (BM); Joazeiro, *Chase 7944* (G). GOYAZ: indefinite, *Gardner 3360* (K). PIAUHY: betw. Canabrava and Boa Esperança, *Gardner 2260* (G, NY, US, K); betw. Cachoeira and Marmaliero, *Gardner 2426* (K, BM, BD). INDEFINITE: no locality given, *Herb. Vind. 1588* (K, BD; ISOTYPE).

BRITISH GUIANA: Ireng Valley, Roraima, *Quelch & McConnell 220* and *302* (K); Rupurunie, *Appon 2203* (K); Konkarmo, Nov. 16, 1884, *Thurn 3* (US, K, BM); no locality, *Schomburgk 189* (K).

The plants referred here appear to be intermediate between *H. ternatum* and *H. salicoides*, though more closely related to the former and perhaps constituting only a Brazilian phase of that species. The concept as here taken is highly unsatisfactory and will no doubt be eventually much changed or entirely done away with. The plants have leaves which are linear to lanceolate and densely strigose especially beneath. It is pale and is not scabrous. The mature calyx is ca. 2.5 mm. long and pale-strigose.

EXCLUDED OR UNIDENTIFIED SPECIES.

HELIOPHYTUM CRISPULUM Fresen. in Mart. Fl. Bras. viii. pt. 1, 45, t. 10, f. 5 (1857). *Heliotropium crispulum* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96 (1893).—Near Rio San Francisco between Tapera and Capão, Minas Geraes, Brazil, *Martius*.—Possibly a phase of *H. angiospermum*.

HELIOPHYTUM ODORUM Fresen. in Mart. Fl. Bras. viii. pt. 1, 45 (1857). *Heliotropium odorum* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 96 (1893); not Balf. f. (1884). *Heliotropium fragrans* Macbr. Proc. Am. Acad. li. 541 (1916)—Minas Geraes, Brazil, *Martius*—Possibly a phase of *H. angiospermum*.

HELIOPHYTUM PASSERINOIDES Klotzsch in Schomb. Fauna & Fl. Brit. Guiana 1152 (1848), nomen nudum.—Auf der Savanne in der Umgebung des Takutu. Strauch. British Guiana, *Schomburgk*—Possibly *H. Fumana*.

HELIOTROPIUM AMERICANUM Mill. Gard. Dict. ed. 8, no. 11 (1768)—“Sent me by the late Dr. Houstoun from Vera Cruz.”—Unrecognized. I searched for the type at the British Museum but could not find it. It is possible that the plant does not belong to the family.

HELIOTROPIUM BRASILIANUM Roth, Nov. Sp. Pl. 103 (1821)—Said to have come from Brazil. It belongs to the section *Orthostachys*.

HELIOTROPIUM CITRIFOLIUM Lehm. Göttingische gelehrte Anzeigen 1817: 1515 (1817); Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 127 (1818); Asperif. i. 32 (1818); R. & S. Syst. iv. 729 (1819).—"Habitat in America meridionali (v. s.)."—Apparently a *Tournefortia* and probably Brazilian.

Heliotropium erectum Vell. Fl. Flum. 69 (1825) and Icones ii. t. 42 (1827)—**TOURNEFORTIA** sp.

HELIOTROPIUM GRACILE R. Br. Prodr. 493 (1810).—This Old World species was reported from Brazil by Don, Gen. Syst. iv. 359 (1838), probably upon a misdetermination.

Heliotropium humifusum of Walp. Nov. Act. Acad. Caes. Leop. Nat. Cur. xix. Suppl. 1, 371 (1843); DC. Prodr. ix. 542 (1845).—This West Indian species is reported by Walpers as occurring in South America. Meyen's collection, the basis of this report is cited thus,—“Peruvia: in planitie circa Tissalomam. Fl. mense Aprili.” At Berlin there is a collection by Meyen determined as *H. humifusum* and given as collected April 1831 at “Pipiloma” at “15000” ft. This collection is *Coldenia paronychioides* Ph. A study of Meyen's account of his journey to Lake Titicaca makes it seem clear that the locality mentioned by Walpers and on Meyen's label both were intended for the locality in extreme southern Peru called Piscacoma, cf. Meyen, Reise i. 463-472 (1834).

Heliotropium lithospermoides Willd. ex Lehm. Nov. Acad. Caes. Leop. Nat. Cur. ix. 140 (1818), nomen; R. & S. Syst. iv. 737 (1819).—This is **LITHOSPERMUM STRICTUM** Lehm.

HELIOTROPIUM MINARUM Glaz. Bull. Soc. Bot. France lvii. Mem. 3e, 479 (1910).—between Sitio and Barbacena, Minas Geraes, Brazil, *Glaziou 15272*—The above is a nomen subnudum, the only descriptive details being that the plant is subfrutescent and has pale yellowish flowers.

Heliotropium microcalyx R. & P. Fl. Peruv. ii. 3, t. 109b (1799).—**TOURNEFORTIA** sp.

Heliotropium oppositifolium R. & P. Fl. Peruv. ii. 2, t. 108b (1799).—**TOURNEFORTIA** sp.

Heliotropium pinnatum Vahl, Symb. Bot. iii. 21 (1794).—**PHACELIA MAGELLANICA** (Lam.) Cov.

HELIOTROPIUM RIGIDULUM DC. Prodr. ix. 540 (1845)—“in Mexico circa urbem Matamoras julio flor. legit cl. Berlandier! (pl. exs. p. 234) et eandem ni fallor in Brasiliâ bor. ad Villam di Barra legit cl. Blanchet (pl. exs. n 2666!).” I have not seen *Berlandier 234*, but *Blanchet 2666*

is clearly *H. procumbens*, and I suspect that *H. rigidulum* will eventually drop into the synonymy of that species.

HELIOTROPIUM RIVINOIDES Hassler, Add. Pl. Hass. i. 17 (1917).—This nomen nudum is associated with *Fiebrig 1439* from Paraguay. I have not seen this collection.

HELIOTROPIUM ROTUNDIFOLIUM Sieb. ex Lehm. Icones 19, t. 30 (1821).—This is a species of the Levant. At the New York Botanical Garden, however, there is a plant evidently representing it which is associated with one of Linden's original labels indicating that the plant was collected in New Grenada in 1842-3. It bears Linden's number 1594. I suspect that there has been some confusion in labeling the collection.

Heliotropium scandens Vell. Fl. Flum. 69 (1825) and Icones ii. t. 41 (1827).—*TOURNEFORTIA* sp.

Heliotropium scorpioides Willd. ex Lehm. Nov. Act. Acad. Caes. Leop. Nat. Cur. ix. 140 (1818), nomen; R. & S. Syst. iv. 737 (1819); not HBK (1818).—*LITHOSPERMUM DISTICHUM* Ortega.

Heliotropium stylosum Ph. Bot. Zeit. xxviii. 500 (1870).—*NEOCARYUM STYLOSUM* (Ph.) Johnston.

HELIOTROPIUM THYMIFOLIUM Vahl. ex Lehm. Neue Schr. Naturf. Ges. Halle iii. pt. 2, 17 (1817); Asperif. i. 67 (1818); DC. Prodr. ix. 543 (1845).—The source of the type is unknown, but is probably West Indian.

Heliotropium tarmense Krause, Bot. Jahrb. xxxvii. 632 (1906).—*TOURNEFORTIA* sp.

SCHLEIDENIA DASYCARPA Fresen. in Mart. Fl. Bras. viii. pt. 1, 37 (1857). *Heliotropium Martii* Gürke in E. & P. Nat. Pflanzenf. iv. Abt. 3a, 97 (1893). *Heliotropium dasycarpum* Fresen. ex Gürke, l. c.—Rio San Francisco near Joazeiro, Bahia, *Martius*; state of Piauhy, *Gardner 2262*; state of Bahia, *Blanchet 3903*.—I have only seen *Gardner 2262*. This is a phase of *H. paradoxum*. I suspect that at least some of the other collections represent *H. polyphyllum* Lehm.

2. NOTES ON VARIOUS BORAGINOIDEAE.

Cryptantha Werdermanniana, sp. nov., annua 5-15 cm. alta hirsuta ascendentem ramosa robusta; foliis lineari-clavatis obtusis hirsutis minute pustulatis 1-3 cm. longis 2-4 mm. latis ascendentibus superioribus paullo reductis; spicis solitariis 2-8 cm. longis ebracteatis; calycibus fructiferis laxè dispositis ascendentibus 7-8 mm. longis basem versus ca. 3 mm. crassis paullo asymmetricis tarde deciduis, basi rotundis cum pedicellis 1-2 mm. longis, lobis linearibus vel lanceolato-linearibus conniventibus sed apicem versus recurvatis

costa cum setis fulvescentibus horridis et in marginibus hispido-villosis; corolla inconspicua ad 4 mm. longa alba, lobis elliptico-obovatis ascendentibus ad 1 mm. longis; ovulis 4; nuculis 4 homomorphis 2.7–3 mm. longis 1.2–1.5 mm. latis lanceolato-oblongis maturitate brunneis densissime tuberculatis basi truncatis vel obtusis apice hebetibus margine angulatis dorso obtusis et infra medium obscure carinatis ventre ca. $\frac{4}{5}$ longitudinis ad gynobasem quadrangularem columnarem ca. 2 mm. longam affixis, sulcis paullo asymmetricis apicem versus clausis basem versus divaricato-furcatis in areolam triangularem parvam abrupte ampliatis; stylo ca. 1 mm. longo quam nuculae conspicue longiori.—CHILE: Cerro de la Copa, Dept. Taltal, 2300 m., Nov. 1925, *Ilse Francke* in *Pl. Chile. Werdermann. no. 1043* (TYPE, Gray Herb.).—A remarkably distinct new species which keys out in my revision, *Contr. Gray Herb.* lxxviii. 33 (1927), with *C. globulifera* (Clos) Reiche and *C. peruviana* Johnston. It is probably most nearly related to *C. globulifera* from which it differs in the size, form and roughenings of the nutlets, long style, much larger calyx, generally more robust habit and very detached northern range. The back of the nutlet is tuberculate with the tubercles very crowded. There is no evident transverse arrangement of the roughenings as in *C. globulifera* or *C. diffusa*. The new species comes from the salitrepampa about 85 km. northeastward from the port of Taltal, in about lat. 25° 4' S. and long. 69° 50' W.

CRYPTANTHA PONDII Greene. Erectly branched rather slender strigose herb 1–3 dm. tall; stems tan-colored, antrorsely strigose; leaves not numerous, linear, obtusish, 1–2(–5 acc. Greene) cm. long, 1–2.5 mm. broad, more or less pustulate and strigose; spikes geminate or ternate (or quadrate acc. Greene), 1–2 cm. long, rather crowded and frequently glomerate, irregularly inconspicuously and shortly leafy-bracted throughout; corolla evident, limb spreading, 2–3 mm. broad; fruiting calyx obovate-oblong in outline, ca. 3 mm. long, somewhat asymmetrical, sessile by an oblique pyramidal base, ascending, tardily deciduous, appressed silky-hirsute; mature calyx-lobes linear-lanceolate, connivent, midrib thickened, unarmed; ovules 4; nutlets 4 or not infrequently fewer, subhomomorphous with the axial (?) one obscurely surpassing the others, smooth or very obscurely and minutely tuberculate above the middle, dark at maturity, 1.2–1.7 mm. long, 0.5–0.7 mm. broad, ovate-lanceolate, back flattened, margins definitely angled; groove nearly closed, medial, abruptly but narrowly forked at base; gynobase subulate, $\frac{2}{3}$ – $\frac{3}{4}$ height of nutlets; style decidedly surpassing the nutlets.—*Pittonia* i. 291 (1889). *C. Bartolomaei* Greene, l. c. ii. 232 (1892); Johnston, *Contr. Gray*

Herb. lxxiv. 103 (1925).—LOWER CALIFORNIA: Bay of San Bartolomé, 1889, *Lieut. Pond 22* (Greene Herb., TYPE of *C. Pondii*; US, ISOTYPE); Bay of San Bartolomé, 1889, *Lieut. Pond* (Greene Herb., TYPE of *C. Bartolomaei*).—During the summer of 1925 I was able to visit the Greene Herbarium now at the University of Notre Dame and took the opportunity to examine the types of *C. Pondii* and *C. Bartolomaei*. These plants are obviously the same species. They were collected at the same locality, on the same date and by the same collector and probably represent different portions of one collection. In 1925, l. c. 62, I incorrectly cited *C. Pondii* as a synonym of *C. patula* Greene, since the plants in the Gray Herbarium, received from Greene and labeled by him as part of the type-collection of *C. Pondii*, are clearly representative of his other species, *C. patula*, and, as seems probable now, part of the type-collection from San Benito Island. The plant in the National Herbarium at Washington, labeled as *C. Pondii*, has not been subjected to mislabeling and clearly represents *C. Pondii* Greene. The species is a very distinct one of uncertain affinities. It is probably best placed in a special Series between *Graciles* and *Ramulosissimae*.

CRYPTANTHA MOHAVENSIS Greene, *Pittonia* i. 120 (1887). *C. fallax* Greene, l. c. v. 54 (1902); Johnston, *Contr. Gray Herb.* lxxiv. 104 (1925).—The type of *C. fallax* has been examined. The species is obviously a synonym of *C. mohavensis*.

CRYPTANTHA CIRCUMSCISSA (H. & A.) Johnston, *Contr. Gray Herb.* lxxviii. 55 (1923). *Piptocalyx circumscissus* Torr. in Wats. *Bot. King Exped.* 240 (1871).—ARGENTINA: annual with white flowers, in sand near Me chat cheel, Neuquen, Nov. 11, 1925, *H. F. Comber 135* (G, K.).—This very distinctive and unmistakable species can now be reported from Argentina since the material obtained by Mr. Comber matches in habit as well as structural details the common plant of western United States. The list of indigenous borages which occur in Argentina and Chile and reappear in United States now consists of *Pectocarya linearis* (R. & P.) DC., *Pectocarya pusilla* (A. DC.) Gray, *Cryptantha albida* (HBK.) Johnston, *C. circumscissa* (H. & A.) Johnston, *Plagiobothrys fulvus* (H. & A.) Johnston, *Lappula Redowskii* (Hornem.) Greene, *Lappula texana* (Scheele) Britt., *Myosotis virginica* (L.) BSP. and *Coldenia Nuttallii* Hook.

Plagiobothrys (§ ? *Allocarya*) **plurisepalus** (F. v. Muell.), comb. nov. Annual; stems prostrate or ascending, 3–15(–20) cm. long, simple or with a few long simple ascending branches, strigose or somewhat hispid-villous, floriferous to the base; leaves sublinear, very gradually tapered towards the base, 1–3 cm. long, 1–2.5 mm. broad,

obtuse, strigose or appressed hispid-villous, occasionally somewhat pustulate, lowest ones crowded into an evanescent rosette; flowers numerous, loosely racemose; bracts linear, foliaceous, remote, extra-axillary or even oppositiflorous; calyx ca. 2 mm. long in flower, more or less villous, divided into 5-8(-9 fide Muell.) linear lobes; fruiting calyces strongly accrescent and asymmetrical, 5-9 mm. long, their lobes conspicuously indurated and thickened at the base and closely investing the fruit, upper parts curved or much contorted; mature pedicels ascending, 1-2 mm. long, coarse; corolla inconspicuous, white but drying brownish, ca. 2 mm. long, subtubular; corolla-lobes 4-6, ovate-orbicular, ascending, small; corolla-throat with weakly intruded puberulent areas alternating with the lobes; stamens 2-5, inserted just below the middle of the tube; ovules 2 or less commonly 4; nutlets 2 or less commonly 4, oblong-ovate, heteromorphic, frequently asymmetrical, pale or somewhat fuscous, the back and sides rounded and roughened with a system of more or less transverse loosely reticulate (frequently high narrow) ridges which anastomose with the medial dorsal keel and below the middle frequently develop at the expense of it, apex frequently cornute, ventral surface keeled prominently to just below the middle; areola cuneate in outline, submedial, sunken below the crest of the keel; axial nutlet usually slightly smaller and broader, dulled with very minute papillae or spicules, most persistent; style reaching to about $\frac{1}{2}$ - $\frac{2}{3}$ height of nutlets.—*Maccoya plurisepalea* F. v. Muell. Frag. Aust. i. 127 (1859). *Rochelia plurisepalea* Druce, Rep. Bot. Exch. Cl. Brit. Isles iv. 644 (1917). *R. Maccoya* F. v. Muell ex Benth. Fl. Aust. iv. 408 (1869).—NEW SOUTH WALES: Bulloo River, 1887, L. Morton; Taretta, Aug. 1887, W. Bauerlen 102; Broken Hill, Oct. 1917, A. B. Black; Murray River, Mueller. SOUTH AUSTRALIA: Arkaringa Creek, May 1891, R. Helms; Mt. Lyndhurst, Sept. 1898, M. Koch 266; Quorn, Oct. 1916, J. M. Black; Hawker, Oct. 1916, J. M. Black; Lake Weatherstone, Flinders Range near Lake Torrens, Nov. 1882, R. Tate; Murray Plains, Aug. 1881, R. Tate; Carrieton, Sept. 1916, J. M. Black.—Because of a superficial resemblance in the calyx and a coincidental development of biovulate flowers this remarkable species since its initial publication has been confused with *Rochelia*. *Rochelia*, however, is only a distant relative being most closely related to *Lappula*, having the nutlet-attachment of that genus and in addition nutlets that are roughened by tuberculations which are crowned by stellate trichomes. The immediate relatives of our plant are found in *Plagiobothrys*, particularly in the section *Allocarya*. In habit, the general characters of the flower and especially in the attachment, form, and markings of the

nutlets our plant agrees perfectly with the section *Allocarya*. In fact as a member of *Plagiobothrys* the species is striking only because of the erratic variation in the number of its floral parts. This remarkable variation, while perhaps characteristic for the species, yields no generic characters, inasmuch as the range of variation exhibited includes that which is normal for *Plagiobothrys*. This may be appreciated by a study of the tabulation given below. The collections dissected are indicated by the letter on the left. The collections cited above have been lettered in the order that they are arranged, thus, for example, "G" refers to Mr. Black's collection from Quorn. The material studied is scanty, but opportunity was usually found for making at least three dissections of each collection.

Collection	Ovules	Anthers	Corolla-lobes	Calyx-lobes
A	2	4	4	5
B	2	2	4	5
C	2	3-5	5	5
D	2	4	4? or 5?	7
E	4	3	5	5
F	4	3	5	5
G	2	4-5	5	7
H	2	3-4	5-6	7-8
I	4	4	5	5
J	2	3	5	7
K	2	4-5	6	7
	<hr/> 2 or 4	<hr/> 2-5	<hr/> 4-6	<hr/> 5-8

The number of floral parts furnishing no differentiae it is evident that the plant must be distinguished by structural differences. The most important of these is the thickened and indurated calyx-lobes which much suggest those of *Cryptantha texana* (DC.) Greene and relatives and to a less extent *P. glaber* (Gray) Johnston and its relatives.

In *P. plurisepalus* the great bulk of the plant is inflorescence, consisting of elongate loosely flowered false racemes (helicoid uniparous cymes). The plant is floriferous almost to the very base, and the stem proper very much reduced. The cauline leaves are hence crowded into a loose rosette. I am unable to state definitely that the lowest leaves are opposite, though I have some indication that they are so. My material is not copious and in most cases is too mature for the settling of this point. As all the species of *Plagiobothrys* have opposite lower leaves, though the pairing of these is sometimes obscured by the shortening of the stem and the consequent crowding into a rosette, it is of particular interest that the presence or absence of them be ascertained in the present species. This is most readily accomplished by some one who has access to plentiful fresh material.

Some of the collections I have cited have been determined as *Eritrichium australasicum*, apparently because they matured 4 nutlets. As here defined the species is taken as characterized by its thickened calyx-lobes and elongate somewhat heteromorphous nutlets. With the calyx-lobes, corolla-lobes and stamens showing erratic departures from the normal number in the group, it is not at all surprising to find the ovules behaving in a similar though less extreme manner. Personally I am surprised that they do not vary more, and that plants with 3 ovules or merely a single one have not been found. In any event the number of nutlets is at best a poor character since even in forms normally producing 4 ovules one to several are frequently aborted and a reduced number of nutlets matured.

For the opportunity of examining a series of specimens representing this and the following species I am particularly indebted to Mr. J. M. Black of North Adelaide, South Australia, who not only shared his specimens with me, but also won the interest of Mr. J. W. Audas of Victoria, who also generously provided me with material. To both of these gentlemen I would here express my cordial thanks for their important assistance without which the notes on these Australian species could not have been prepared.

Plagiobothrys (§ *Allocarya*) **elachanthus** (F. v. Muell.), comb. nov. Annual; stems one to several, erect or prostrate, (including the inflorescence) 5–15 cm. long, simple or with a very few long simple strict branches, usually appressed-villous or hispid-villous; leaves linear, 1–2.5 cm. long, 1–2 mm. broad, obtuse, spreading, sparsely villous or hispid with usually appressed hairs, occasionally pustulate, lower ones opposite, the others alternate; racemes 2–10 cm. long, simple, loosely flowered, interruptedly bracted; calyx ca. 1 or rarely 2 mm. long in flower, divided into 5 erect lance-oblong or rarely linear villous lobes; fruiting calyx 2–3(–5) mm. long, lobes herbaceous, linear; pedicels thickened, ca. 0.5 mm. long, ascending; corolla inconspicuous, white but drying brownish, 1.8–2 mm. long, only shortly surpassing the calyx; limb narrow, 0.8–1 mm. broad, with 5 ascending obovate lobes; throat bearing 5 weakly intruded puberulent areas; stamens 5, borne below the middle of the tube; ovules 4; nutlets 4, lustrous and somewhat glassy, pale or rarely fuscous, angulate, the body ovoid but puckered just above the base ventrally and bearing there the small plane oblong or narrowly triangular slightly oblique attachment scar, almost completely encircled medio-longitudinally with a strong keel which is conspicuously developed above the middle, back and sides coarsely reticulate with prominent ridges which anas-

tomose with the keel particularly below the middle; gynobase pyramidal; style reaching to $\frac{3}{5}$ – $\frac{4}{5}$ height of nutlets.—*Heliotropium elachanthum* F. v. Muell. *Linnaea* xxv. 424 (1852).—VICTORIA: Wattville near Dookie, Oct. 1922, *A. B. O'Dowd*; Wimmera, 1890, *Mueller*; Wimmera, *Dallachy*; Lara, 1923, *A. F. Gates*; Dimboola, *F. Reader*. SOUTH AUSTRALIA: Pt. Lincoln, Oct. 1909, *H. Griffith*; Rocky Creek, Oct. 1851, *Mueller*.—A well marked species previously confused with *P. australasicus* from which it is readily separated by the characters of the nutlets. The body of the nutlet above the base is somewhat drawn out obliquely downward. On the crest of this puckering is found the areola. In this character the plant suggests relationships with the section *Echidiocarya*, as does also the non-compressed body of the nutlet, its reticulate ridging and somewhat vitreous pericarp. The fruit, however, is by no means so definitely stiped as in *Echidiocarya*.

Thanks to the courtesy and interest of Mr. J. F. Rae of the National Herbarium of Victoria, I have had the privilege of examining a portion of the type of *H. elechanthum*. Like the other collection from South Australia, i. e. Griffith's from Pt. Lincoln, Baron Mueller's type is coarser in habit and has slightly larger fruit than the plants I have seen from Victoria.

PLAGIOBOTHRYIS (§ *Allocarya*) AUSTRALASICUS (A. DC.) Johnston. Annual; stems one to several, erect or prostrate, (including the inflorescence) 5–12 cm. long, usually with several strictly ascending simple laterals from below the middle, sparsely strigose; leaves linear, 1–3 cm. long, 1–2(–2.8) mm. broad, obtuse, spreading, glabrous or sparsely appressed short-hispid, lower ones opposite, margins ciliate and frequently pustulate; racemes 3–8 cm. long, remotely flowered, interruptedly bracted, simple; calyx in flower ca. 1.5 mm. long, appressed villous-hispid, divided into 5 erect lance-oblong lobes; fruiting calyx 2–2.5 mm. long, the lobes lanceolate, herbaceous and ascending; pedicels thickened, ca. 0.5 mm. long, ascending; corolla inconspicuous, white but drying brownish, ca. 1.8 mm. long, shortly surpassing the calyx; limb 0.7–1 mm. broad, with 5 ascending obovate lobes; stamens borne just below middle of tube; corolla-throat with 5 weakly intruded puberulent spots; ovules 4; nutlets 4, pale or fuscous, opaque, ca. 1.3 mm. long, compressed-ovoid, angulate, roughened on the back and sides with loosely reticulate ridges that anastomose with the well developed medio-dorsal keel, ventral face with a large areola sunken below the crest of the keel, ventral keel extending down to about middle of the nutlet and paralleled and crowded on either side by wrinkles in the pericarp; areola inframedial, triangular, more

or less excavated, about $\frac{2}{5}$ length of nutlet, not oblique; gynobase pyramidal; style reaching to about $\frac{4}{5}$ height of nutlets.—Contr. Gray Herb. lxxviii. 75 (1923). *Eritrichium australasicum* A. DC. Prodr. x. 134 (1846). *Allocarya australasica* Greene, Erythea iii. 57 (1895).—WESTERN AUSTRALIA: Swan River, 1839, Drummond.—This species is apparently restricted to Western Australia, the forms from eastern Australia passing as this species being in large part at least *P. elachanthus*. It is evidently quite distinct from that species differing in its opaque, more compressed nutlets and very different nutlet-attachment. The areola is decidedly triangular and somewhat excavated and is located on the lower half of the nutlet evidently sunken below the level of the ventral keel. It appears to be rather closely related to *P. procumbens* (Colla) Gray of Chile.

Plagiobothrys orientalis (L.), comb. nov. *Heliotropium orientale* L. Sp. Pl. 131 (1753); Houttuyn, Linn. Pflanzensyst. v. 402 (1779); Lehm. Asperif. i. 73 (1818). *Lithospermum javanicum* Steud. Syst. i. 547 (1825). *Eritrichium plebejum*, var. *tenue* Herder, Act. Hort. Petrop. i. 542 (1872), excl. pl. amer. *Allocarya asiatica* Kom. in Fedde, Repert. xiii. 236 (1914). *P. asiaticus* Johnston, Contr. Gray Herb. lxxiii. 68 (1924).—The type of *Heliotropium orientale* L., since its publication unidentified, is clearly the Kamtchatkan species of *Plagiobothrys*. I compared a collection of Rieder, isotypic of *E. plebejum*, var. *tenue*, and a Kamtchatkan collection made by Kamarov (on Aug. 19, 1908) directly with the type at the Linnean Society and found them remarkably similar and evidently conspecific. The collections of Kamarov and Rieder were from the herbarium at Kew. The type of *Heliotropium orientale* in the Linnean Herbarium lacks detailed data. However the cabalistic symbol associated with the plant was examined by the late B. Daydon Jackson, who informed me that the plant was presumably collected by Steller in Kamtchatka. This would agree with what we know of the distribution of the species represented. More authentic material of the species appears to be preserved at Stockholm. Lindman, Ark. Bot. ix. no. 6, pg. 3 (1909), gives the source of this material as "leg. König in Asia." The accuracy of this I doubt. According to Jackson, Index Linn. Herb. 14 (1912), Linnaeus had collections by König only from Iceland and southern India, in neither of which regions *Plagiobothrys* is known to grow or to be even expected. Hultén, K. Sv. Vet. Akad. Handl. ser. 3, v. no. 1, 5-12 (1927), who gives a very detailed account of botanical exploration in Kamtchatka, does not list König as a collector in Kamtchatka, the only region in which the species represented by the Linnean type is known to grow.

Various authors after Linneus considered the plant to have come from Java. Steudel even went so far as to rename it *Lithospermum javanicum*. I can find no mention of the plant in any of the literature on the flora of Java. The basis for attributing the plant to Java appears to be the statement, "Diese ist . . . in Ostindien, vornämlich in Java zu Hause," which is found in the German edition of the Systema commonly attributed to Houttuyn (for complete citation see Willd. Sp. Pl. i. pg. xxv).

Plagiobothrys gracilis (R. & P.), comb. nov. *Myosotis gracilis* R. & P. Fl. Peruv. ii. 5 (1799). *Echinospermum gracile* Lehm. Asperif. i. 129 (1818). *Rochelia gracilis* R. & S. Syst. iv. 111 (1819). *Pectocarya gracilis* Johnston, Contr. Gray Herb. lxx. 36 (1924).—The type of *Myosotis gracilis* is not a *Pectocarya*, which all authors for almost a century have assumed, but is instead definitely a species of *Plagiobothrys* of the section *Allocarya*. The original collection is said to have come from Concepcion, Chile. The specimen from Ruiz preserved at Berlin shows the plant to have fruit similar to *P. Greenei* of California. The only Chilean material, seen by me, which has similar fruit and habit is a collection made by Baeza in 1917 at Cerrillos in the province of Coquimbo. This plant I recently referred to *P. procumbens*, Contr. Gray Herb. lxxviii. 89–90 (1927). Provisionally, however, I am recognizing both *P. gracilis* and *P. procumbens*, distinguishing the former from *P. procumbens* by the presence of four consimilar nutlets all armed with evident glochidiate subulate appendages. In *P. procumbens* the nutlets are all unarmed or only the axial nutlet is armed with short glochidiate appendages. Just how *P. gracilis* is to be distinguished from *P. Greenei*, if indeed it can be distinguished, has not been determined.

Pectocarya platycarpa Munz & Johnston, comb. nov. *P. gracilis*, var. *platycarpa* Munz & Johnston, Contr. Gray Herb. lxx. 36 (1924).—It having been found that the name *Pectocarya gracilis* (R. & P.) Johnston belongs in the synonymy of a species of *Plagiobothrys*, the occasion is taken for giving specific recognition to the present plant. This plant of the deserts of California, Arizona and Utah is clearly distinct from *Pectocarya linearis* (R. & P.) DC. in its very broad thick nutlet-margins, stiffer habit and different range.

Trigonotis minutus (Wernh.), comb. nov. *Lithospermum minutum* Wernh. Trans. Linn. Soc. ser. 2, Bot. ix. 118 (1916). *Plagiobothrys minutus* Johnston, Contr. Gray Herb. lxxiii. 68 (1924).—I have examined the type of this species at the British Museum. The material is scant but seems clearly to represent a species of *Trigonotis*. It is most certainly not a *Plagiobothrys*.

HAVILANDIA BORNEENSIS Stapf, Trans. Linn. Soc. ser. 2, Bot. iv. 209, t. 16a (1894). *Lithospermum borneensis* Boerl. Handl. Fl. Nederl. Ind. ii. pt. 2, 488 (1899). *Plagiobothrys borneensis* Johnston, Contr. Gray Herb. lxxiii. 68 (1924).

HAVILANDIA PAPUANA Hemsl. Kew Bull. 1899: 107 (1899).—The genus *Havilandia* was incorrectly referred to *Plagiobothrys*, its relations, rather, appear to be with *Trigonotis*, a genus which has a number of species in the temperate areas of the larger islands of the East Indies. The gross habit, texture of the herbage, pubescence and corolla structures are characteristic of that genus. It differs, however, in having nutlets with a definitely basal or very slightly supra-basal attachment. The individual nutlets suggest those of *Zoelleria*.

ZOELLERIA PROCUMBENS Warb. Bot. Jahrb. xvi. 28 (1893).—I have been able to study the type of this monotypic genus at Berlin. I entirely agree with Warburg, who stated that *Zoelleria* was aberrant only as to the number of nutlets. The genus is related to *Trigonotis* and *Havilandia*, which it closely resembles in habit and vegetative as well as floral characters. The nutlets are smooth and obscurely tetrahedral. I do not believe that it merits the recognition as a distinct tribe of the *Boraginoideae* accorded it by Gürke, E. & P. Nat. Pflanzenf. iv. Abt. 3a, 131 (1893). It is simply an aberrant relative of *Havilandia* and *Trigonotis* and like them evidently belonging to the tribe *Eritrichieae*.

Microula Rockii, sp. nov., perennis; caulibus erectis vel decumbentibus 5–20 cm. longis gracilibus herbaceis sparse adpresseque villosis basem versus longe ramosis e radice erecta profunda gracile orientibus; foliis herbaceis obtusis costatis sed enervatis subtus glabris supra sparse adpresseque villosis, inferioribus oblanceolatis vel oblongo-oblanceolatis 2–3 cm. longis 0.7–1 cm. latis basem versus gradatim attenuatis, caulinis 5–18 mm. longis ellipticis vel obovato-ellipticis distantibus ascendentibus; floribus in glomerulos 5–8-floros collectis ad apices ramulorum gracilium paucifoliorum dispositis et a foliis suffultis; calycibus 5-lobatis nigrescentibus herbaceis villosociliatis extus glabris, lobis lanceolatis ascendentibus acutis ecostatis ca. 1 mm. longis, maturitate paulo accrescentibus ovato-lanceolatis ad 2 mm. longis; pedicellis brevibus 1–6 mm. longis gracilibus erectis vel ascendentibus; corolla dilutissime caerulea conspicua 6–10 mm. diametro, lobis obovato-orbicularibus rotundatis patentibus, tubo subcylindrico apicem versus paulo gradatim ampliato 2–2.5 mm. longo 1.5–2.2 mm. crasso fusco calycem paulo superanti, fornicibus 5 trapeziformibus ca. 0.5 mm. altis latere exteriori dense breviterque villosis latere interiori glaberrimis; staminibus inclusis medio tubo

affixis; antheris oblongis ca. 0.7 mm. longis quam filamentis subulatis 2-3-plo longioribus; ovario glaberrimo 4-ovulato; stigmatibus capitato; nuculis 1-4 horizontalibus vel ascendentibus pallidis plus minusve spiculiferis 2.5-3.5 mm. longis basem versus sparse rugosis vel cristatis dorso medio-longitudinali cum areola 2-3 mm. longa angusta prominenti ornatis (marginis areolae obtuse dentatis) ventre per areolam medialem vel paullo submedialem parvam ad gynobasem convexam adfixis.—TIBET: moist meadows of Wanchen nira, between Labrang and Yellow River, alt. 3300 m., July 29, 1926, *J. F. Rock 14511* (TYPE, Gray Herb.); wet meadows of Dzomo la, in alpine region between Radja and Jupar range, alt. 3300 m., July 1926, *Rock 14384* (G). KANSU: alpine meadows in mountains west of Adjüan, east end of Minshan, T'ao River Basin, alt. 3750 m. and lower, July 5, 1925, *Rock 12605* (G).—An extremely well marked species characterized by its large very pale-blue corollas, very fine appressed and inconspicuous pubescence, glabrate lower leaf-faces and very elongate dorsal areola of the nutlets. In lateral view the nutlets much suggest those of a true *Eritrichium*, but the surface of the nutlets and the nature of the dorsal areola point unmistakably to *Microula*. The species is known only from eastern Tibet and southwestern Kansu.

Microula trichocarpa (Maxim.), comb. nov. *Omphalodes trichocarpa* Maxim. Bull. Acad. St. Petersb. xxvi. 500 (1880) and Mém. Biol. x. 681 (1880); Brand, Pflanzenr. iv. Fam. 252, 105 (1921).—I have had the opportunity to study isotypic material of this species at Kew. It is obviously a *Microula* and appears to be most related to *M. myosotidea*. A collection from Gargannar in southwestern Kansu collected by R. C. Ching, no. 919, is referable to the species.

Microula Forrestii (Diels), comb. nov. *Omphalodes Forrestii* Diels, Notes Royal Bot. Gard. Edinburgh v. 169 (1912); Brand, Pflanzenr. iv. Fam. 252, 105 (1921). *M. hirsuta* Johnston, Contr. Gray Herb. lxxv. 48 (1925).—The type of *M. Forrestii* and *M. hirsuta* came from the same mountain-mass and are obviously synonymous.

II. A NEW SPECIES OF JUNCUS FROM COLOMBIA

BY C. A. WEATHERBY

JUNCUS Andreanus n. sp., perennis, rhizomate perbrevis, radicibus fibrosis; culmis dense caespitosis gracilibus basi non incrassatis teretibus vel leviter compressis leviter vel nequaquam striatis 2–4.5 dm. altis; vaginis basalibus stramineis vel rubro-tinctis laxiusculis margine hyalino, infimis folii rudimentum subulatum circa 2 mm. longum apice gerentibus, superioribus laminis subteretibus canaliculatis gracilibus culmo plus minusve brevioribus instructis; auriculis brevibus subcoriaceis obtusis; inflorescentia pauciflora valde glomerata circa 1.5 cm. lata vix ultra 1 cm. alta, a bractea culmo simili plus minusve superata, ramis brevibus patentibus; floribus prophyllatis, bracteis scariosis late ovatis acutis vel obtusiusculis; perianthii segmentis consimilibus 3–4 mm. longis ovato-lanceolatis acuminatis medio rubro-castaneis aetate brunneis margine hyalinis pallidis adscendentibus fructum obtegentibus; staminibus sex perianthio duplo brevioribus, antheris circa 1 mm. longis filamentis subaequantibus; ovario fere uniloculare, placentis in parietibus subsessilibus; capsulis ovoideis truncato-obtusis stramineo-brunneis vel superne castaneis textura ex comparatione tenui perianthio subaequantibus vel paullo brevioribus; seminibus oblongo-ovoides ecaudatis circa 0.3 mm. longis.—COLOMBIA: Facatativá, Dept. Cundinamarca, alt. 2680 m., June 16, 1875, *André*, no. 624, type in Hb. Gray; meadow in sabana, alt. 2600 m., Zipaquira, Cundinamarca, Oct. 20–24, 1917, *Pennell*, no. 2558 (distributed as *J. imbricatus*); eastern slope of Páramo de las Coloradas, above La Baja, Santander, alt. 3900 m., Jan. 27, 1927, *Killip & Smith*, no. 18483.

Juncus Andreanus is a well-marked, apparently local species of the *Poiophylli*, belonging to § 9 of Buchenau's treatment in the Pflanzenreich. The two other South American species of that division differ from it as follows. *J. capillaceus* Lam., of the southern Andes, has the bases of the culms somewhat thickened; a very long bract making the inflorescence appear lateral; green, merely acute or obtusish perianth-segments, the inner broader with narrow median band and very wide hyaline margin; and oblong-ovoid triseptate capsule. *J. imbricatus* Laharpe, of wide range in the Andes, is of coarser habit, with strongly striate culms and leaves, larger flowers, and oblong-ovoid capsule definitely exceeding the perianth. *J. setaceus* Rostk. of North America has generally stouter culms, a very long bract, larger flowers (about 5 mm. long), green, stiff, coriaceous perianth-segments strongly spreading in fruit, a globose-conic, apiculate, woody capsule, and larger seeds (0.6–0.8 mm. long).

III. SOME UNDESCRIBED AMERICAN SPERMATOPHYTES

BY I. M. JOHNSTON.

Mastigostyla, gen. nov. Iridacearum. Perianthii segmenta basi erecta et breviter connata deinde patentia multo inaequalia, 3 exteriora oblongo-obovata conspicua unguiculata, 3 interiora inconspicua multo minora lanceolato-lineara acuta vix patentia. Stamina 3, filamentis in tubum cylindraceum connatis, antheris in tubo subsessilibus erectis cum styli ramis ut videtur alternantibus. Ovarium oblongum glabrum 3-loculare, loculis multi-ovulatis. Stylus intra tubum stamineum filiformis, ramis 3 furcatis membranaceo-marginatis apice obtusis stigmatosis latere interiori sub apice flagellum longissimum gerentibus. Capsula oblonga apice truncata loculicide 3-valva. Semina angulata rugosa opaca.—Bulbus tunicatus. Folia pauca anguste linearia. Spathae oblongae pedunculatae terminales vel laterales vix acuminatae. Flores in spatha pauci pedicellati, bracteis exterioribus spathae subsimilibus, interioribus inclusis tenuioribus scariosis.—Nomine a μάστιγος, flagellum, et οτύλος, stylus, derivatur.

A very well marked genus of uncertain affinities. In the *Natürlichen Pflanzenfamilien*, ii. Abt. 5, 144 (1887), it keys out as a member of the *Iridoideae-Tigridinae*. Of the three genera of that group it seems to have most in common with *Alophia* and I suspect it is closely related to it. The style of *Mastigostyla* is very peculiar. The basal stalk of the style is sheathed by the united filaments. The three style-branches are each deeply forked, the six lobes each produce a long contorted subapical flagellate appendage. The stigmatic surface apparently tips each lobe of the branches. The style-branches and their lobes are membranously wing-margined and so appear to be very strongly compressed radially to the axis. Each flagellum is decurrent for the length of the axial face of the lobe. This decurrent base of the flagellum appears as a third wing similar in structure and breadth, and perpendicular to the two lateral wings of the lobe. The stigmas reach to about the tips of the anthers and the flagella, of course, much surpass them. I have been unable to determine definitely whether the style-branches were opposite or alternate with the stamens. The latter condition, however, seems to be the case.

Mastigostyla cyrtophylla, sp. nov., glaberrima; bulbis 2–3 cm. longis 1.5–2 cm. crassis ovoideis brunneis; caulibus 1–3 dm. altis simplicibus vel furcatis nodis saepe 2; foliis 3–4 remotis 10–40 (supremis 4–6) cm. longis 2–4 mm. latis conduplicatis arcuatis multi-

nervatis; bracteis spathae exterioribus 2 ca. 3 cm. longis acutis siccatis plumbaceis vel purpurascensibus; perianthio azureo vel violaceo, lobis imam ad basem breviter connatis in parte (5–7 mm. longa) infima plus minusve erectis supra patentibus, lobis exterioribus 2.7–3 cm. longis 1–1.2 cm. latis lamina oblongo-obovatis apice rotundis subulate 8–10 mm. longe unguiculatis, lobis interioribus lanceolato-linearibus 12–14 mm. longis 1–1.5 mm. latis acutis; staminibus monodelphis, filamentis in tubo 8 mm. longo confluentibus; antheris 5–6 mm. longis rectis; styli ramis 3 infra medium bilobatis 5 mm. longis membranaceo-marginatis 1–1.3 mm. latis tenuibus, lobis ca. 3 mm. longis apicem versus flagellum gracile 8 mm. longum contortum gerentibus, flagello ad latus axillare styli 2–3 mm. longe decurrenti; capsulis 10–12 mm. longis 4–5 mm. crassis; seminibus brunneis 2–2.5 mm. longis undulato-rugosis opacis sub lente densissime minutissimeque tuberculatis.—PERU: sandy pampa, 2400–3600 m. alt. on southern slopes of Chichani north of Arequipa, March 1920, *Hinkley 16* (TYPE, Gray Herb.); open sandy soil above Arequipa, 2500–2600 m., April 1925, *Pennell 13172* and *13173* (G).—A slender plant producing few narrow gracefully recurved plicate leaves. According to Pennell the corolla is violet and is either unspotted or spotted with a darker color. The Hinkleys gave the color as blue.

Roupala loxensis, sp. nov., frutex vel arbuscula; ramulis rigidis maturitate glabris et fuscis juventate ferrugineo-velutinis; foliis alternis simplicibus rigide coriaceis ovatis 5–9 cm. longis 3.5–7 cm. latis integris apice obtusis basi rotundis vel subcordatis supra lucidis glaberrimis, subtus opacis cum nervis perlaxe reticulatis prominulis basem versus circa costam plus minusve velutinis aliter glabris; petiolis ascendentibus 1–3.5 cm. longis velutinis subteretibus; racemis axillaribus conspicue ferrugineo-velutinis 15–21 cm. longis sessilibus folia evidenter superantibus; pedicellis 1–2 mm. longis basem versus connatis; perianthiis 7–10 mm. longis subclavatis; lobis perianthii intus albis siccatis rubescentibus, extus dense ferrugineo-velutinis; antheris linearibus 2–3 mm. longis; stylo glabro in stigmatem sensim subincrassato; ovario globoso dense ferrugineo-velutino; folliculis 2–2.5 cm. longis 10–12 mm. latis obliquis oblongis compressis glabrescentibus.—ECUADOR: between La Toma and Loja, 1800–2600 m., Sept. 4, 1923, *Hitchcock 21414* (TYPE, Gray Herb.); between Loja and Portovelo, Oct. 1918, *Rose, Pachano & Rose 23320* (G).—Related to *R. cordifolia* HBK. which also comes from southern Ecuador. It differs from that species in the shape and entire margin of the leaves, spreading pubescence and shorter connate pedicels.

Roupala brachybotrys, sp. nov., arborea; ramulis gracilibus,

maturitate glabratis et cinerascentibus, juventate brunneo-strigosis cum pilis minutis et arcte adpressis; foliis glabris coriaceis alternis 4–6 cm. longis 1.5–3 cm. latis ellipticis vel lanceolato-ellipticis bicoloribus, apice acutis vel obtusiusculis, basi acutis in petiolum canaliculatum gracilem 7–18 mm. longum attenuatis margine integris vel irregulariter remoteque obtuso-dentatis, supra lucidis, subtus opacis cum venis saepe distinctis tenuibus leviter prominulentibus; spicis axillaribus multifloris densis 2–3.5 cm. longis 1.5 cm. crassis foliis evidenter brevioribus, rachibus dense brunneo-strigosis; pedicellis gracilibus distinctis 1–2 mm. longis strigosis; perianthiis albis (siccatis nigris) glaberrimis clavatis 6–7 mm. longis, lobis linearibus apicem versus paullo ampliatis; antheris angustis 1.5 mm. longis; stylis tenuibus glabris incluso stigmatate clavato 5–6 mm. longis; ovario brunneo-strigoso; folliculis ignotis.—ECUADOR: between El Tambo and La Toma, Prov. Loja, 1000–2200 m., Sept. 3, 1923, *Hitchcock 21366* (TYPE, Gray Herb.).—Related to *R. complicata* HBK. but differing in its smaller leaves, short racemes and small glabrous flowers.

Muhlenbeckia dumosa, sp. nov., fruticosa 5–10 dm. alta vix volubilis glaberrima ramosissima; ramis erectis sulcato-angulatis cortice brunneo obtectis, internodiis 1–2 cm. longis; ocreis laxis diu persistentibus; foliis coriaceis concoloribus obscurissime nervatis numerosis, lamina integerrima elliptica basem versus saepe angulata 15–35 mm. longa 6–15 mm. lata acuta basi cuneata et inde in petiolum gracilem 5–8 mm. longum transmutata; floribus fasciculatis vel solitariis rare brevissimeque racemosis hermaphroditis flavis, pedicellis 2–3 mm. longis gracillimis bractea parva longioribus; perianthii profunde 5-lobi lobis ellipticis ca. 2 mm. longis rotundis patentibus; staminibus 8, filamentis gracilibus perianthio brevioribus; stigmatibus subcapitatis nudis, stylo brevissimo; achaenio ca. 3.5 mm. longo a sepalis auctis investito nigrescenti ovoideo obtuse triquetro obscure verrucoso-rugoso subnitido basi rotundato.—PERU: rocky ravines on southern slope of Chichani north of Arequipa, ca. 2500 m., *Hinkley 48* (TYPE, Gray Herb.); open rocky slope above Arequipa, ca. 2800 m., April 1925, *Pennell 13246* (G). BOLIVIA: La Paz, 3000 m., *Bang 132* and *Rusby 1026* (G).—This plant has been confused with *M. rupestris* Wedd. and *M. chilensis* Meisn. The former is a very close relative but is a subespitose diffuse plant with smaller leaves which are not angulate at the base. The latter species has more or less twining twigs and its flowers are borne in well developed racemose clusters. The correct combination for it has not been published, and may be recorded as follows:

Muhlenbeckia hastulata (Sm.) comb. nov. *Rumex hastulatus* Sm. in Rees Cyclop. no. 29 (1819). *M. chilensis* Meisn. in DC. Prodr. xiv. 148 (1856).

Tetragonia vestita, sp. nov., annua herbacea 5–15 cm. alta laxè sparseque ramosa; ramis laxè ascendentibus vel decumbentibus canescentibus, infimis oppositis ceteris alternis, cum pilis asymmetricis crassis subulatis vel conicis ca. 1 mm. longis villosis; foliis ovatis vel oblongo-ovatis 2.5–6 cm. longis 1.5–3 cm. latis flavo-virentibus concoloribus patentibus subcarnosis trinerviis crystallino-papillosis et saepe sparse villosis apice obtusis basi subsessilibus deltoideis; floribus axillaribus solitariis; calyce monophyllo 4–5 mm. longo quadrifido, lobis petaliformibus latis obtusis 3–3.5 mm. longis ad 3 mm. latis externe villosis interne glabris luteis; corolla nulla; staminibus 15–20; filamentis capillaribus flavis; antheris oblongis flavis; stigmatibus 5–7; ovario conspicue villosa 5–7-loculato et -ovulato; fructibus ad 5 mm. longe pedicellatis subglobosis obscure quadricostatis ca. 6 mm. longis; seminibus 5–7.—PERU: frequent in dryish places in and just below the fertile belt in the hills directly back of Mollendo, Dept. of Arequipa, Oct. 16, 1925, *Johnston 3553* (TYPE, Gray Herb.).—A very distinct species readily recognized by its villous pubescence and its obscurely angled 5–7-celled fruit. The subulate or conical single-celled hairs are peculiar and are very abundant on the younger parts of the stem and on the ovary.

Portulaca peruviana, sp. nov., perennis; radice elongata crassa valida; caulibus gracilibus decumbentibus vel laxè ascendentibus 3–9 cm. longis saepe ramosis ad axillas foliorum perbreviter dense pilosis aliter glabris, internodiis 2–5 mm. longis; foliis alternis ascendentibus oblongis vel anguste sublanceolatis vel etiam spathulatis 5–10 mm. longis 1–2 mm. latis carnosissimis compressis apice acutis vel rotundis; capitulis bracteis 4–5 euphyllodeis oblongis vel lanceolatis 4–6 mm. longis involucri ca. 3-floris; calyce supra rupturam ad 4 mm. longo lobis 2 in quintam partem longitudinis basi connatis triangularibus acutis; corolla rubra 15–18 mm. diametro lobis 5 anguste obovatis quam sepalis duplo longioribus; capsulis subsessilibus globosis vel breviter globoso-ovoideis 2–3 mm. longis basem versus circumscissè dehiscentibus parte superiore nitentibus cum calyce et corolla cohaerentibus emarcescentibus coronatis, parte inferiore stramineis subdiciformibus; seminibus nigrescentibus reniformibus subnitidis cum tuberculis ad 0.5 mm. diametro depressis stellato-radiantibus non prominentibus notatis.—PERU: open rocky slopes, Tingo, Dept. Arequipa, 2200–2300 m., *Pennell 13140* (TYPE, Gray Herb.); sandy pampa, southern slopes of Chichani above Arequipa, *Hinckley 1* (G); Arequipa, 1892,

A. E. Douglas (G).—This species belongs to the group of *P. pilosa* L. and is characterized by its perennial habit, purple or red flowers and basally circumscissile capsule. Though the minute stellate scales which cover the seed are not prominent, they seem to stand out individually more plainly than in those species in which the crowded scales are drawn up into a strong boss or tuberculation. The whole scale in *P. peruviana* seems to be thickened rather than merely umbonate as in most species.

Calandrina adenosperma, sp. nov., perennis glaberrima glaucescens robusta ad 4.5 dm. alta; caulibus erectis subsimplicibus pluribus subteretibus basem versus 4–5 mm. crassis e caudice prostrato fruticoso crasso ramoso erumpentibus; foliis carnosissimis sed non crassissimis ad basem caulis laxe rosulatis, supra rosulam valde reductis remotis saepissime 2; foliis rosulatis obovatis vel oblongo-ovatis 5–10 cm. longis 3.5–6 cm. latis integerrimis apice obtusis vel breviter acuminatis a parte supra medium basem versus in petiolum latum gradatim contractis; foliis supra rosulam ovatis vel orbiculari-ovatis subamplexicaulibus 2.5–5 cm. longis 2–3.5 cm. latis apice obtusis; inflorescentia racemosa 5–10-flora simplici vel furcata conspicue bracteata; bracteis oppositis scariosis orbicularibus vel ovatis amplexicaulibus ca. 1 cm. longis; pedicellis elongatis ascendentibus quam bracteis 3–7-plo longioribus infimis ad 6 cm. longis, superioribus brevioribus; sepalis orbicularibus 8–10 mm. longis obscure delicateque nervosis viridibus vel basem versus plus minusve scariosis apice rotundis vel latissime obtusis; petalis elliptico-obovatis rubris ca. 8–10 cm. longis quam sepalis paullo longioribus; staminibus numerosis; capsula subglobosa sepalis paullo breviori 3 (vel rariter 4)-valva ca. 8 mm. longa; seminibus numerosis ca. 0.9 mm. longis nigris opacis cum papillis brunneis capitulo-glanduliferis echinatis.—PERU: sides of ravines on southern slopes of Chachani, north of Arequipa, 2700 m., March 1920, *Hinckley 35* (TYPE, Gray Herb.).—A member of the group centering around *C. grandiflora* Lindl. It is characterized by its small corolla, conspicuous bracts, glandular echinate seeds, peculiar habit and isolated northern range.

Spergularia collina, sp. nov., annua herbacea 5–10 mm. alta abundanter breviter glanduloso-villosa laxe dichotomo-ramosa; ramis laxe ascendentibus teretibus cum internodiis 1–2 cm. longis; foliis linearibus patentibus compressis carnosulis 1–2 cm. longis 1–2 mm. latis cuspidulatis; stipulis ovatis scariosis acuminatis et saepe plus minusve laceratis basem versus connatis ca. 1 mm. longis; floribus axillaribus; pedicellis gracilibus 1–2 cm. longis patentibus vel reflexis foliis aequilongis vel eis longioribus; sepalis anguste oblongis 4–5 mm.

longis 1-1.5 mm. latis obtusis viridibus margine scariosis; petalis albis elliptico-oblongis sepalis paullo brevioribus ca. 1.7 mm. latis apice rotundis et integris; staminibus 10 paullo inaequilongis ovarium superantibus; filamentis quam antheris 6-7-plo longioribus; ovario ovoideo-ellipsoideo breviter stipitato; stylis 3 distinctis ad 0.8 mm. longis; capsula ovoidea sepalis paullo breviori ca. 2.5 mm. crassa; seminibus nigris opacis homomorphis compressis ca. 0.4 mm. longis exalatis vel saepe cum margine acuto munitis tuberculatis vel rariter glanduloso-muriculatis.—PERU: sandy open place at lower edge of the fertile belt in the hills back of Mollendo, Oct. 16, 1925, *Johnston 3568* (TYPE, Gray Herb.).—Apparently a member of the group of *S. diandra* (Gurs.) Boiss., in which it is distinguished by the length of its petals, its 10 well developed stamens and roughened seeds. It is the plant from Mollendo reported and figured by Weberbauer, Engler & Drude, *Veg. Erde* xii. 144, fig. 9 (1911), as *Drymaria molluginea*. This determination is most obviously incorrect for *D. molluginea* is a glabrate glaucescent plant of Mexico and a true *Drymaria* having bifid petals and 5 stamens.

Spergularia congestifolia, sp. nov., perennis; caulibus prostratis pluribus ramosis 2-8 cm. longis e radice valida erecta profunda emergentibus a pedunculo ascendente glanduloso villosa 3-8 cm. longo terminatis, internodiis brevibus 1-4 mm. longis; foliis congestissimis lineari-setaceis falcatis antrorse hispidulis plus minusve glandulosis 3-9 mm. longis 0.5-1 mm. latis cuspidulatis cinerascentibus quam internodiis longioribus; stipulis hyalinis albidis oblongis foliis subaequilongis in pilis villosis longis profunde laciniatis basem versus connatis; floribus 3-12 in cymam laxam parvibracteata dispositis; pedicellis 5-12 mm. longis ascendentibus; sepalis lanceolato-oblongis breviter villosis glandulosis 4-5(-6) mm. longis 1-2 mm. latis apice obtusis margine scariosis; petalis albis ca. 6 mm. longis et 4 mm. latis ovato-ellipticis quam sepalis paullo longioribus apice rotundis; staminibus 10 biseriatis 3.5-4 mm. longis ovario oblongo-elliptico longioribus; stylis 3 basem versus coalescentibus; capsulis 3-valvis ca. 5 mm. longis ad 3 mm. crassis ovoideis quam sepalis paullo longioribus; seminibus exalatis, maturis ignotis.—PERU: prostrate on open places in the fertile belt in the hills back of Mollendo, Oct. 16, 1925, *Johnston 3567* (TYPE, Gray Herb.).—This species is related to *S. fasciculata* Ph. and ***S. Stuebelii*** (Hieron.) Johnston (*Tissa Stuebelii* Hieron. Bot. Jahrb. xxi. 308 (1895)), but quickly distinguished by its prostrate habit, very congested numerous leaves and large excessively lacerate stipules. The vegetative parts of the plant are reminiscent of those of *Cardionema* (= *Pentacaena*).

Alchemilla Parodii, sp. nov., annua multicaulis; caulibus prostratis vel ascendentibus gracilibus villosis 3–15 cm. longis; foliis flabellatis adpresse villosis, lamina 3–6 mm. longa 5–8 mm. lata basi obtusa tripartita, segmentis 3–4-fidis, laciniis oblongis vel linearibus; stipulis inciso-dentatis amplexicaulibus villosis ad petiolum 3–5 mm. longum adnatis; floribus oppositifoliis glomeratis parvulis 2–2.7 mm. longis breviter pedicellatis, glomerulis 5–10-floris; hypanthio 1–1.3 mm. longo obovoideo basem versus attenuato extus 8-costato inter costas glabras breviter villosis intus glaberrimo, 4 sepalis et 4 bracteolis hypanthii consimilibus erectis vel ascendentibus 0.9–1.5 mm. longis paullo inaequalibus villosis subulatis acutis; achaenio ovoideo solitario; stamine ad fauces hypanthio in discum angustissimum affixa. —ARGENTINA: Manantiales, Prov. Buenos Aires, Nov. 12, 1925, *Parodi 6664* (TYPE, Gray Herb.); Avellaneda, Prov. Buenos Aires, Oct. 11, 1925, *Parodi 6530* (G); Palermo, Buenos Aires, Oct. 17, 1926, *Parodi 7313* (G).—This interesting herb is a member of the section *Aphanes* and much resembles *A. arvensis* L., with which it has been confused. It is readily separated from *A. arvensis*, however, by having subulate rather than deltoid or ovate sepals and hypanthium-bracteoles. In addition the sepals and bracteoles equal or surpass the hypanthium in length and the hypanthium averages slightly smaller and more prominently ribbed than in *A. arvensis*. According to Prof. Parodi the new species is widely distributed and frequently very abundant locally on the virgin meadowy pampa in the Prov. of Buenos Aires and adjacent Santa Fé and Córdoba. Its wide occurrence in undisturbed situations, in addition to its morphological peculiarities, give strong arguments for considering the plant indigenous to Argentina.

With the species I associate the name of Dr. Lorenzo R. Parodi, the well known and scholarly agrostologist of the University of Buenos Aires. Prof. Parodi has been very generous and helpful in his relations with the Gray Herbarium and hence it is with pleasure that I name this plant after him and acknowledge my appreciation for his many kindnesses.

Wendtia miniata, sp. nov., fruticans 1 m. alta ramosissima; ramulis floriferis ad 1 mm. crassis gracilibus obscure sericeo-pubescentibus; ramis vetustis lignosis tenuibus fuscis; foliis numerosissimis oppositis firmis 3–5 mm. inter sese distantibus simplicibus oblanceolatis integris juventute sparsissime inconspicueque adpresso-villosis vetustate glabratis 5–8 mm. longis 1–2 mm. latis apice late acutis basi in petiolum gracillimum 1 mm. longum attenuatis; floribus terminalibus ca. 1 cm. longe pedicellatis; involucris 6–7 mm. longis linearibus

aliquid in lobos furcatis minute pubescentibus; sepalis oblongo-lanceolatis ca. 7 mm. longis 2–2.5 mm. latis graciliter acuminatis; petalis obovatis 1.4–1.5 mm. longis ca. 8 mm. latis apice rotundis vel obtusis miniatis; staminibus 10, 5 cum filamentis 3 mm. longis alternis cum filamentis 2 mm. longis; antheris ovoideis; ovario globoso dense argenteo-strigoso; stigmatibus 3 (? vel rariter 4) ca. 3 mm. longis lineari-ligulatis; capsula ad 5 mm. longa 3- vel rariter 4-loculata glabrata loculicidaliter dehiscenti, seminibus in loculis 1 (? vel 2).—**ARGENTINA:** in gulches, Cuesta de Miranda near Chilecito, La Rioja, ca. 2300 m., Jan. 30, 1927, *L. R. Parodi* 7821 (TYPE, Gray Herb.).—A very well-marked species differing from all known congeners in the color and large size of its corolla. According to Prof. Parodi its petals are vermilion. The species seems to be most closely related to *W. calycina* Griseb., but differs from it, in addition to the corolla-characters mentioned, in its biseriate stamens, simple or merely furcate involucre bracts, scantier pubescence, and smaller differently shaped leaves.

Geranium Parodii, sp. nov., acaule perenne caespitosum humile; radice verticali 5–8 mm. crassa apice breviter furcata paucicipite; foliis omnibus basalibus, petiolis 1.5–8 cm. longis minute apicem versus saepe densissime subsericeo-strigulosis, laminis 1.2–1.8 cm. latis crassiusculis strigulosis ambitu reniformi-rotundis palmate 5–7-partitis lobis plus minusve lato- vel ovato-cuneatis et varie incisis, lobo medio saepe usque ad medium palmate 3–5-lobulato, lobulis oblongis vel oblanceolato-oblongis obtusiusculis; stipulis petiolo usque ad $\frac{2}{3}$ adnatis extus medio-longitudinaliter pubescentibus parte libera lanceolata acuta; pedunculis solitariis basilibus unifloris ebracteatis 1–1.8 cm. longis breviter et satis dense incano-subsericeis obsitis; floribus folia vix superantibus; sepalis elliptico-oblongis ad 6 mm. longis 2.5 mm. latis conspicue trinervatis; petalis albis ad 12 mm. longis oblongo-obovatis calyce ca. 2.5-plo longioribus; staminibus pistillisque calyce brevioribus; fructibus maturis ignotis.—**ARGENTINA:** predominant on the Pampa de Achala, Sierra de Achala, Prov. Córdoba, ca. 2200 m., Dec. 1–4, 1926, *Parodi* 7514 (TYPE, Gray Herb.).—This species belongs to the section *Andina* of Knuth, *Pflanzenr.* iv. Fam. 129, 78 (1912), and seems to be most nearly related to *G. nivale* Knuth of Peru from which it differs in its slightly smaller corolla, ribbed sepals and the lobulate lobes of its slightly larger leaves.

Monnina argentina, sp. nov., suffrutescens 2–4 dm. alta, infra ramosissima; ramis gracilibus erectis cum pilis curvatis strigosis puberulentis; foliis lineari-lanceolatis 2–4 cm. longis 2–4 mm. latis acutis et cuspidulatis integerrimis enervatis basem versus in petiolum

gracilem ca. 2 mm. longum exstipulatum contractis sparse pubescentibus vetustate glabratis, superioribus reductis; racemis elongatis ca. 1 dm. longis; bracteis minutis caducis; floribus ad 4 mm. longis; pedicellis pergracilibus ca. 1 mm. longis; sepalis lanceolato-ovatis acutis ca. 0.9 mm. longis; alis oblique lateque obovatis ca. 4 mm. longis et 2 mm. latis flavis; carino plicato aureo ad 4 mm. longo galeato apice undulato; androecii appendice parva ovata brevi inter phalanges staminum prolongata subtus supra medium dense longeque pilosa ad 2.5 mm. longa; antheris 8 duabus solitariis, aliis (6) in phalanges duas plus minusve aggregatis et basi connatis; stylo *M. Lorentzianae* persimili; ovario dense pubescenti; samaris magnis late ovatis apice profunde emarginatis basi cordatis ad 11 mm. longis et 8 mm. latis molliter breviterque pubescentibus.—ARGENTINA: Las Minas, Dept. Andalgalá, Prov. Catamarca, April 10, 1917, *Jørgensen 1703* (G); barrancas, Cuesta de Miranda near Chilecito, Prov. La Rioja, 2200 m., *Parodi 7805* (TYPE, Gray Herb.).—A member of the subgenus *Pterocarya*. In Chodat's conspectus, Bull. Herb. Boiss. ii. 252 (1896), it works out to *M. leptostachya* Benth. to which it is obviously not related. Its closest relatives appear to be *M. dictyocarpa* Griseb. and *M. Lorentziana* Chodat, both of which came from Catamarca. From the former it differs in its pubescent larger samaras, much larger leaves, and more robust habit. *Monnina Lorentziana*, to judge from the illustration, Chodat in E. & P. Nat. Pflanzenf. iii. Abt. 4, 341, fig. 184 (1896), is quite different in its larger flowers, large terminal-appendage of the androecium, glabrous fruit, distinct anthers, etc. In the shape of its fruit, style, stigma and upper corolla-lobes, however, it is quite similar to *M. argentina*.

Hippocratea Mitchellae, sp. nov., glaberrima fruticosa 3 m. alta; ramulis oppositis laxe ascendentibus teretibus; foliis ellipticis vel ovato-oblongis obsolete crenato-subseratis vel integris firmis fere concoloribus 8–15 cm. longis 5.5–8.5 cm. latis basi rotundis apice obtusis vel in acumen breve subito contractis, nerviis plurimis tenuibus arcuatis longe ascendentibus inter se a venis crebris transversis prominulentibus conjunctis, petiolo 1–2 cm. longo supra sulcato quam limbo 8–10-plo brevior; paniculis axillaribus elongatis apertis folio brevioribus vel superantibus pseudotrivotomis aut vere alternatim ramosis, ramulis dichotomis compressis, bracteolis parvis adpressis triangularibus ca. 1 mm. longis; floribus fragrantibus majusculis; pedicellis 1–3 mm. longis; sepalis parvis viridibus membranaceis semicircularibus margine pectinatis; petalis albis obovatis ad 6 mm. longis divaricatis integris; disco brevi vix carnosio margine undulato; fructu ignoto.—HONDURAS: sunny open space at sea level

near Tela, Prov. Atlantida, Apr. 10, 1926, *Elizabeth R. Mitchell* 74 (TYPE, Gray Herb.).—Apparently belonging to the subgenus *Pristimera* and most nearly related to *H. Miersii* Loesn. (= *Pristimera apiculata* Miers) of the Lesser Antilles and Guiana from which it differs in its broader entire-margined white petals, shorter filaments and less developed stigmas. According to the collector it grows among other bushes on a sunny open place and becomes 3 m. tall. The flowers were fragrant and the petals white. The leaves were glossy like those of a *Citrus*. It is a pleasure to name this species for its discoverer, Mrs. John Mitchell, who, during her residence in northern Honduras, prepared excellent specimens of the plants of that country. This material has been generously given to the Gray Herbarium.

Fuchsia Killipii, sp. nov., fruticosa subscandens; ramulis subteretibus brunnescentibus obscure sparseque puberulentis; foliis oppositis vel teretibus ellipticis 5–9 cm. longis 2–3.5 cm. latis integris obscure undulatis juventute obscure puberulentis mox glabratis apice acutis basi in petiolum 5–10 mm. longum gracilem gradatim contractis subtus paullo pallidioribus evidenter nervosis; stipulis caducis deltoideis; floribus rubris in axillis supremis solitariis vel geminatis vel corymbulatis conjunctim racemos vel thyrsos foliatis laxos speciosos formantibus; pedicellis gracilibus ascendentibus 1–2 cm. longis, fructiferis 2–4 cm. longis; ovario crasse ellipsoideo inconspicue puberulento ca. 4 mm. longo; hypanthio 3–4 cm. longo basi nodoso deinde contracto apicem versus gradatim ampliato 5–7 mm. crasso extus glaberrimo intus canescenti et dense breviterque villosis; sepalis lanceolatis 15 mm. longis ascendentibus, basi 3–4 mm. latis; petalis oblanceolatis 2.5–4 mm. latis 13–15 mm. longis apice obtusis vel obtuso-rotundis coccineis quam sepalis paullo brevioribus vel iis subaequilongis; staminibus inaequalibus quam petalis paulo brevioribus; antheris oblongis; stylo ad medium vel supra villosio stigmatate subintegro coronato; bacca globosa ca. 6 mm. crassa.—COLOMBIA: Rio Suratá above Suratá, Dept. Santander, 2000–2300 m., Jan. 5–6, 1927, *Killip & Smith* 16695 (TYPE, Gray Herb.) and 16604 (G); vicinity of La Baja, Dept. Santander, 2200–2600 m., Jan. 14–28, 1927, *Killip & Smith* 16776 (G); vicinity of Charta, Dept. Santander, 2000–2600 m., Feb. 1–11, 1927, *Killip & Smith* 17459 and 18854 (G).—Related to *F. venusta* HBK., but differing in its globose rather than oblong-ellipsoid fruit, more membranaceous herbage, less woody fistulose brownish stems and flat entire petals. From *F. caracasensis* Field. & Gard. it differs in its globose fruit, elongate inflorescence and glabrate herbage. The flowers of *F.*

Killipii are much more numerous and more intensely scarlet than in either of its relatives. It is known only from northeastern Colombia in the Dept. of Santander and is described by its collectors as a "woody vine" and as a shrub 4-12 ft. tall.

Ochroma peruviana, sp. nov., arborea laxa ramosa; trunco 2-4.5 dm. crasso pallido; partibus juvenilibus omnibus densissime tomentosus saepe cum pilis stellatis dimorphis cinnamomeis obtectis; foliis maturitate firmis ca. 34 cm. longis et 30 cm. latis cordatis palminervatis obsolete trilobatis breviter acuminatis bicoloribus supra glabris, subtus cum pilis minutis homomorphis stellatis 10-13-ramosis dense cinnamomeo-tomentosis, margine obscure undulatis; petiolis maturitate 25-30 cm. longis glabris, juventute cum pilis dimorphis dense obtectis; calycibus 8 cm. longis coriaceis extus cum trichomatibus dimorphis dense tomentosus, lobis exterioribus 3 cm. longis imam ad basem ca. 2 cm. latis triangularibus ecostatis acutis, lobis interioribus suborbicularibus 3 cm. longis, tubo ca. 5 cm. longo cylindrico-campanulato; petalis ad 12 cm. longis clavatis 4-5 cm. latis extus apicem versus tomentosus aliter glabris; capsulis ca. 14 cm. longis paullo infra medium ca. 2.8 cm. crassis ca. 6 cm. longe pedicellatis apice truncatis, valvis extus tomentosus marginem versus bicostatis, intus glaberrimis; seminibus ellipsoideis 2.6-3 mm. longis 1.5-2 mm. longe stipitatis minute glandulosis, lana seminum fumea.—PERU: Pampayacu, Rio Huallaga, Dept. Huanuco, Jan. 23, 1927, *Ryozo Kanehira* 354 (TYPE, Gray Herb.).—In range lying between *O. boliviana* Rusby, of Bolivia, and *O. grandiflora* Rowlee, of southern Ecuador. It appears to be most closely related to *O. grandiflora*, but differs in its plane rather than carinate outer corolla-lobes, and in its more copious and different pubescence. The new species seems to be unique in the genus because of the very dense brown tomentum which covers the young branches and leaves as well as the outer surface of the mature calyx. At first glance this tomentum appears ramentaceous, though close examination shows it to consist of a close dense stellate-tomentum from which tufts of longer hairs project. These tufts are stellate hairs in which the long branches are erect and tufted rather than spreading as is usually the case. In age the longer protruding hairs tend to disappear leaving only the close dense tomentum formed by the smaller hairs. *Ochroma peruviana* is said to be the common tree in second-growth forests about Pampayacu and in adjacent parts of the Huallaga River valley. It is locally known as "Huampo" and its wood is used for rafts and shelters.

Ardisia Mitchellae, sp. nov., fruticosa 1.5–3 m. alta; foliis ellipticis 10–13 cm. longis 4–5.5 cm. latis glabris apice late acuminatis basi acutis margine ad et supra medium crenulatis basem versus integris supra lucentibus subtus paullo pallidioribus prominulenter simpliceque pinnato-nervatis; petiolis 5–10 mm. longis; inflorescentia terminali laxa subcorymbosa ad 25-flora foliis multo breviori ad 6 cm. diametro; pedicellis (1.5–2 cm. longis) et pedunculis ferrugineis glandulis minutis cylindricis brevi-stipitatis obtectis; floribus pulcherrimis 5-meris ad 1 cm. longis; sepalis basi breviter coalitis triangulari-ovatis ca. 2.5 mm. longis glandulis stipitatis obtectis; petalis dextrorsum tegentibus subsymmetricis oblongis late acutis albis vel apicem versus rosaceis cum lineis multis crassis pictis; filamentis brevibus inconspicue glanduloso-pubescentibus; antheris angustis linearibus apice cuspidulatis 6–7.5 mm. longis quam petalis evidenter brevioribus; ovario ovoideo glabro; stylo gracili antheris vix superanti; bacca ignota.—HONDURAS: in good soil in undergrowth near river, vicinity of Tela, Prov. Atlantida, alt. 15 m., April 4, 1926, *Elizabeth R. Mitchell 66* (TYPE, Gray Herb.); rich soil in dense jungle, vicinity of Tela, 150 m., May 6, 1926, *Elizabeth R. Mitchell 98* (G).—A species belonging to the section *Icocorea* and apparently most closely related to *A. Donnell-Smithii* Mez, from which it differs in its larger flowers, cuspidulate anthers and glabrous lower leaf-surfaces.

Verbena juniperina Lag., var. **grisea**, var. nov., a varietate genuina differt statura humiliori indumento cinerascenti ramulis rariter elongatis plerumque ad axillas ramorum fasciculos foliorum densos formantibus.—PERU: ravines, southern slope of Chachani, north of Arequipa, 3350 m., March 1920, *Hinkley 76* (TYPE, Gray Herb.); open rocky slopes on Chachani, ca. 2600 m., April 1925, *Pennell 13259* (G); open mixed formation, Cuajones Mine, Torata, ca. 3250 m., Feb. 1925, *Weberbauer 7461* (FM).—Obviously related to the Argentine *V. juniperina* Lag., but readily separable by the ashy rather than light-green herbage and its reduced branchlets. In the typical form of *V. juniperina* the branchlets develop, becoming 4–9 cm. long, but in the var. *grisea* they are represented by leaf-fascicles and very rarely become more than 10 mm. long. The variety is a low, 3–5 dm. tall, very dense shrub and is known only from southern Peru whence it has been reported by Weberbauer, *Veg. Erde* xii. 130 (1911) as *V. juniperina*.

Salpiglossis linearis, sp. nov., annua gracilis erecta 1.5–3 dm. alta ascendenter ramosa imam ad basim inconspicue glandulari-villosa aliter glabra; foliis integerrimis enervatis, basalibus resulatis oblanceolatis 2–3 cm. longis crassiusculis glandulari-villosis, caulinis

alternis linearibus obtusis glabris 2-6 cm. longis 1-1.5 mm. latis, superioribus plus minusve reductis; floribus ad apices ramulorum in cymam simplicem irregularem aggregatis resupinatis; calycibus glabris irregulariter 5-lobatis cum lobis superioribus longioribus, ad anthesin 4-7 mm. longis, fructiferis 8-10 mm. longis quam capsula subduplo longioribus; pedicellis 3-20 mm. longis rectis ascendentibus; corolla purpurea et plus minusve aurantiaca tubulata 17-20 mm. longa; tubo 11-15 mm. longo, parte inferiori ad 2 mm. longa gracillima ca. 0.5 mm. crassa aurantiaca in calyce occulta, parte superiori et media tubulata 1.8-2 mm. crassa aurantiaca vel purpurea, extus inconspicue sparseque glandulari-villosa, intus basem versus retrorse villosa; faucibus paullo inflatis et obliquis brevibus; limba obliqua cum venis purpureo-marginatis reticulatis; labia inferiori breviori bilobata ad 2.5 mm. longa oblongo-lanceolata recurvata; labia superiori longiori trilobata, lobis anguste ovato-triangularibus 2 mm. longis in alabastro exterioribus; staminibus 5 inclusis, duobus superioribus perfectis cum filamentis linearibus infra medium corollae affixis decurrentibus basem versus sparse villosis et antheris orbicularibus 1 mm. longis bilocularibus cum loculis appositis et apice confluentibus, duobus staminibus lateralibus supra medium corollae affixis linearibus imperfectis apicem versus paullo dilatatis glabris, stamine infimo perfecto sed valde reducto in faucibus affixo minus quam 0.5 mm. longo; stigmatate dilatato ca. 2.3 mm. lato 1.2 mm. longo transverse pentagono-oblongo; stylo lineari glabro; disco miniato; capsula ellipsoidea ad 4 mm. longa; seminibus numerosis angulatis.—PERU: white dunes, Tiabaya, Dept. Arequipa, ca. 2150 m., April 8, 1925, *Pennell 13063* (TYPE, Gray Herb.); open sandy slope, Tiabaya, ca. 2150 m., *Pennell 13081* (G); open sandy soil, Tingo, Dept. Arequipa, ca. 2200 m., April 8, 1925, *Pennell 13119* (G).—This striking plant appears to be without close relatives. It seems to fit best into the section *Leptoglossis* of Wettstein, E. & P. Nat. Pflanzenf. iv. Abt. 3b, 36 (1895), but is atypical there since it produces an aborted fifth stamen. The species is characterized by its entire leaves, of which the cauline are glabrous and decidedly linear, and by its elongated tubular corolla which is abruptly contracted (inside the calyx) above the base. The detailed notes made by Dr. Pennell in the field on numbers 13081 and 13119 are as follows,—Corolla-tube near apex constricted, then abruptly inflated and decurved; tube "pale orange-yellow," streaked with or becoming wholly "mulberry purple"; lobes all spreading, internally "pale orange-yellow," reticulate-lined with "mulberry purple." In gross aspect the plant suggests a member of the *Polemoniaceae* or some of the smaller genera of the *Gentianaceae*.

Hymenoxys Parodii, sp. nov., herbacea annua glaberrima erecta ca. 15 cm. alta supra sparse stricteque ramosa; foliis radicalibus ignotis, caulinis alternis pinnatis vel bipinnatis 3–6 cm. longis oblongo-ovatis, segmentis distantibus linearibus ascendentibus, petiolis ad basem dilatatis et subvaginatis; capitulis subglobosis 5–8 mm. diametro eradiatis terminalibus a foliis subtendentibus evidenter superatis, pedunculo 2–10 mm. longo ebracteato sulcato apice sub capitulo conspicue incrassato; involucris biseriatis rigidis conniventibus, squamis exterioribus ovatis acutis 8 ca. 5 mm. longis quam interioribus paullo brevioribus; receptaculo conico nudo; achaeniis subteretibus 2.5 mm. longis multicostatis dense adpresseque sericeo-villosis; pappi paleis 5–6 hyalinis ellipticis vel oblongis erosis acuminatis paullo inaequalibus achaeniis subaequilongis quam corollis paullo brevioribus; corollis 2.5 mm. longis flavis, tubo 1 mm. longo brunnescenti subcylindrico extus ad apicem puberulento, faucibus cylindro-campanulatis, dentibus limbi erectis triangularibus extus puberulentis.—**ARGENTINA**: saline soil near Bañado de Flores, near Buenos Aires, Nov. 13, 1927, *L. R. Parodi 8170a* (TYPE, Gray Herb.).—Related to *H. anthemoides* (Juss.) Cass. but differing in habit, size of heads, length of peduncles and length of pappus. The plant is erect, simple below but with a few strict branches above. The heads are large and borne on the thickened summit of the short ebracteate peduncles, which do not surpass the adjacent leaves. The pappus is shorter than the corolla and the tips of the pappus-scales do not protrude from between the florets. In *H. anthemoides* the plant is diffusely branched from the base and decumbent. The heads are smaller and borne on long (2–3 cm.) unthickened bracted peduncles that evidently surpass the adjoining foliage. The acuminate tips of the pappus-scales surpass the corolla and appear as bristles protruding from between the florets in an undissected head. Although the present plant is clearly distinct from the common one passing as *H. anthemoides* it is possible that it may be the real *H. anthemoides* since the type of the species came from “près de Buenos-Aires.” The original description is quite ambiguous.

IV. THE BOTANICAL ACTIVITIES OF THOMAS BRIDGES

BY IVAN M. JOHNSTON

THOMAS BRIDGES (1807–1865) was one of the botanical collectors of the early half of the last century who provided contemporary systematists with material from Chile and Bolivia. His collections are

important through the study given them, and the species and records based upon them, by such botanists as Hooker, Lindley, Benthams and Miers in Great Britain and by DeCandolle and Turczaninow on the Continent. Many of Bridges's plants being critical ones it is an unfortunate fact that the geographical data accompanying them are very meagre and frequently misleading if not actually incorrect. Suspecting these facts I have on several occasions desired information concerning the routes traveled by Bridges with the hope of gaining therefrom some suggestion as to the precise source and probable identity of some critical collection. Lasègue, *Mus. Bot. Delessert* 259-260 (1845), has provided the most extended and reliable account of the collecting activities of Bridges. His account, however, is necessarily brief and is not especially detailed.

The present sketch of Bridges's botanical activities has been worked out from a study of the letters from Bridges, H. Cuming and A. Caldcleugh¹ in the Hooker Correspondence at Kew, from Bridges's plant-lists at Kew and the British Museum of Natural History, and from such pertinent published works as I could discover. A determined search for unpublished data on Bridges was made in London, letters and other manuscripts being sought at the Linnean Society, Royal Society, Royal Geographic Society, Horticultural Society and the British Museum at Bloomsbury. Cuming was a friend and later became London agent for Bridges. Were it possible to locate Cuming's correspondence and manuscripts much information concerning Bridges might be found. Except, however, for some letters at Kew, nothing of this sort was discovered in any of the institutions visited in or about London. Another possible source of information is the correspondence of Arnott, Lindley and DeCandolle since Bridges sent them plants and doubtless wrote to them as well.

"Lately we have received from England a collector of the name of Bridges, but as he has come out on his own speculation, he has been forced to take a trade for his existence, and is now a brewer of small beer in this place. Mr. Lambert and the Linnean Society were instrumental in his coming out." Thus wrote Caldcleugh to Hooker from Valparaiso, Chile, on May 10, 1829 concerning Bridges who, in his twenty-second year, had landed at Valparaiso nine months earlier on Aug. 8, 1828.

¹ The letters of Alexander Caldcleugh give interesting details and sidelights on Bridges's activities and character. Caldcleugh's business in Chile I do not know. I suspect, however, that he had some diplomatic mission inasmuch as Lasègue l. c. 259, reports him as earlier having such connections in Brazil. He resided many years in Chile and interested himself in furthering botanical exploration in that country. He collected about Valparaiso and Coquimbo, but his great service to botany was in interesting Hugh Cuming in plant-collecting and in bringing that, as yet unknown, but later famous collector to the attention of Sir William Hooker.

During the first year in Chile Bridges does not appear to have been able to collect extensively, although he did make the acquaintance and become an admirer of Carlo Bertero, the Italian botanist who was then actively collecting in Central Chile. In Dec. 1829 Bridges sent Hooker his "collections of 1828," that is presumably those obtained in the spring and summer of 1828-29. These specimens were unnumbered and apparently all came from the region about Valparaiso.

In Oct. 1830 Bridges wrote that he had recently collected in the Department of Quillota and that he was preparing for an expedition to the Cordilleras, having "received some assistance from Mr. Barclay and Mr. Bevan." I have found no letters giving the details of this trip to the Cordilleras. In May 1832 Bridges shipped from Hacienda de San Isidro, Quillota, 497 specimens to Hooker, 280 to Arnott and some to Bentham and Lindley. These are obviously the plants, numbered 1-497, listed in a catalogue preserved in the library at Kew. These plants were collected in the Cordilleras, in the Aconcagua River Valley and in the region centering around Valparaiso. They obviously contain the results of his first expedition to the Cordilleras, which probably took place early in 1831.

A study of the catalogue which Bridges prepared for his numbers 1-497 shows that the localities mentioned can be roughly grouped as follows: 1. localities near Valparaiso, viz., Viña del Mar, Placillas, Playa Ancha, Queb. Lacumas and La Hacienda de la Merced; 2. localities along the Casa Blanca road to Santiago, viz., Casa Blanca, Cuesta de Zapata and Bustamante; 3. localities along the coast north of Valparaiso, viz., Reñaca, Concon and Quintero; 4. localities centering around Quillota, viz., Limache, Hacienda de la Palma, Sierra de San Isidro, Cajon de San Pedro and Cuesta de Pachacuma; 5. localities along the old Mendoza road up the Aconcagua Valley, viz., Llaillai, Tinajas, Hacienda de San José, San Felipe (and north of that town, Los Lorcs and Sierra Bella Vista), Salto del Soldado, Guardia Vieja, Ojos de Aguas and La Laguna [del Inca]; and finally, 6. localities along the road between Los Andes and Santiago, viz., Cuesta de Chacabuco and Colina. Two stations given as "plains near Zuepay" and "Cuesta de Chile Cauquen Wn. Quillota" I have been unable to locate.

Early in Sept. 1832 Bridges wrote that he had just arrived in Santiago from Quillota, where he had spent more than a year laying out a farm for a friend, Mr. Waddington. He wrote that he had had little time for botany during the period although two months earlier, in July 1832, we learn from Caldeleugh that Bridges was making small collections which Caldeleugh disposed of to naval officers "or others who have commissions of that nature."

In a letter from Valparaiso, dated Oct. 25, 1832, Bridges stated that he now planned to devote himself to botany and had booked a passage to Valdivia. Writing from Valdivia on Feb. 26, 1833² he told of having just returned from a "very long journey to the interior," having traveled with a party from the "Commissary of the Indians" whose object was to stop one of the passes in the Cordilleras and prevent the incursions into Chile of the Pehuelche Indians. He also mentioned visiting Lake Ranco and concluded his letter by stating that he was going directly to Chiloë in a "few days." On Aug. 27, 1833 Bridges wrote that he had returned to Valparaiso after an absence of nine months and announced the sending to Hooker of 283, to Arnott of 268 and to Greville of 248 plants of southern Chile. He also sent to Hooker a catalogue of his numbers 558-857 which covered all of his collections from southern Chile. This catalogue is now preserved in the library at Kew. I have seen no catalogue of his numbers 498-557. These numbers probably belong to the plants which Bridges collected about Valparaiso and Quillota in 1832.

It does not seem possible to determine Bridges's route in Valdivia from a study of the localities given in his catalogue. About Corral, whence many of his plants were obtained, he mentions such localities as Castello del Corral, Castello de Amargos, Isla Mansera and Castello Niebla. In the region about the town of Valdivia he mentions Arique, Pufude, "Las Animas," "Chumpulla," "Los Canellos" and "El Cancagual," the four latter of which I have not been able to locate. Also mentioned in his list and the sources given for many of his collections are Lago Ranco, "Los Andes between Osorno and Rio Maullin" and "Los Uanos between Valdivia and Osorno," the last two I have been unable to locate. The only localities which indicate that he actually visited Chiloë, where he apparently collected very little, are "Puguenun River" on the northern extremity of the island and "La Punta del Carelmapu" on the mainland just north of the island across the channel from Puguenun.

Bridges, however, did not continue active botanical work as he had planned. We learn from Cuming, in a letter dated Feb. 1834, that Bridges had agreed to superintend for two years an "estate near Talca." Bridges is next heard of through Caldeleugh who wrote from Santiago in July 1836 that "Mr. Bridges came up lately from the country and . . . he says [collecting] is quite out of the question at present, as his employer will not consent to his dedicating any portion of his time to other pursuits. It seems that he is in

²The contents of this letter was summarized and published by Hooker, *Jour. Bot.* i. 177-178 (1834).

receipt of a good salary, is saving money and is fearful of risking his situation."

After a lapse of six or seven years Bridges resumed correspondence with Hooker, writing from Valparaiso on June 1st, 1841, that since he had last written he had been "occupied with agricultural affairs, with little benefit to himself and too busy for Natural History." That year, however, he had resumed botanical work. He had "made an excursion over the Andes by Pass of Planchon, lat. 34-35°, to the elevated valleys on the eastern slope" and in a "few days" was sailing for Copiapó to begin exploration there. Bridges also announced that he was sending Hooker, some plants from the "Andes of Colchagua" and some from the base of the Andes in the Province of Colchagua. He stated that no catalogue of these collections had been made. These specimens are no doubt those from Bridges which Cuming, in his letters of Oct. 27 and Nov. 26, 1841, indicated as consisting of 150 from "the Andes" and 220 from "various localities." These specimens, it is certain, carry numbers falling between 858 and 1278. It is to be noted, however, that, besides the 370 plants mentioned by Cuming, 51 additional ones would be necessary completely to fill the gap of numbers. I suspect, hence, that while most of the numbers 858 to 1278 were obtained in the Andes or at their base early in 1841, some of this gamut came from elsewhere, probably from near Valparaiso.

I have very little precise information regarding the geographical details of Bridges's work in the Province of Colchagua. It is an important fact, however, that the "Province of Colchagua" is much smaller now than formerly, for in 1865 it was divided and a new Province of Curico was established. I am of an opinion that the hacienda upon which Bridges worked between 1834 and 1841 was in what is now the Province of Curico and that his collections labeled as from the Province of Colchagua in fact came from what is today the Province of Curico. To reach Paso El Planchon, lat. 35° 12' S., Bridges had to ascend the cordilleras entirely within Curico. Hence there can be little doubt that plants of middle and high altitudes, given as from the Andes of Colchagua, really came from Curico or just within Mendoza across the eastern frontier. On the Argentine slope of the cordilleras Bridges mentioned visiting "El Valle de las Cuevas, about 10 leagues to the east of Volcano of Petorca," a valley about 2000 m. in altitude on the Mendoza side.

Perhaps significant is a reference by Bridges, Proc. Zoöl. Soc. London xiv. 7 (1846), in which he mentions the Rio Teno and seems

to infer a thorough acquaintance with the parts of that stream at the foot of the mountains. I suspect that the hacienda at which he was employed was situated on or near the Rio Teno and that the plants from the "base of the Andes in the Prov. Colchagua" were obtained in the region just north of the city of Curico.

Bridges was next heard from on Nov. 20, 1841, announcing that he had arrived in Coquimbo a few days before, having been occupied since the end of June in collecting between Copiapó and Coquimbo. He next planned to ascend the Rio Elqui "to snowline" and subsequently to go to Valparaiso by way of Illapel, Petorca and Quillota and to arrive there late in January. The plants collected on this expedition to northern Chile bear the numbers 1279-1424. The original catalogue which gives rather full locality- and habitat-data, is preserved in the library of the British Museum of Natural History. The localities mentioned by Bridges, arranged in the probable order in which he visited them are as follows,—Port of Copiapó, Copiapó, Andes of the Valley of Copiapó, near Chañarcillo, El Totoral, Los Pozos, Vallenar, Freirina, Huasco, Peña Blanca, Coquimbo, Mina Arqueros, Valle Elqui, Vicuña, Paiguano, "Valle of Borasa, Prov. Coquimbo" (unlocated), Andacolla and Illapel. Although the first ten localities listed lie within the Province of Atacama and about 50% of the collections came from that province, all of Bridges's collections of late 1841 are found in herbaria and are almost universally cited as from the Province of Coquimbo or merely as from Coquimbo. In Hooker's herbarium by some blunder the collection is all labeled as from Concepcion! There also appears to have been some confusion in the numbering of the various sets, cf. Miers, *Illust. S. Am. Pl.* ii. 25 (1857). According to Bridges, in Feb. 1842, twenty sets of the Atacama-Coquimbo plants were prepared. The best one of these went to Hooker.

In 1842 Bridges returned to England apparently going via Mendoza. The next letter from Bridges, which has been preserved, is dated, Valparaiso, May 21, 1844. In it he says, "Soon after my arrival in Valparaiso I wrote you and since I have made an excursion to the southern part of Bolivia where I penetrated about 70 leagues into the interior, taking the road from Cobija towards Potosi across the Desert of Atacama." He mentions visiting the "Valley of Caspana," apparently that containing the village of Caspana which lies about 70 km. east of Calama. He prepared no list of the plants collected and apparently did not number the collections.

We next hear from Bridges in a letter from Cochabamba,³ dated

³ This was published in large part by Hooker, *Jour. Bot.* iv. 571-577 (1845).

April 3, 1845. We learn that he had landed, a second time, at Cobija on Sept. 13, 1844. He remained there a "few days" and was delighted to find a variety of plants on the fog-bathed slopes above the town. Obtaining mules and men he went to Calama, thence northeastward through Tapaquilcha to Potosi, where he spent "only a few days." Then going northward he went to Chuquisaca (ca. 60 km. west of Sucre) where he remained for a month. Eventually he arrived in Cochabamba on Dec. 24, 1844. After about three months, early in April 1844, he crossed the mountains northeast of Cochabamba and entered the Amazon Basin following down the Mamoré River northward towards the Brazilian frontier. In July 1845, when he encountered *Victoria*,⁴ he was at Santa Ana on the Yacuma River, a tributary of the Mamoré. Loreto and Trinidad are the only other localities in the Mamoré Basin mentioned as having been visited by him. Bridges also visited Santa Cruz de la Sierra, going there probably up the Rio Piray as he had planned. In March, 1846, Cuming wrote Hooker that a letter from Bridges, dated Sept. 11, 1845, had been received from Santa Cruz de la Sierra. Bridges reported that his excursion into the Amazon Basin had not been productive of a variety of plants, in the "thousand miles" of travel he had not collected 100 species. I have no definite information concerning the remainder of Bridges's journey in Bolivia. From Santa Cruz he had planned to return to Cochabamba. Since he reports a bird, Proc. Zool. Soc. London xv. 29 (1847), from "Yungas of La Paz" I suspect that he left the country by way of La Paz. He must have returned promptly to England, for from London on June 21, 1846, apparently some time after his return, he wrote Hooker that the seeds of *Victoria* were to be sold at 2 shillings each and the herbarium specimens of the plant at 30 shillings. The first and best set of Bridges's Bolivian collections were sent to Hooker; according to its collector it consisted of about "550 species." The specimens were unnumbered and were apparently unprovided with definite geographical data. According to Bridges no catalogue of this collection was prepared.

Following his return to England, in the latter months of 1846, Bridges became very ill, apparently from some disease contracted in Bolivia. He wrote Hooker on Dec. 8, 1846 from Bristol that he had been very ill and had "been expectorating blood from the lungs for two weeks." Despite this, however, again writing from Bristol, on Jan. 14, 1847, he acknowledged Hooker's congratulations on his recent marriage. According to Dall, Proc. Calif. Acad. i. 236 (1866), he

⁴ Hooker printed Bridges's letter which tells of this discovery, Bot. Mag. lxxiii. sub. t. 4275, pg. 10 (1847).

married Mary Benson, niece⁶ of Hugh Cuming. Shortly after his marriage, for the sake of his health, he returned to Chile going there via Panama.

The last word we have concerning Bridges in South America is in Caldeleugh's letter from Valparaiso which is dated Sept. 30, 1851. We hear that "Mr. Thomas Bridges is now in this place having formed a kind of nursery ground for the sale of every description of fruit and other trees and plants. He now collects little and is very sore upon the subject of *Victoria Regia* which he asserts was introduced (at least the subject which flowered) by him and that he has received no medal and scarcely 'mention honorable' for having done so."

According to Dall, l. c., Bridges "visited and explored the island of Juan Fernandez" in 1851. If he did so he made no botanical collections there or at least these did not reach European herbaria, for neither Hemsley nor Skottsberg, who have studied and published upon the flora of the island, mentions his collections nor notes him as having contributed to our knowledge of the flora of the island.

In 1855, Dall states that Bridges proceeded to Panama remaining there some six months; and from thence to England, subsequently to France, and finally to California where he arrived in Nov. 1856. About 1857 he went to British Columbia, and remained there nearly two years collecting and exploring. He then returned to California and made his home in San Francisco until his illfated journey in 1865. Very little is known concerning his collecting-itinerary in California. We learn from a letter dated May 5, 1858, that he had collected in Mariposa County, in "Scott and Trinity Mts. near Yreka," and in the Coast Ranges of Santa Clara County. His Californian collections, except those distributed by the Smithsonian Institution after his death, lack numbers, and invariably, it seems, have no precise indication of collection-locality.

In April 1865 Bridges went to Nicaragua for biological exploration, remaining there until September. While returning to San Francisco he was stricken with malaria, dying at sea four days later on Sept. 9, 1865. He was 59 years of age at his death and was survived by a widow and five children.

The first set of Bridges's South American collections, at least, appear to have been invariably sent to Sir William Hooker and, consequently, are now to be found in the herbarium at Kew. From his correspondence one infers that the second set was retained for himself. What became of this material I do not know. At Kew with the

⁶ According to Britten & Boulger, *Biogr. Index* 22 (1893), Bridges became the "son-in-law of Hugh Cuming." Dall, however, was a friend of Bridges in California and having first-hand sources of information is probably correct.

Bridges plants from the Hooker Herbarium are those received from Bentham. Many of the collections by Bridges in the Bentham Herbarium have "Lord Colchester, 1832" written on the labels. The significance of this annotation is not entirely clear. Mr. S. A. Skan, librarian at Kew, has, however, called my attention to the fact that, according to the Dictionary of National Biography, the mother of the parliamentarian, Charles Abbot, First Lord Colchester, by a second marriage became the wife of Jeremy Bentham, by his first marriage grandfather of George Bentham the botanist. The Second Lord Colchester was an officer in the British Navy. Bentham, hence, probably received the specimens in question from his relative the First or Second Lord Colchester and consequently the annotation "Lord Colchester, 1832" so prominent on Bridges's labels has only historical significance.

The Gray Herbarium contains an incomplete set of Bridges's collections from Chile and a few of his plants from Bolivia. During the course of some work on the Chilean flora I have become convinced that the numerous collections in the Gray Herbarium which are unaccompanied by labels and associated only with the data, "Am. Aust. F." or "Am. Aust. Fielding" in Asa Gray's handwriting, are in large part also collections of Bridges. These are probably from the herbarium of Henry B. Fielding and in some manner became divorced from their original data.

The salient facts concerning Bridges's collections in South America may be summarized as follows:—

Year	Locality	Number collected	Collection numbers
1828 & 1829	Prov. Valparaiso	unknown	—
1830 (&? 1831)	Valparaiso region, Aconcagua Valley and Cordilleras.	497!	1-497
1832	? Prov. Valparaiso	59?	498-557
1832-1833	Prov. Valdivia	299!	558-857
Jan.-June, 1841	Prov. Curico	370!)	858-1278
? 1841	? Prov. Valparaiso	51?)	
July-Dec. 1841	Atacama-Coquimbo	148!	1279-1427
Jan.-May, 1844	Prov. Antofagasta	unknown	—
Sept. 1844-1845	Bolivia	550!	—