

CONTRIBUTIONS FROM THE GRAY HERBARIUM  
OF HARVARD UNIVERSITY.

No. LXXVIII.

ISSUED

MAR. 15, 1927

STUDIES IN THE BORAGINACEAE.—VI.

BH # 36607

A REVISION OF THE SOUTH AMERICAN BORAGINOIDEAE.

By IVAN M. JOHNSTON.

PUBLISHED BY  
THE GRAY HERBARIUM OF HARVARD UNIVERSITY  
CAMBRIDGE, MASS., U. S. A.  
1927.

vesting the nutlets and falling away as a bur or persistent with the nutlets falling away individually.—Del. Sem. Hort. Hamburg iv. (1833); Don. Gen. Syst. iv. 373 (1837). *Krynitzkia* F. & M. Ind. Sem. Hort. Petrop. vii. 52 (1841). *Piptocalyx* Torr. in Wats. Bot. King Exped. 240 (1871). *Oreocarya* Greene, Pittonia i. 57 (1887). *Eremocarya* Greene, Pittonia i. 58 (1887). *Greeneocharis* Gürke & Harms in E. & P. Nat. Pflanzenf., Gesamtreg. 462 (1899). *Wheelerella* Grant, Bull. So. Calif. Acad. v. 28 (1906). *Johnstonella* Brand in Fedde, Repert. xxi. 249 (1925).

One of the largest and most perplexing genera of the *Boraginaceae*. It is exclusively American. About two-thirds of the approximately 150 species occur in western United States. In South America the genus is most abundant in Chile with outlying species in Peru, Bolivia and Argentina.

As here defined, the genus includes the North American group of coarse perennials current as *Oreocarya*. My study of the South American species of *Cryptantha* has convinced me that the recognition of *Oreocarya* has been most arbitrary. That group appears to consist merely of the more or less coarse persistent members of *Cryptantha* § *Krynitzkia*. I am convinced that the characters of the sections of *Cryptantha* defined below are much more fundamental than are such "generic" characters as coarseness of habit and persistence of root which must be stressed in justifying the continued maintenance of *Oreocarya*. I do not believe that *Oreocarya* should be recognized unless the primitive, coarse, persistent species and the more evolved, slender, annual ones in the three sections of *Cryptantha* each be given generic recognition. Personally I do not approve of, and certainly will not be responsible for the segregation of 5 weak genera from the currently accepted *Cryptantha* simply to give logical justification for the maintenance of any mere habit-genus as indefinite as *Oreocarya*.

#### KEY TO SECTIONS.

Plants not producing cleistogamic flowers; North and South America..... I. § *Krynitzkia* (spp. 1-22).

Plants producing cleistogamic flowers; South America.

Cleistogamic flowers simple, borne in the middle and upper or frequently in all the leaf-axils, occasionally replacing the chasmogamic flowers in the inflorescence proper.

II. § *Eucryptantha* (spp. 23-30).

Cleistogamic flowers highly specialized, appearing as persistent ovoid or lenticular structures (cleistogenes) borne at the base of the plant below or just above the surface of the ground..... III. § *Geocarya* (spp. 31-40).

I. Section **KRYNITZKIA**.—This is the largest and most difficult section of *Cryptantha* and is distinguished from the other two sections

of the genus by the complete lack of cleistogamic flowers. It reaches its maximum development in North America, where it is represented by about 100 species. There can be little doubt that in the section are found the most primitive members of the genus. One species, *C. albida*, occurs in both North and South America. The only other approach to this condition is the case of *C. parviflora*. This species, while evidently separable, is very closely related to the North American *C. Grayi* and *C. angustifolia*. The species assembled in the series *Barbigerae* are as a group clearly related to those North American species I have collected under that heading, cf. Contr. Gray Herb. lxxiv. 60-69 (1925). It is interesting to note that whereas the short style overwhelmingly predominates among the North American species of the section, the long style is somewhat more common among the southern members. In North America there are numerous species with smooth polished nutlets; in South America there are only four, all closely related and quite different from the northern forms. *Cryptantha gnaphalioides* is a peculiar shrubby perennial, which would be referred to the genus *Oreocarya* if it grew in North America. In other than its habit, however, it is much like *C. dichita*, *C. hispida* and *C. phaceloides*, species which in some regards are reminiscent of the Californian *C. mohavensis*.

## KEY TO SPECIES.

- Nutlets perfectly smooth and shiny, large, 2.8-3.3 mm. long.  
Chile.  
Plant perennial, shrubby at base. *Gnaphalioides*....1. *C. gnaphalioides*.  
Plant an annual herb. *Phaceloides*.  
Corolla 7-10 mm. broad; leaves 7-13 mm. broad.....2. *C. dichita*.  
Corolla 4-7 mm. broad; leaves 2-3 mm. broad.  
Nutlets 2.....3. *C. hispida*.  
Nutlets 4.....4. *C. phaceloides*.
- Nutlets more or less roughened and dull.  
Nutlets thick with deep plane sides, not crowded, only impinging on one another close to the gynobase and hence separated by open re-entrant sinuses, anterior face occupied by a large triangular (apparently) excavated areola; gynobase narrowly pyramidal; northern Argentina.  
*Albidae*.....5. *C. albida*.
- Nutlets strongly compressed with angulate or rounded edges, crowded and closely juxtaposed, not separated by open broad sinuses, anterior face with a very small shallow areola; gynobase subulate.  
Edges of nutlets sharp, with a definite thin margin; abaxial nutlet more or less emphasized, usually largest and most persistent. *Angustifoliae*.  
Nutlet homomorphous, 1-1.5 mm. long; spikes bracted throughout; Argentina.....6. *C. diplotricha*.  
Nutlets heteromorphous, 0.6-1 mm. long; spikes bractless or bracted at base only; Chile and Peru..7. *C. parviflora*.

Edges of nutlets merely angled or rounded, not sharp, mostly marginless but more or less thickly margined in a few species; axial nutlet more or less emphasized, usually the largest or most persistent. *Barbigerae*.

Corolla evident or conspicuous, 2-7 mm. broad.

Spikes bractless; Chilean.

Plant persistent, a perennial or long-lived annual; stems becoming prostrate or trailing.

Plant loosely branched, forming a loose broad open mat, pubescence canescent; corolla 5-6 mm. broad.....8. *C. subamplexicaulis*.

Plant densely branched, forming a dense cushion, pubescence silvery; corolla 2-4 mm. broad.9. *C. argentea*.

Plant a short-lived annual; branches short, erect or ascending.

Nutlets homomorphous, obscurely roughened  
10. *C. chaetocalyx*.

Nutlets heteromorphous, definitely tuberculate or papillate.....11. *C. filiformis*.

Spikes bracted.

Corolla 2-4 mm. broad; nutlets homomorphous or heteromorphous, 1.3-1.8 mm. long.

Style much surpassing the 4 nutlets; Peru....12. *C. granulosa*.

Style shortly surpassing the 2-4 nutlets; Chile.  
13. *C. taltalensis*.

Corolla 5-6 mm. broad; nutlets homomorphous, ca. 2 mm. long; Chile.....14. *C. Romani*.

Corolla inconspicuous or minute, 0.5-1.5(-2) mm. broad.

Spikes bracted; style noticeably surpassing the nutlets.

Fruiting calyx 3-4 mm. long, with narrow erect or slightly spreading lobe-tips; Chile and southern Peru.....15. *C. filaginea*.

Fruiting calyx 5-6 mm. long, with broad decidedly spreading lobe-tips; Peru.....16. *C. limensis*.

Spikes bractless; style equalling the nutlet or just surpassing them.

Nutlets obscurely tuberculate or almost smooth.

Fruiting calyx 8-11 mm. long; nutlets lanceolate, 2.8-3.2 mm. long; plant coarse shaggy-hirsute; Andes of northern Chile.....17. *C. calycina*.

Fruiting calyx 2-3 mm. long; nutlets lance-ovate, ca. 2 mm. long; plant finely strigose or appressed short-hispid; Patagonia.....18. *C. patagonica*.

Nutlets definitely tuberculate or wrinkled.

Back of nutlets tuberculate, coarsely if at all transversely grooved.

Fruiting calyx 2.5-3 mm. long, lobes lance-linear or narrowly lanceolate; Peru.....19. *C. peruviana*.

Fruiting calyx 3-4 mm. long, lobes linear or lance-linear; Chile and Argentina....20. *C. globulifera*.

Back of nutlets with transverse lineate grooves.

Spikes very tawny; fruiting calyx 3-4 mm. long; plant stiff; Chile and Argentina....21. *C. diffusa*.

Spikes green; fruiting calyx 2-2.5 mm. long; plant weak; Bolivia.....22. *C. debilis*.

1. ***Cryptantha gnaphalioides*** (A. DC.) Reiche. Perennial, 2-4 dm. tall, becoming much branched and shrubby, commonly decidedly

woody towards the base; stems erect, closely white-strigose and frequently sparsely hirsute also, cottony-strigose towards base, older parts with exfoliating bark; leaves linear to lance-linear, broadly attached, 1-4(-6) cm. long, 1.5-2.5(-3) mm. broad, obtusish or acutish, more or less strigose and frequently somewhat hirsute, usually canescent, spreading, abruptly reduced above, with leaf-buds or fasciculate leaves in the axils, bases more or less persistent; racemes unbracted, geminate, 1-4 cm. long, not loose, pedunculate; fruiting calyx tardily deciduous, oblong-ovate, 4.5-6 mm. long; mature calyx-lobes oblong-linear, obtusish, densely strigose or abundantly short-hirsute; pedicels 1-2 mm. long; corolla white, 5-9 mm. broad; ovules 4; nutlets 1-4, apparently with the axillary one always developing, ovate-oblong, smooth and shiny, light colored, frequently somewhat mottled with brown, 2.8-3.3 mm. long, 1.2-1.5 mm. broad, apex acute and slightly outcurved, base rounded, edges acute particularly above the middle; back of nutlet flattish or low convex, occasionally above the middle somewhat obtuse with a rather definite medial ridge; inner face of nutlet right-angled with the groove closed throughout; gynobase about  $\frac{2}{3}$  height of nutlets; style usually very conspicuously surpassing the nutlets, more than twice the length of the gynobase.—Anal. Univ. Chile cxxi. 822 (1908) and Fl. Chile v. 227 (1910). *Eritrichium gnaphalioides* A. DC. Prodr. x. 131 (1846); Clos in Gay, Fl. Chile iv. 466 (1849); Ph. Fl. Atac. 39 (1860) and Viage Des. Atac. 213 (1860); Ph. Cat. Pl. Itin. Tarapaca 56 (1891). *E. fruticosum* Ph. Linnaea xxix. 15 (1857).

CHILE. COQUIMBO: Baños del Toro, *no collector given* (MS); Pachuana, Oct. 1878, *Philippi* (MS); rocky place, Prov. Coquimbo, Sept. 1836, *Gay 1077* (MS, TYPE of *E. fruticosum*; G, photo.); Prov. Coquimbo, 1839, *Gay* (G, photo. of TYPE of *E. gnaphalioides*). ATACAMA: Rio Laguna Grande, 2300 m. alt., Jan. 1924, *Werdermann 238* (G, US, FM, IP); Potrero de Toledo, Rio Laguna Grande, 2660 m. alt., Jan. 1926, *Johnston 5895* (G); Yerba buena near Carrizal, Sept. 1885, *King* (MS); Yerba buena, Oct. 1871, *Reed* (G); Bandurrias, 1885, *Geisse* (MS); Desert of Atacama [Bandurrias] *Geisse 24* (NY); Copiapó, June 1841, *Gay 1074* (MS); Aguada del Tabaco, Sierra San Miguel, 3000 m. alt., Nov. 1925, *Johnston 4892* (G); Quebrada San Miguel above Los Marayes, Sierra San Miguel, Nov. 1925, *Johnston 4919* (G); Quebrada de Paipote, Jan. 1885, *F. Philippi* (MS); Potrerillos, 1920, *Harding 22848* (US, NY); vicinity of Potrerillos, 2500 m. alt., Oct. 1925, *Johnston 3696* (G); Quebrada de Doña Ines Chica, Jan. 1886, *Gigoux* (G). INDEFINITE: no locality given, *Gay* (G, NY).

A common and very characteristic undershrub of gravelly slopes and plains between 2000 and 3000 m. alt. in the arid mountains of the Province of Atacama. Frequently the dominant perennial over large areas. The greatest abundance of the plant noted was on the barren llano near the highest point on the railroad between Copiapó

and Pueblo Hundido, where at about 2000 m. alt. the plants of this species were extremely common and apparently the only kind of vegetation over many square kilometers. The plant is well known to the natives frequenting the mountains as "Té burro," "Té del campo" or "Té blanco." An infusion of the leaves is used as a beverage. Generally, however, this *Cryptantha* is used in tea-making only when the more generally favored "Té colorado" or *Vivania rosea* is unobtainable.

2. **C. dichita** (Ph.), comb. nov. Very coarse annual, 1-3 dm. tall; stems erect or ascending, one to several, subsimple or with a few short ascending branches, short-hispid and (especially above) coarsely pungent tawny-hirsute, 2-4 mm. thick; leaves broad and coarse, obtuse, hirsute and short-hispid, at least the under surface conspicuously pustulate, the lower leaves 7-11 mm. broad and 5-7 cm. long; middle and upper cauline leaves oblong or lanceolate, 3-5 cm. long, 8-13 mm. broad; spikes coarse, dense, 1-2 cm. long, bractless or with a leafy bract at base; fruiting calyx ovate-oblong, coarse, ca. 5 mm. long, short pedicellate; fruiting calyx-lobes linear or spatulate-linear, erect, hirsute and hispid, midrib not prominent; corolla large, 7-10 mm. broad, white with a yellow throat; fruit 4-ovulate; nutlets 2, oblong-lanceolate, 3-3.3 mm. long, smooth and shiny, apex acute, back flat or low convex, sides angled, groove very narrow; gynobase  $\frac{1}{2}$ - $\frac{2}{3}$  height of nutlets; style very much surpassing nutlets, about twice length of gynobase.—*Eritrichium dichita* Ph. in Villanueva, Anal. Univ. Chile liii. 444 (1878), nomen; Ph. Anal. Univ. Chile xc. 516 (1895); Reiche, Anal. Univ. Chile cxxi. 831 (1908) and Fl. Chile v. 236 (1910).

CHILE. ATACAMA: "Desierto de Atacama," 1877, Villanueva (MS, TYPE; G, photo.); Potrerillos, 1920, Harding 22849 (US); near Los Alamos, Quebrada de Potrerillos, 2400 m. alt., Johnston 3695 (G).

The two collections with precise locality-data both come from about Potrerillos in the Department of Chañaral. Since Villanueva, who collected the type, mentions visiting the Quebrada Salado and such other localities in the Potrerillos region as Pedernales Lake, Doña Ines Chica, etc., it is not improbable that the type of the species actually came from that general region. According to him the plant was called "dichita" and was eaten by animals.

3. **C. hispida** (Ph.) Reiche. Annual, 1-2 dm. tall, coarsely hirsute, stiffly erect with a few short strictly ascending floriferous branches above; leaves linear, strictly ascending, 1-4 cm. long, 2-3 mm. broad, coarsely hirsute; spikes dense, bractless, ca. 1 cm. long;

fruiting calyx ovate-oblong, 4–5 mm. long, short-pedicellate; mature calyx-lobes linear, erect, commonly hirsute, midrib not very prominent; corolla 5–7 mm. broad, white; fruit 4-ovulate; nutlets 1–2, smooth and shiny, pale, oblong-lanceolate, 3–3.3 mm. long, ca. 1.4 mm. broad, apex acute, base rounded, edges angled, back flat or broadly obtuse with a weak but definite medial ridge, ventrally right-angled, groove closed to base and unforked; gynobase  $\frac{1}{2}$ – $\frac{2}{3}$  height of nutlets; style very long, much surpassing the nutlets, about twice the length of gynobase.—Anal. Univ. Chile cxxi. 831 (1908) and Fl. Chile v. 236 (1910). *Eritrichum hispidum* Fl. Atac. 38 (1860) and Viage Des. Atac. 44 and 212 (1860).

CHILE. ATACAMA: Quebrada de Doña Ines Chica, Dept. Chañaral, Jan. 1886, *Gigoux* (G). ANTOFAGASTA: Alto de Varas, Dept. Taltal, 3700 m. alt., 1854, *Philippi* (MS, TYPE; G, photo.).

After *C. phaceloides*, from which species it is scarcely separable, the closest relative of this species is *C. dichita*. It differs from that species in its very much more slender habit and smaller flowers and leaves. Although all the material I have seen falls readily and definitely into one or the other of these two species, I should not be surprised if future collecting gave reason for treating *C. dichita* and *C. hispida* as subordinate to *C. phaceloides*.

4. ***C. phaceloides*** (Clos) Reiche. Annual, 1.5–3 dm. tall, hirsute, stiffly erect, loosely branched; leaves linear, rather few, 1–2 cm. long, 2–3 mm. broad, ascending, hirsute and pustulate; spikes geminate or ternate, spreading, 6–12 mm. long, bractless, densely flowered; fruiting calyx ovate, ca. 4 mm. long, with a short coarse pedicel; mature calyx-lobes lanceolate to linear, erect, appressed hispid and hirsute along the weakly prominent midrib; corolla 4–5 mm. broad, white; fruit 4-ovulate; nutlets 4, slightly heteromorphous with the axial one a trifle the largest, brown and somewhat mottled, oblong-lanceolate, 3.5–3.8 mm. long, ca. 1.5 mm. broad, apex acute, base obtuse, edges acute, back low-convex, groove closed with a small areola at the acute basal forking; gynobase  $\frac{2}{3}$ – $\frac{3}{4}$  height of nutlets; style shortly surpassing the odd nutlet.—Anal. Univ. Chile cxxi. 813 (1908) and Fl. Chile v. 218 (1910). *Eritrichium phaceloides* Clos in Gay, Fl. Chile iv. 468 (1849), not tab. 52 bis! *Krynitzkia phacelioides* F. & M. acc. F. Ph. Cat. Pl. Chile 211 (1881); Gray, Proc. Am. Acad. xx. 280 (1885).

CHILE: no locality given, *Gay* (G, frag. of the TYPE).

I know this species only from the original description and from some fragments (a leaf and a spike with mature fruit and flowers),

apparently from the type, sent me through the courtesy of Professor H. Lecomte. The material is without precise locality-data. When the species was published, however, it was said to grow "en Copiapó." The region immediately about Copiapó and especially that just to the south and west has been quite well explored botanically, yet the species does not appear to have been rediscovered. It is not improbable that Gay got the specimens on his journey through the cordilleras southeast of Copiapó. The species is extremely close to *C. hispida* which grows in the cordilleras in the northern part of the Province of Atacama. The plant described above is not that illustrated by Gay. A comparison of the original description of *C. phaceloides* with the plant subsequently illustrated as that species is sufficient to demonstrate that two species are concerned. The plant illustrated as *E. phaceloides* is obviously a member of the section *Geocarya* and is apparently that which I have described as *C. Gayi*.

5. ***C. albida*** (HBK.) Johnston. Annual, 1–3 dm. tall; stems erect or loosely ascending, solitary or several, subsimple or paniculately branched above, very leafy, finely ashy-hispid; pubescence usually appressed below and spreading above; leaves narrowly oblanceolate or spatulate to linear, obtuse, appressed-hispid and somewhat pustulate, reduced up the stem but extending through the inflorescence as linear bracts; lower and middle cauline leaves 2–7 cm. long, 1.5–4 mm. broad; spikes solitary, numerous, loosely bracted, 1–7 cm. long, becoming remotely flowered; fruiting calyx ovate, 2–3 mm. long, sessile, tardily deciduous; mature calyx-lobes ovate-oblong to narrowly lanceolate, acute, loosely connivent, margins appressed-hispid, midrib somewhat prominent and short-hirsute; corolla white, inconspicuous, ca. 2.5 mm. broad; fruit 4-ovulate; nutlets usually 4, homomorphous with the abaxial one subpersistent, triangular-ovate, 1–1.5 mm. long, broadly tuberculate and usually somewhat granulate, rather thick, not crowded, touching one another only close to the gynobase and hence individually separated by an obvious sinus, apex acute, base truncate or obtuse, back convex, sides straight and deep, ventrally with a large open triangular areola which appears to be excavated at maturity through the breaking away of the attachment-surface from the nutlet-walls; gynobase narrowly pyramidal, a little shorter than the nutlets; style much surpassing the nutlets.—Contr. Gray Herb. lxxviii. 53 (1923); Johnston, Contr. Gray Herb. lxxiv. 42 (1925). *Myosotis albida* HBK. Nov. Gen. et Sp. iii. 91 (1818). *Lithospermum ramosum* Lehm. Asperif. ii. 328 (1818). *Eritrichium ramosum* A. DC. Prodr. x. 132 (1846). *Krynitzkia ramosa* Gray, Proc. Am. Acad. xx. 274 (1885). *C. ramosa* Greene, Pittonia i. 115



(1887). *E. hispidum* Buckley, Proc. Acad. Philad. 1861, pg. 462  
 (1861). *E. falcatum* Hieron. [Sertum Sanjuan.] Bol. Acad. Nac. Cient. Cordoba iv. 64 (1882). *C. falcata* Johnston, Contr. Gray Herb. lxxviii. 54 (1923). *K. mexicana* Brandg. Zoe v. 182 (1904). *C. argentinica* Brand in Fedde, Repert. xx. 318 (1924).

ARGENTINA. CATAMARCA: sand, El Suncho, Dec. 26, 1916, *Jørgensen 1810* (G). LA RIOJA: Cuesta de la Puerta de Piedra, Sierra Velasco, Jan. 8-11, 1879, *Hieronymus & Niederlein 16* (G, fragment of TYPES of *E. falcatum* and *C. argentinica*). JUJUY: La Guaiaca, Feb. 1916, *Hauman* (G).

I have been quite unable to separate the Argentine plant from the better known one of Mexico. The matter of leaf-breadth which Brand gives as separating them is hopelessly inadequate. The habit, flowers and the fruiting structures agree surprisingly and I doubt if there are characters that will separate the Mexican from the Argentine material.

It seems that *C. argentinica* Brand and *E. falcatum* Hieron. are clearly synonymous. The first collection cited by Brand and apparently that which he considers the type of his *C. argentinica* is *Hieronymus & Niederlein 16* from the Sierra Velasco in La Rioja. The type is in the Berlin herbarium. The specimen of this same collection in the herbarium of the University of Cordoba, Argentina, must be considered the type of *E. falcatum*, for as Dr. C. C. Hosseus, *in lit.*, has emphasized to me Hieronymus definitely stated in publishing his species that he had used the material from the Sierra Velasco in drawing up his description since the other collection (that made by Echegaray at Leoncito in San Juan), which he referred to the species, was imperfect. Brand used the name *C. falcata*, apparently for a different species, but for which one I do not know.

6. **C. diplotricha** (Ph.) Reiche. Annual, 1-1.5 dm. tall; stems several, erect, frequently somewhat decumbent at base, appressed-hispid and sparsely hirsute with short pallid hairs; leaves linear or spatulate-linear, 1-2 cm. long, 1.5-3 mm. broad, appressed short-hispid, somewhat pustulate, reduced up the stem but extending through the inflorescence as bracts; spikes solitary or rarely geminate, bracted, 1-4 cm. long, very numerous, congested; fruiting calyx ovate, ca. 2.5 mm. long, very hispid, subsessile; mature calyx-lobes lanceolate, erect or loosely connivent; corolla white, inconspicuous, tubular, ca. 0.8 mm. broad; fruit 4-ovulate; nutlets usually 4, homomorphous with apparently a slight emphasis on the abaxial one, lucid, triangular, dark with light-colored tuberculations or wrinkles, 1-1.5 mm. long, readily deciduous, crowded and closely juxtaposed with no open sinus between the individual nutlets, apex acute and slightly recurving, base trun-

cate, sides sharply margined, back usually convex; groove open or closed above but below expanded broadly into a shallow open triangular areola; gynobase subulate, about equalling length of nutlets; style clearly surpassing the nutlets.—Anal. Univ. Chile cxxi. 821 (1908) and Fl. Chile v. 226 (1910). *Eritrichium diplotrichum* Pl. Cat. Pl. Itin. Tarapaca 57 (1891). *E. diplotrichum*, var. *humilis* Ph. l. c. *C. diplotricha*, var. *humilis* Reiche, l. c. *E. axillare* Ph. l. c. *C. axillaris* Reiche, l. c. *C. modesta* Brand in Fedde, Repert. xx. 48 (1924).

ARGENTINA. LOS ANDES: between Antofagasta and Calalaste, 3600 m. alt., Jan. 1885, *F. Philippi* (MS, TYPE of *E. diplotrichum*; G, photo); Breas, Jan. 1885, *F. Philippi* (MS, TYPE of *E. diplotrichum*, var. *humilis*; G, photo.); between Breas and Salar, Jan. 1885, *F. Philippi* (MS, TYPE of *E. axillare*; G, photo.). LA RIOJA: Tambillos, 1600 m. alt., *Hosseus 1711* (G, part of TYPE of *C. modesta*).

Most related to *C. albida* but clearly different, particularly as to fruit. Both Brand and Reiche have placed the species in the section *Eucryptantha*, accrediting it with cleistogamic flowers. I have searched for closed-flowers but have been quite unable to find any. The corollas are small and tubular, however, and perhaps might be mistaken for cleistogamic ones if not examined under high magnification.

7. ***C. parviflora*** (Ph.) Reiche. Slender annual, 3–20 cm. tall; stems commonly one, usually loosely branched from near base, very leafy, more or less abundantly appressed chalky-hispid and frequently also somewhat spreading short-hirsute; leaves linear, 5–40(–50) mm. long, 1–2 mm. broad, appressed-hispid or spreading short-hirsute, somewhat pustulate beneath, weakly reduced up the stem and in plants beginning to fruit somewhat obscuring the spikes; spikes solitary or geminate, 1–5(–7) cm. long, numerous, bractless except for a leafy bract at base; fruiting calyx ovate or oblong-ovate, 1.5–2 mm. long, sessile, readily deciduous; mature calyx-lobes lanceolate or lance-oblong, connivent, densely short-hirsute; corolla minute, subtubular, 0.3–0.5 mm. broad, white; fruit 4-ovulate; nutlets usually 4, heteromorphous, ovate or triangular-ovate, dark with pale tuberculations or broad murications, apex acute, base rounded, back convex, edges sharply margined, groove usually closed above but below dilated into a shallow triangular areola; odd-nutlet abaxial, largest and most persistent, ca. 1 mm. long; consimilar nutlets 0.6–0.8 mm. long, readily deciduous; gynobase ca.  $\frac{2}{3}$  height of odd-nutlet; style much surpassing odd nutlet, a little shorter than the gynobase.—Anal. Univ. Chile cxxi. 821 (1908) and Fl. Chile v. 226 (1910). *Eritrichum parviflorum* Ph. Fl. Atac. 39 (1860) and Viage Des. Atac. 10 and 213 (1860). *E. microphyllum* Ph. Cat. Pl. Itin. Tarapaca 57 (1891). *C. micro-*

*phylla* Reiche, l. c. 828 and l. c. 233. *C. piscoensis* Brand in Fedde, Repert. xx. 49 (1924). *C. umbelliformis* Brand, l. c. 317. *C. Seleri* Brand, l. c. 317.

CHILE. ATACAMA: Chañarcillo, Sept. 1876, no collector given (MS; G, photo.); Bandurrias, Geisse (MS); Desert of Atacama [? Bandurrias], Geisse 58B (NY); Atacama Desert, 1884, San Roman (MS; G, photo.); gravel, hills north of Copiapó, 800 m. alt., Johnston 5026 (G); Caldera, Dec. 1853, Philippi (MS, TYPE of *E. parviflorum*; G, photo.); coastal dunes, Caldera, Johnston 5059 (G); gravelly bench near Caleta Pan de Azucar, Johnston 5837 (G). ANTOFAGASTA: dry slope, Sierra Esmeralda, Johnston 5681 (G). TARAPACÁ: Chismisia, March, 1885, Rahmer (MS, TYPE of *E. microphyllum*; G, photo.).

PERU. MOQUEGUA: hills southeast of Moquegua, 1500–1600 m. alt., Weberbauer 7398A (G, FM). AREQUIPA: open sandy and rocky slopes, Tingo, 2100–2300 m. alt., Pennell 13112 (G, FM); open gravelly slope above Arequipa, 2500 m. alt., Pennell 13177 (G, FM); Yura, 1884, Borm (G). ICA: slopes above Pisco, 1200–1300 m. alt., Weberbauer 5375 (G, part of TYPE of *C. piscoensis*). LIMA: open rocky slope, Quive, 800–1000 m. alt., Pennell 14300 (G); mountains near Chosica, 1500 m. alt., Weberbauer 5337 (FM, ISOTYPE of *C. umbelliformis*).

This species, while evidently distinct, is very closely related to the North American *C. angustifolia* (Torr.) Greene and *C. Grayi* (V. & R.) Macbr., cf. Contr. Gray Herb. lxxiv. 31 and 38–40 (1925). All the material cited above has heteromorphous nutlets with the abaxial one evidently the largest and most persistent. In this fact as well as in general form and appearance of the nutlets, the present species agrees closely with *C. angustifolia*, though in size of parts and general aspect it is much nearer *C. Grayi*.

I have been quite unable to separate specifically the Chilean and Peruvian plants. In a very general way it can be said that the Peruvian specimens are somewhat more strictly branched and more leafy particularly above. These, however, are but vague differences and, perhaps, hardly more than an impression. The type and only known collection of *E. microphyllum* unquestionably belongs here. The specimen is a poor one, with numerous simple flagellate branches and linear leaves ca. 6 mm. long. In habit it very much suggests *C. pusilla* (T. & G.) Greene, of North America. The nutlets are clearly heteromorphous. I have seen no authentic material of *C. Seleri* but assume it to be the hispid plant collected by Pennell and Borm in the vicinity of Arequipa. *Cryptantha umbelliformis* I believe to be merely a young state of the same form. *Cryptantha piscoensis* has an appressed pubescence and is a somewhat coarser form. It has been collected at Quiva by Pennell.

Possibly representing a distinct species in my own collection, no. 6281, from a dryish bench just below the fertile belt in the hills back

of Mollendo, Peru. This plant definitely has homomorphous nutlets. Though the nutlets are all consimilar, the abaxial one is more firmly attached to the gynobase than are the others. In other than the homomorphy of its nutlets the plant is quite like the Peruvian forms of *C. parviflora*. It has the appressed pubescence and the slightly coarse habit of the type of *C. piscoensis*.

8. **C. subamplexicaulis** (Ph.) Reiche. Perennial or persistent annual with a firm branching root, erect and subsimple at first but later with several or many trailing branches from a loose fruticulose caudex and forming a loose prostrate mat 3–12 dm. broad and 1–2 dm. tall, hispid or hispid-villous and usually appressedly so and canescent; leaves linear to linear-lanceolate or oblong-lanceolate, 1–4 (–5) cm. long, 2–4(–5) mm. broad, acutish, sessile by a broad usually cordulate or rounded base, more or less pustulate; spikes solitary or geminate, bractless, 3–12 cm. long, becoming remotely flowered; fruiting calyx ovate or ovate-oblong, 3–5 mm. long, contracted below into a short stout and angled pedicellate base; mature calyx-lobes lanceolate or linear, erect with tips more or less spreading, densely or at times sparsely appressed hispid-villous, the midrib prominent below middle and more or less hirsute; corolla evident, 5–6 mm. broad, white; fruit 4-ovulate; nutlets 4, homomorphous or somewhat heteromorphous with the axial nutlet (always the most persistent) slightly the largest and dullest, 1.5–1.9 mm. long, tuberculate or papillate, obscurely granulate, sometimes sparsely stipitate-glandular, apex acute, base truncate or obtuse, sides angled, back convex or obscurely obtuse; groove narrow or closed, usually with a small areola at the broad basal fork; gynobase  $\frac{2}{3}$ – $\frac{3}{4}$  height of nutlets; style very much surpassing the nutlets and about twice length of gynobase.—Anal. Univ. Chile cxxi. 826 (1908) and Fl. Chile v. 231 (1910). *Eri-trichum subamplexicaule* Ph. Fl. Atac. 39 (1860) and Viage Des. Atac. 25 and 213 (1860).

CHILE. ANTOFAGASTA: dry shrubby hillside, Cerro Perales near Taltal, *Johnston 5633* (G); Paposo, Dec. 1853, *Philippi* (MS, TYPE; G, photo.); fertile belt on west slope of Cerro Yumbes, Paposo, *Johnston 5562* (G); slopes in fertile belt, El Rincon just north of Paposo, *Johnston 5543* (G); grassy slope in fertile belt above Aguada Panulcito, *Johnston 5475* (G); sheltered places, Aguada Panul, *Johnston 5448* (G); moist bench in quebrada, Aguada de Miguel Diaz, *Johnston 5416* (G); dune slope just southwest of Aguada de Miguel Diaz, *Johnston 5412* (G); dune slope just back of Punta Reyes below Aguada de Miguel Diaz, *Johnston 5411* (G).

A well marked species in its typical form, characterized by its very remarkable habit. The plant grows on the fog-bathed middle slopes of the hills fronting the sea. The long branches trail through the

grass or even clamber somewhat in the low bushes forming a loose mat commonly about 8 dm. broad. Although appearing to flower the first year, it seems to persist ordinarily at least for several seasons, forming a loosely branched depressed fruticulose caudex.

The three collections from the vicinity of Miguel Diaz are not typical, having longer more hirsute calyces and non-canescens herbage. The two collections from the dunes are further atypical, being more or less ascendingly branched and not certainly persistent. It is not improbable that future collecting will show the plants from Miguel Diaz to be worthy of special nomenclatorial recognition. As now known *C. subamplexicaulis* reaches its northern limit at Miguel Diaz. The species is reported from Iquique and Tocopilla by Reiche, but through misdeterminations of *C. filiformis*.

9. **C. argentea**, sp. nov. Perennis prostrata dense argenteo-strigosa; ramis numerosissimis ramosis e caudice prostrato dense ramoso fruticoso orientibus in pulvinum 2-5 cm. altum 1-4 dm. latum densum congestis; foliis firmis 5-15 mm. longis 1-2 mm. latis dense argenteo-strigosis numerosis acutis basi rotundis vel cordulatis, superioribus paullo reductis, inferioribus conspicue marcescentibus; spicis geminatis vel solitariis 3-12 cm. longis ebracteatis; calycibus fructiferis ovatis 2-3 mm. longis deciduis basem versus crasse angulatumque attenuatis; lobis calycis oblongi-linearibus obtusis strigosis vel dense velutinis, supra medium plus minusve herbaceis et saepe recurvatis vel ascendentibus, infra medium erectis cum setis flavescenscentibus paucis perbrevibus horridis; corolla conspicua alba 2-4 mm. lata; fructu 4-ovulato; nuculis 4 homomorphis cum nucula axillari subpersistenti 1.5-2 mm. longis tuberculatis vel papillatis minute granulatis apice acutis basi rotundatis dorso convexis ventre  $\frac{2}{3}$ - $\frac{3}{4}$  longitudinis ad gynobasem adfixis, sulcis clausis vel anguste apertis in areolam deltoideam dilatatis; stylo nuculam longe superante quam gynobasis duplo longiori.

CHILE. ANTOFAGASTA: crevices about head of high fog-bathed sea-cliffs near Aguada Cachina, *Johnston 5734* (G); about head of high fog-bathed sea-cliffs near Aguada Grande, *Johnston 5814* (G, TYPE).

This species is known only from the crevices about the head of the high line of huge fog-bathed sea-cliffs which stretch for about 25 km. northward from the Atacama-Antofagasta provincial boundary between Caleta de Pan de Azucar and Caleta Esmeralda. The plant is notable for its silvery, very dense strigose pubescence and particularly because of its very densely pulvinate habit. The root is strong, branched and indubitably perennial. The species is evidently most related to *C. subamplexicaulis* of the fertile fog-bathed hillsides north

of Taltal, but is clearly different in its pulvinate habit, silvery pubescence, smaller corollas and inconspicuously hirsute calyces.

10. **C. chaetocalyx** (Ph.), comb. nov. Annual; stems several, 4–10 cm. long, spreading, loosely branched, with a very short mostly appressed slender hispid pubescence; leaves linear or oblong to lanceolate, obtusish, 1–1.5 cm. long, 1–3(–4) mm. broad, scabrous, short-hirsute, evidently and abundantly pustulate; spikes 1–3 cm. long, bractless, solitary or geminate, becoming loose in age; fruiting calyx ovate, 2–4 mm. long, contracted into a short stout angulate pedicellate base; mature calyx-lobes linear, above middle sparsely hirsute and green and spreading, midrib very prominent and pungent short-hirsute below middle; corolla white, 2.5–5 mm. broad; ovules 4; nutlets usually 4, homomorphous with the axial one most persistent, 1.5–2 mm. long, oblong-ovate, very finely granulate, more or less obscurely rugulose or tuberculate, apex acute, sides sharp, base rounded, back convex without a medial ridge; gynobase ca.  $\frac{3}{4}$  height of nutlets; style definitely surpassing the nutlets.—*Eritrichum chaetocalyx* Ph. Fl. Atac. 39 (1860) and Viage Des. Atac. 10 and 213 (1860). *E. divaricatum* Ph. Anal. Univ. Chile xc. 534 (1895). *C. divaricata* Reiche, Anal. Univ. Chile cxxi. 827 (1908) and Fl. Chile v. 232 (1910). *E. pustulosum* Ph. Anal. Univ. Chile xc. 537 (1895).

CHILE. ATACAMA: Bandurrias, *Geisse*, (MS); Desert of Atacama [? Bandurrias], *Geisse 154* (NY); Atacama Desert [Caldera region], *Morong 1235* (G, NY, US, FM); "Caldera ? Copiapó," *no collector given* (MS); Caldera, Dec. 1853, *Philippi* (MS, TYPE of *E. chaetocalyx*; G, photo.); Caldera, Sept. 1879, *no collector given* (MS, TYPE of *E. pustulosum*; G, photo.); Caldera, Sept. 1885, *F. Philippi* (MS, TYPE of *E. divaricatum*; G, photo.); Caldera, 1906, *Gigoux* (G).

Although in the original account of *E. chaetocalyx* the type is given as coming from near Pan de Azucar, lat.  $26^{\circ} 10'$ , I feel certain that in fact it came from Caldera, lat.  $27^{\circ} 5'$ . There are no specimens in the Philippi herbarium from north of Caldera. I searched for the plant about Caleta de Pan de Azucar and did not find it. In the Philippi herbarium there is but a single collection labeled *E. chaetocalyx* which was collected by Philippi during his travels in the Atacama Desert in 1853–4. This is from Caldera and checks perfectly with the original description. It is notable that in the text of the narrative of his explorations, Philippi does not mention the species in connection with Pan de Azucar although he does so with Caldera. Hence I feel confident that the locality given with the original description is an error and probably a slip of the pen. The type almost certainly came from Caldera. The species is a very distinct one with characteristic coarse spreading stems and more or less obscurely roughened nutlets. Its

relations are with *C. granulosa* and *C. filiformis* though it is quite distinct from both.

11. ***C. filiformis*** (Ph.) Reiche. Annual, 5–30 cm. tall, usually loosely and ascendingly branched from the base, finely hispid and frequently appressedly so; leaves not numerous, lanceolate to lance-linear or oblanceolate, 1–3 cm. long, 1–5(–9) mm. broad, obtuse or acutish, sessile, pustulate and hirsute; spikes solitary or geminate, 1–10 cm. long, bractless, becoming loosely flowered; fruiting calyces ovate or oblong-ovate, 3–5 mm. long, subsessile; mature calyx-lobes linear or lance-linear, obtusish, hirsute below the middle, above the middle usually herbaceous sparsely appressed short-hispid and spreading; corolla conspicuous, 4–7 mm. broad, white; fruit 4-ovulate; nutlets usually 4, heteromorphous, ovate or ovate-oblong, back obscurely obtuse, base truncate, sides angled, groove opened or closed and broadly forked near base; odd nutlet axial, evidently the largest, 1.5–2 mm. long, most firmly affixed, palest, tuberculate or muricate or papillate, more or less stipitate-glandular; homomorphous nutlets 1.3–1.5(–1.7) mm. long, tuberculate, brownish; gynobase about  $\frac{2}{3}$  length of nutlets; style much surpassing nutlets, about twice length of gynobase.—Anal. Univ. Chile cxxi. 829 (1908) and Fl. Chile v. 234 (1910). *Eritrichum filiforme* Ph. Fl. Atac. 39 (1860) and Viage Des. Atac. 213 (1860). *E. mite* Ph. Anal. Univ. Chile xc. 539 (1895). *C. mitis* Reiche, l. c.

CHILE. ANTOFAGASTA: Hueso Parado, Taltal, 1853, *Philippi* (MS, TYPE of *E. filiforme*; G, photo.); coastal hills, Tocopilla, Sept. 1889, *Vidal* (MS, TYPE of *E. mite*; G, photo.); Tocopilla, no collector given, no. 13 (MS); gravelly fog-bathed slope, Tocopilla, Oct. 1925, *Johnston* 3578 (G). TARAPACÁ: Quebrada Huantaca, Iquique, Sept. 1904, *Martens* (MS); Quebrada Huantajaya, Iquique, 700 m. alt., Sept. 1925, *Werdermann* 764 (G).

The type of *C. filiformis* is a very small slender plant given as from Hueso Parado at Taltal. Although with a different gross aspect, it has the fruit-characters, the calyx and pubescence of the Tocopilla and Iquique plants. I made very many collections of *Cryptanthas* in the region about Taltal but did not discover any plants there that could be mistaken for *C. filiformis*. If the plant actually came from the Taltal region it must be rare or very local. The known range of the species is very disrupted. The material at hand shows variation in size and shape of the calyx-lobes and to some extent in the outline of the nutlets also. However, these variations are unimportant since they are all present among the large suite of specimens I collected on a single hillside at Tocopilla.

12. ***C. granulosa*** (R. & P.) Johnston. Annual, 5–30 cm. tall; stems erect, becoming loosely and ascendingly branched, finely hispid

with the hairs appressed or somewhat spreading; leaves linear, 2–3.5 cm. long, 2–4 mm. broad (rarely, in *C. latifolia*, somewhat oblong and 5–10 mm. broad), obtuse, rounded to a sessile base, sparsely pustulose-setose; spikes solitary or geminate, bracted, 3–12 cm. long, becoming loosely flowered; bracts few to many, linear or oblong, 3–5(–10) mm. long; fruiting calyx ovate, 2–4 mm. long, subsessile; mature calyxlobes linear or lance-linear, obtuse, sparsely appressed-hispid, below middle sparsely short-hirsute on the weakly prominent midrib, above middle more or less herbaceous and spreading; corolla evident, white, 2–4 mm. broad; ovules 4; nutlets 4, homomorphous or heteromorphous with the axial one (always subpersistent) slightly the largest, ovate-oblong, 1.3–1.8 mm. long, tuberculate or papillate and somewhat glandular, apex acute, base rounded or obtuse, edges angled, back convex, groove closed or gradually dilated towards the base; gynobase  $\frac{2}{3}$ – $\frac{3}{4}$  height of nutlets; style surpassing the nutlets, about equalling the gynobase.—Contr. Gray Herb. lxxviii. 54 (1923). *Myosotis granulosa* R. & P. Fl. Peruv. ii. 5 (1799). *C. latifolia* Johnston, Contr. Gray Herb. lxxiii. 73 (1924).

PERU. LIMA: mountains near Chosica, 1400 m. alt., *Weberbauer 5340* (FM); Mount San Augustin near Lima, 250 m. alt., *Weberbauer 5695* (FM); loose stony upper slopes of seaside hills, Chorrillos near Lima, 150 m. alt., *Macbride 5861* (FM, TYPE of *C. latifolia*; G, ISOTYPE). AREQUIPA: sandy hills, Mollendo, *Hitchcock 22357* (US, G); lower edge of fertile belt in hills back of Mollendo, *Johnston 3532* (G).

I have concluded that *C. latifolia* is merely the luxuriant phase of *C. granulosa*. Mounted on the sheet with the type is a small plant, which is apparently typical of Ruiz & Pavon's species. The plant from Mollendo seems to belong to the present species, but appears to be very much more abundantly bracted than is the typical form about Lima.

13. ***C. taltalensis***, sp. nov. Annua 1–3 dm. alta laxe lasaliter ramosa; ramis saepe gracilibus minute strigosis et plus minusve breviter hispidis; foliis linearibus vel rariter anguste lanceolatis paucis 1–2 cm. longis 1–2(–3) mm. latis pustulatis breviter hispidis, superioribus paullo reductis; spicis solitariis vel geminatis 3–5 cm. longis bracteatis; bracteis linearibus caducis 3–5 mm. longis; calycibus fructiferis congestis ascendentibus oblongis 3–4.5 mm. longis asymmetricis sessilibus faciliter deciduis basi conicis; lobis calycis linearibus erectis ascendenter hispidis cum costa prominenti; corolla evidenti 3–4 mm. lata alba; fructu 4-ovulato; nuculis 1–3 saepissime plures abortis heteromorphis ovatis apice acutis dorsi convexis margine angulatis, sulcis clausis vel anguste apertis basi in areolam deltoideam dilatatis; nucula axillari ca. 1.8 mm. longa subpersistenti semper maturanti



papillata plus minusve glandulari opaca ventre  $\frac{3}{4}$  longitudinis ad gynobasem affixa; nuculis consimilibus tuberculatis deciduis ca. 1.5 mm. longis; stylo nuculam axillarem brevissime vel breviter superanti.

CHILE. ANTOFAGASTA: gravelly slopes near crest of hills southeast of Taltal, *Johnston 5121* (G, TYPE); rocky bottom of dry quebrada in hills southeast of Taltal, *Johnston 5120* (G); rocky talus-slope in Quebrada de San Ramon, near Taltal, *Johnston 5156* (G); dryish gravelly open places on summit ridge of Cerro Perales near Taltal, 1000 m. alt., *Johnston 5634* and *5635* (G).

This species is most closely related to *C. flaginea*, from which it differs in its larger corollas and few, strongly heteromorphous nutlets. It was found at various points in the region about the port of Taltal, always associated with *C. flaginea*, though less common and less generally distributed than that widely ranging species. Although it appeared to be a very definite and recognizable entity in the field, subsequent study of the collected material shows it so closely related to *C. flaginea* that I have been tempted to propose it merely as a variety of that species.

14. **C. Romanii**, sp. nov. Annua laxa ramosa 8–15 cm. alta sparse strigosa hirsuta; foliis linearibus 1–3 cm. longis 1–2.5 mm. latis pustulatis breviter hirsutis acutis, superioribus paullo reductis; spicis solitariis vel geminatis 2–3 cm. longis bracteatis; bracteis linearibus 4–6 mm. longis; calycibus fructiferis congestis ascendentibus oblongis 3–4.5 mm. longis asymmetricis subsessilibus deciduis basi conicis; lobis calycis linearibus erectis costatis ascendenter hirsutis; corolla conspicua 5–6 mm. lata alba; fructu 4-ovulato; nuculis 4 homomorphis cum nucula axillari subpersistenti 2 mm. longis oblongo-ovatis tuberculatis obscure granulatis apice acutis dorse convexis margine angulatis et incrassatis ventre  $\frac{4}{5}$  longitudinis ad gynobasem affixis; sulcis clausis vel anguste apertis basem versus breviter furcatis; stylo nuculas valde superanti.

CHILE. ANTOFAGASTA: Sierra Esmeralda, Dept. Taltal, 1884, *San Roman* (MS, TYPE; G, photo. and frag.).

In gross habit this species much suggests *C. hispida* and in fact was so determined by Philippi. Its relations, however, are with *C. flaginea* and *C. taltalensis*, particularly the latter. It differs from both in its very large corollas. From *C. taltalensis* it also differs in its 4 homomorphous nutlets. It differs from *C. flaginea*, which I collected in the Sierra Esmeralda, in its slightly coarser habit, very large corollas and slightly larger nutlets.

15. **C. flaginea** (Ph.) Reiche. Annual, 1–2 dm. tall, erect and shortly branched above or loosely branched from the base; stems

slender, finely strigose and hispid; leaves linear or lanceolate, 1–2.5 (–3) cm. long, 1–2 mm. broad, spreading, obtuse, pustulate, finely short-hispid, weakly reduced up the stem; spikes solitary or geminate 2–5 (–8) cm. long, bracteate; bracts linear, 3–6 mm. long, caducous; fruiting calyx oblong, 3–4 mm. long, usually congested, readily deciduous, sessile, ascending; mature calyx-lobes linear, below the middle appressed short hispid and along the prominent midrib hirsute, above somewhat herbaceous and sparsely hairy and slightly spreading; corolla inconspicuous, white, subtubular or with a very narrow limb, 0.5–1.5 (–2) mm. broad; fruit 4-ovulate; nutlets 4 or rarely fewer, subhomomorphous with the axial one slightly emphasized and most persistent, tuberculate, usually obscurely granulate, 1.2–1.5 (–1.8) mm. long, ovate or oblong-ovate, apex acute, edges angled and frequently margined, base obtuse, back convex; groove narrow or closed, forked at base; gynobase  $\frac{2}{3}$ – $\frac{3}{4}$  as high as the nutlets; style much surpassing the nutlets.—Anal. Univ. Chile cxxi. 829 (1908) and Fl. Chile v. 234 (1910). *Eritrichium filagineum* Ph. Anal. Univ. Chile xc. 536 (1895).

CHILE. ATACAMA: Monte amargo, Sept. 1885, *F. Philippi* (MS, TYPE; G. photo.); Desert of Atacama [Caldera Region], *Morong* 1238 (G, NY, US, FM), 1263 (G, NY, US), 1249 (NY); sand, Caldera, *Johnston* 5064 (G); Caldera, 1922, *Gigoux* (G); gravelly benches and slopes, Chañaral, *Johnston* 4808 (G); vicinity of Caleta Pan de Azucar, *Johnston* 5831 and 5844 (G); quebrada below Aguada Grande, *Johnston* 5812 (G). ANTOFAGASTA: crest of high fog-bathed sea-cliffs near Aguada Grande, *Johnston* 5813 (G); wash on plain between Ag. Grande and Ag. Cachina, *Johnston* 5745 (G); Cerro de la Cachina on dry gravelly crest, *Johnston* 5744 (G); sandy soil, Aguada Cachina, *Johnston* 5736 (G); north of Portezuelo de Mina Carola, Sierra Esmeralda, *Johnston* 5682 (G); gravel, Quebrada de Taltal, *Johnston* 5123 (G); gravelly slopes near crests of hills southeast of Taltal, *Johnston* 5122 (G); Taltal, 100 m. alt., *Werdermann* 809 (G); summit ridge of Cerro Perales near Taltal, *Johnston* 5636 (G); gravelly floor of Quebrada San Ramon near Taltal, *Johnston* 5157 and 5158 (G); Paso Malo north of Taltal, *Johnston* 5179 (G); gravelly bench, Estancia Vieja, *Johnston* 5204 (G); summit of Cerro Yumbes, Paposos, *Johnston* 5547 (G); Posada, Quebrada Guanillo, Paposos, *Johnston* 5601 (G); El Rincon, Paposos, *Johnston* 6285 and 5546 (G); hillside, Aguada Panulcito, *Johnston* 5479 (G); between Ag. Panul and Ag. Panulcito, *Johnston* 5244 (G); rocky slope, Aguada Cardon, *Johnston* 5295 (G); Aguada de Miguel Diaz, *Johnston* 5417 and 5418 (G); quebrada just north of Antofagasta, *Johnston* 3659 (G).

PERU. AREQUIPA: lower part of fertile belt in hills back of Mollendo, *Johnston* 6280 (G); hills, Mollendo, *Hitchcock* 22384 (G, US).

In the Museo Nacional at Santiago the original collection of this species is represented by six plants, two in the small herbarium of Federico Philippi and four in the main herbarium of the museum. It seems certain that the older Philippi described his species from the latter four plants. These are associated with a label giving the

locality as "Monte amargo," a station on the railroad about half-way between Caldera and Copiapó. This collection of four plants is a mixture, three representing *C. filaginea* as here defined and one being a plant of *C. parviflora* just coming into fruit. I suspect that the plant of *C. parviflora* is the one mentioned by Philippi as having been collected by Borchers near Caldera. It seems very probable, also, that the specific name, *filaginea*, was suggested by this same odd plant.

The species seems to reach its southern limit in the Caldera-Copiapó region. It is very generally distributed in the coastal region further north, in fact is the predominating and common species of the genus in the coastal portion of the Department of Taltal. It is related on one hand to *C. taltalensis* and on the other to *C. limensis*. The latter is a coarser plant and less branched and has broader firmer leaves and larger fruiting calyces.

16. **C. limensis** (A. DC.) Johnston. Annual, 5–15 cm. tall; stems usually loosely branched from the base, finely appressed-hispid; leaves oblanceolate to linear, 1–3 cm. long, 2–4 mm. broad, obtusish, finely appressed-hispid, more or less pustulate; spikes solitary or geminate, evidently bracted, 3–5 cm. long; fruiting calyx 5–6 mm. long, ovate-oblong, subsessile; mature calyx-lobes linear to linear-ob lanceolate, below the middle with a prominent very hirsute midrib, above broadened herbaceous spreading and merely appressed-hispid; corolla inconspicuous, subtubular, white, ca. 1 mm. broad; fruit 4-ovulate; nutlets 4, homomorphous or sometimes slightly heteromorphous, ovate-oblong, 1.5–1.7 mm. long, tuberculate, apex acute, base truncate, back convex, edges angled, groove closed or narrow but below gradually dilated into a suprabaasal triangular areola, axial nutlet always most firmly affixed and occasionally a trifle the largest; gynobase about  $\frac{3}{5}$  height of nutlet; style surpassing the nutlets.—*Contr. Gray Herb.* lxx. 46 (1924). *Eritrichium limense* A. DC. *Prodr.* x. 133 (1846). *C. Macbridei* Johnston, *Contr. Gray Herb.* lxxiii. 74 (1924). *C. Woitschachii* Brand in Fedde, *Repert.* xx. 317 (1924).

PERU. LIMA: loose stony upper slopes of sea-side hills, Chorrillos near Lima, ca. 150 m. alt., *Macbride* 5869 (FM, TYPE of *C. Macbridei*; G, ISOTYPE); Lima, 1833, *Abadia* (G, photo. of TYPE of *E. limense*). AREQUIPA: open places in and just below fertile belt in hills back of Mollendo, *Johnston* 3531 (G). INDEFINITE: "Peru," *Woitschach* (G, fragment of TYPE of *C. Woitschachii*).

Very closely related to *C. filaginea* but a coarser plant with larger fruiting calyces. *Cryptantha Macbridei* and *C. Woitschachii* are clearly synonyms of this species.

17. **C. calycina** (Ph.) Reiche. Annual, 1–3.5 dm. tall; stems commonly solitary with short ascending laterals above or with nu-

merous long erect branches from towards the base, shaggy coarse-hirsute; leaves linear or lance-linear, 1-4 cm. long, 1.5-3 mm. broad, obtusish, hispid, somewhat pustulate; spikes geminate or ternate, bractless, glomerate or elongating and becoming very loosely flowered, 1.5-6(-10) cm. long; fruiting calyx strongly accrescent, 8-11 mm. long, 2-2.5 mm. broad, short-pedicellate; mature calyx-lobes lance-linear or linear, proximate and erect above the fruit which they greatly surpass, midrib thick and very prominent and armed with coarse slightly tawny hirsute bristles, margins villous-hispid; corolla inconspicuous, subtubular, white, 1-2 mm. broad, lobes erect; fruit 4-ovulate; nutlets usually 4, homomorphous with the axial one slightly the most persistent, lanceolate, 2.8-3.2 mm. long, 0.9-1.2 mm. broad, smooth or obscurely tuberculate particularly towards the apex, apex acuminate, back flat or broadly obtuse with, at most, an obscure low medial ridge, groove closed or very narrow but usually open at the broad forking; gynobase subulate, ca.  $\frac{3}{5}$  height of nutlets; style equalling the nutlets or shortly surpassing them.—Anal. Univ. Chile. cxxi. 825 (1908) and Fl. Chile v. 230 (1910). *Eritrichum calycinum* Ph. Fl. Atac. 38 (1860) and Viage Des. Atac. 80 and 212 (1860).

CHILE. ATACAMA: talus, Rio Sancarron below Rucas, 3200 m. alt., *Johnston 6225* (G); dry rocky floor of quebrada, Rio de Valeriano above Juntas del Encierro, 3250 m. alt., *Johnston 6025* (G); Quebrada Alfalfa, 3200 m. alt., *Johnston 6004* (G); rocky hillside, Laguna Chica, 3200 m. alt., *Johnston 5961* (G); gravelly bench in quebrada east of Laguna Grande, 3400 m. alt., *Johnston 5923* (G); sunny gravelly slope, Quebrada Tolar, Sierra San Miguel, 3400 m. alt., *Johnston 4950* (G); Encantada, Jan. 1901, *Reiche* (MS). ANTOFAGASTA: Sandon, 2700 m. alt., Feb. 1854, *Philippi* (MS, TYPE; G, photo.).

An extremely well marked and very distinct species, which appears to be without any close, obvious relatives. The unusually large fruiting calyces and its very elongate nutlets make it readily recognizable. I found it usually associated with *C. diffusa*, commonly in the upper parts of the range of that species, though always much less common.

18. **C. patagonica** (Speg.) Johnston. Annual, 1-1.5(-3) dm. tall, drying dark; stems slender, erect or decumbent, usually several, commonly with short spreading branches, finely strigose or appressed short-hispid; leaves linear, obtuse, 1-3.5 cm. long, 1-2(-3) mm. broad, spreading, finely short appressed-hispid, finely pustulate beneath; spikes solitary or geminate, bractless, 1-3 cm. long, glomerate or elongating but not particularly loose-flowered; fruiting calyx ovate, 2-3 mm. long, 1.5-3 mm. broad, short-pedicellate; mature calyx-lobes narrowly lanceolate, connivent above, shortly surpassing the nutlets,

midrib prominent and hirsute, margin appressed villous-hispid; corolla inconspicuous, white, ca. 1.5 mm. broad; fruit 4-ovulate; nutlets 4, homomorphous with the axial one most persistent, lance-ovate, ca. 2 mm. long, ca. 0.8 mm. broad, smooth or more often obscurely tuberculate particularly above the middle, apex acute, base truncate, sides angled, back usually convex below the middle and flat above; groove closed or very narrow, usually with a small areola at the fork; gynobase subulate,  $\frac{2}{3}$ – $\frac{4}{5}$  height of nutlets; style equalling or shortly surpassing the nutlets.—Contr. Gray Herb. lxxviii. 54 (1923). *Am-sinckia patagonica* Speg. Anal. Soc. Cient. Argentina liii. 137 (1902).

ARGENTINA. SANTA CRUZ: very arid desert between Rio Santa Cruz and Rio Gallego, Feb. 26, 1882, *Spegazzini* (G); arid plains along Rio Santa Cruz, Feb. 7, 1882, *Spegazzini* (G, part of TYPE); desert along Rio Chico, Feb. 21, 1882, *Spegazzini* (G); Patagonia, lat. 50°–53°, 1882, *Moreno & Tonini* (NY).

This species, which sets the southern limit of the genus at about lat. 52° S., is probably most related to the very distinct *C. calycina* of the desert Andes of northern Chile. It has been much misunderstood and has passed under many names. The collection by *Moreno & Tonini*, above cited, is that reported as *Cynoglossospermum humile* by *Kuntze*, Rev. Gen. iii. pt. 2, 204 (1898). *Spegazzini*, Pl. Patag. Aust. 551–552 (1897), and *Macloskie*, Fl. Patag. 678–679 (1905), treated it as *E. diffusum* and *E. parvulum*.

19. ***C. peruviana*** Johnston. Annual, slender, 1–2 dm. tall; stem simple or with several long ascending branches, finely short-hispid and frequently appressedly so; leaves narrowly linear, 1–3(–6) cm. long, 1–2 mm. broad, numerous, finely hispid, inconspicuously pustulate, little reduced up the stem; spikes solitary or geminate, 1–5 cm. long, bractless, glomerate then elongating; fruiting calyx ovate, 2.5–3 mm. long, subsessile; mature calyx-lobes lance-linear or narrowly lanceolate, erect, appressed hispid-villous, somewhat hirsute along the weakly prominent midrib; corolla white, inconspicuous, subtubular with a very narrow limb 0.8–1.4 mm. broad; fruit 4-ovulate; nutlets 4 or rarely fewer, homomorphous with the axial one subpersistent and always developing, 1.5–1.8 mm. long, lance-ovate, very coarsely muricate or muricate-rugose, finely granulate, pale, apex acute, edges acute, back convex, groove closed or gradually dilated towards the base; gynobase about  $\frac{3}{5}$  length of nutlets; style just surpassing the nutlets.—Contr. Gray Herb. lxxiii. 74 (1924). *C. Weberbaueri* Brand in Fedde, Repert. xx. 318 (1924). *C. cajabambensis* Brand, l. c. 319.

PERU. ANCASH: Hacienda Cajabamba between Samanco and Caraz, *Weberbauer* 3041 (G, frag. of TYPE of *C. cajabambensis*); rocky places, Ocos,

3200–3400 m. alt., *Weberbauer 2658* (G, frag. of TYPE of *C. Weberbaueri*). LIMA: loose rocks on dry slope above river, Rio Blanco, 3600 m. alt., *Macbride & Featherstone 674* (FM, TYPE of *C. peruviana*; G, ISOTYPE). AREQUIPA: gravelly soil along stream-courses, Arequipa near base of El Misti, 3000–3200 m. alt., *Pennell 13235* (G, FM); ravines and hillsides on southern slopes of El Chachani north of Arequipa, 3350 m. alt., *Hinkley 77* (G, US). MOQUEGUA: open mixed formation, Torata, 2200–2300 m. alt., *Weberbauer 7398* (G, FM).

A Peruvian plant which is very closely related to *C. globulifera* and perhaps is only a phase of it differing in its northern range, slender habit and slightly smaller flower-parts. It sets the northern limit for the distribution of *Cryptantha* in South America, in the Department of Ancash occurring north almost to lat. 9° S.

20. **C. globulifera** (Clos) Reiche. Annual, 1–3(–4) dm. tall; stems few or solitary, usually loosely branched, hispidulous; leaves linear, 1–4 cm. long, 1–2 mm. broad, obtusish, short appressed-hispid, little reduced up the stem; spikes solitary or geminate, bractless, 1–6(–10) cm. long, becoming loosely flowered in age; fruiting calyx ovate-oblong, 3–4 mm. long, ascending, base rounded and very shortly pedicellate; mature calyx-lobes linear or lance-linear, connivent above with the tips somewhat spreading, margins villous, hirsute along the prominent midrib, the hairs all clean and white or only slightly tawny; corolla inconspicuous, white, subtubular, ca. 1 mm. broad; fruit 4-ovulate; nutlets 1–4, homomorphous, ovate-oblong, 1.5–2 mm. long, finely granulate, pale, weakly but densely tuberculate with the tuberculations in more or less broken transverse rows, apex acute, back convex, edges acute below middle and rounded above, groove narrowed or closed but usually with an open fork; gynobase  $\frac{3}{4}$ – $\frac{4}{5}$  height of nutlets; style just surpassing or a little surpassed by the nutlets.—Anal. Univ. Chile cxxi. 827 (1908) and Fl. Chile v. 232 (1910). *Eritrichium globuliferum* Clos in Gay, Fl. Chile iv. 464 (1849). *E. glareosum* Ph. Linnaea xxxiii. 189 (1864). *C. glareosa* Greene, Pittonia i. 111 (1887); Reiche, l. c. 820 and l. c. 225. *E. carrizalense* Ph. Anal. Univ. Chile xc. 526 (1895). *C. carrizalensis* Reiche, l. c. 819 and l. c. 224. *E. floribundum* Ph. Anal. Univ. Chile xc. 532 (1895). *C. floribunda* Reiche, l. c. 825 and l. c. 230. *E. parvulum* Ph. Anal. Univ. Chile xc. 535 (1895). *E. oliganthum* Ph. Anal. Univ. Chile xc. 535 (1895). *C. oligantha* Reiche, l. c. 819 and l. c. 224. *E. sphaerophorum* Ph. Anal. Univ. Chile xc. 539 (1895). *E. longisetum* Ph. Linnaea xxxiii. 189 (1864) in part; only as to plant from San Felipe which became type of *E. floribundum*, cf. Anal. Univ. Chile xc. 538 (1895).

ARGENTINA. CHABUT: gravelly places along Rio Carren-leofú, March 5, 1900, *Spegazzini* (G). RIO NEGRO: vicinity of General Roca, 250–360 m.

alt., *Fischer 131* (G, US, FM). MENDOZA: vicinity of Mendoza, Nov. 1913, *Hauman 260* (G).

CHILE. SANTIAGO: Las Arañas, Sept. 1861, *no collector given* (MS). ACONCAGUA: San Felipe, Sept. 1861, *Philippi* (MS, TYPE of *E. floribundum*; G, photo.); bed of Rio Aconcagua near San Felipe, Sept. 1860, *Philippi* (MS, TYPE of *E. glareosum*; G, photo.); San Felipe, Aug. 20, 1921, *Claude-Joseph 1408* (US); Rio Blanco, Aug. 25, 1921, *Claude-Joseph 1346* (US). COQUIMBO: common on coastal dunes, La Serena, Sept. 1836, *Gay 47* (G, frag. and photo. of TYPE of *E. globuliferum*); gravelly talus, Los Llanos, Estero de Guanta, ca. 1400 m. alt., *Johnston 6246* and *6247* (G); Paihuano, Sept. 1878, *no collector given* (MS). ATACAMA: Bandurrias, *Geisse* (MS); Desert of Atacama [? Bandurrias], *Geisse 58a* (NY); Chañarcillo, Sept. 1885, *no collector given* (MS; G, photo.); Yerba Buena, 1885, *Godoi de Collao* (MS, TYPE of *E. carrizalense*; G, photo.); Caldera, Sept. 1885, *no collector given* (MS, TYPE of *E. parvulum*; G, photo.); Caldera, Sept. 1879, *no collector given* (MS, TYPE of *E. sphaerophorum*; G, photo.); between Caldera and Copiapó?, *no collector given* (MS, TYPE of *E. oliganthum*; G, photo.); Piedra colgada, Sept. 1885, *no collector given* (MS; G, photo.); Vizcachitas, Oct. 14, 1914, *Rose 19336* (US, NY).

A somewhat variable but a natural and readily recognized species. It is not improbable that with the accumulation of study-material the species as here defined may be broken up into several minor species of restricted distribution. The material from Coquimbo is more tawny, coarser and more spreading than other forms. As here interpreted the species is notable since it is the only member of its genus generally ranging at low altitudes which occurs both in Argentina and Chile. Possibly the axial nutlet is slightly emphasized. However, in a number of cases, I found it aborted and the abaxial one developing.

21. **C. diffusa** (Ph.), comb. nov. Annual, 8–20 cm. tall; stems commonly several to many, ascending, strictly branched, hispid; leaves linear or lance-linear, 1–3.5 cm. long, 1–2.5 mm. broad, obtuse, numerous, weakly reduced up the stem, finely appressed-hispid, very obscurely if at all pustulate; spikes solitary or geminate, bractless, 1–5(–8) cm. long, glomerate but in age becoming rather loosely flowered, tawny; fruiting calyx ovate or oblong-ovate, 3–4 mm. long, ascending, base rounded and very shortly pedicellate; mature calyxlobes lanceolate to linear-lanceolate, connivent above, at times with tips spreading, margins villous, the prominent midrib hirsute, the hairs usually very conspicuously tawny; corolla inconspicuous, sub-tubular, white, ca. 1 mm. broad; fruit 4-ovulate; nutlets 1–4, homomorphous, ovate-oblong, 1.5–2.2 mm. long, pale, finely granulate, obscurely tuberculate, marked by 6–12 more or less sinuous deep lineate transverse grooves and hence broadly wrinkled, apex acute, back flattish or obscurely obtuse or convex, edges angled, groove narrow or closed; gynobase  $\frac{3}{4}$ – $\frac{4}{5}$  height of nutlets; style just surpassed by or just surpassing the nutlets.—*Eritrichum diffusum* Ph.

Linnaea xxxiii. 191 (1864) and Anal. Univ. Chile xc. 523 (1895). *E. diffusum* Ph. in Villanueva, Anal. Univ. Chile liii. 444 (1878), nomen. *E. micranthum* Ph. Fl. Atac. 38 (1860) and Viage Des. Atac. 80 and 212 (1860); not *E. micranthum* Torr. (1854) nor *C. micrantha* Johnston (1925). *E. Borchersii* Ph. Anal. Univ. Chile xc. 531 (1895). *C. Borchersii* Hauman, Anal. Soc. Cient. Argentina lxxxvi. 302 (1918). *E. globuliferum*, var. Ph. Anal. Univ. Chile xc. 524 (1895). (?) *C. famatinae* Brand in Fedde, Repert. xx. 318 (1924).

ARGENTINA. MENDOZA: Baños del Inca, Jan. 15, 1886, *Borchers* (MS, TYPE of *E. Borchersii*; G, photo.); Rio Tupungato, 2300 m. alt., *Hauman* 271 (G); Mendoza, Jan.-Feb., *Goldsack* (MS).

CHILE. COQUIMBO: Cordilleras de Illapel, 2500 m. alt., Jan. 1906, *Reiche* (MS); in andiis Hurtado, Feb. 1837, *Gay* 1622 (MS, badly diseased); "Huanta, Baños del Toro, etc.," 1860-61, *Volckmann* (MS, TYPE of *E. diffusum*; G, photo.); Doña Ana, *Peralto* (MS); Baños del Toro, 3500 m. alt., *Werdermann* 220 (G, FM); Cordilleras de Coquimbo, Jan. 1904, *Reiche* (MS). ATACAMA: rocky burnt-over place, Rio Sancarron below Rucas, 3200 m. alt., *Johnston* 6224 (G); loose earth in quebrada, Laguna Grande, 3450 m. alt., *Johnston* 5924 (G); Quebrada de Serna, 1885, *San Roman* (MS); gravelly slope below Portezuelo Tolar, Sierra San Miguel, 3800 m. alt., *Johnston* 4949 (G); stony benches, Quebrada Tolar, Sierra San Miguel, 3500 m. alt., *Johnston* 4951 (G); upper part of Quebrada San Miguel, 2500-2800 m. alt., *Johnston* 4932 and 4933 (G); near Los Marayes, Sierra San Miguel, 1100-1500 m. alt., *Johnston* 4918 and 6282 (G); rocky draw, Potrerillos, 2800 m. alt., *Johnston* 4728 (G); abandoned field, Los Alamos, Quebrada de Potrerillos, 2400 m. alt., *Johnston* 3697 (G); Agua de Acerillo, Oct. 1877, *Villanueva* (MS). ANTOFAGASTA: Sandon, 2700 m. alt., Feb. 1854, *Philippi* (MS, TYPE of *E. micranthum*; G, photo).

Clearly related to *C. globulifera* but differing in its lineately transverse-grooved nutlets, usually conspicuously tawny spikes and high montane distribution. Though there is some intergradation between the two species it is rare. Commonly they are distinguished at a mere glance. In *C. diffusa* no particular nutlet seems to be emphasized nor always developing.

22. ***C. debilis*** (Ph.) Reiche. A weak slender annual, 1-1.5 dm. tall, with a few very loose well developed branches, sparsely hispidulous; leaves linear or oblanceolate, spreading, distant, 2-3 cm. long, 2-4 mm. broad, quite herbaceous, sparsely hispidulous, obtuse, upper ones scarcely if at all reduced; spikes geminate or solitary, spreading, 2-3 cm. long, bractless, becoming very loosely flowered; fruiting calyx broadly ovate, 2-2.5 mm. long, 1.5-2 mm. broad, base broad and very shortly pedicellate; mature calyx-lobes lanceolate, herbaceous, sparsely appressed-villous, weakly hirsute along the non-prominent midrib; corolla inconspicuous, white, subtubular, ca. 1 mm. broad, fruit 4-ovulate; nutlets 4, homomorphous, ovate-oblong, 1.5-1.8 mm. long, pale, very finely granulate, tuberculate or becoming



papillate towards apex, marked by 6–12 deep more or less sinuous lineate grooves and hence broadly transverse-wrinkled, apex acute, back convex, edges acute, groove closed or narrow; gynobase reaching to about  $\frac{4}{5}$  height of nutlets; style just surpassed by nutlets.—Anal. Univ. Chile cxxi. 830 (1908) and Fl. Chile v. 235 (1910). *Eri-trichium debile* Ph. Cat. Pl. Itin. Tarapaca 57 (1891).

BOLIVIA. POTOSI: Paroma, ca. 3800 m. alt., Feb. 25, 1885, *F. Philippi* (MS, TYPE; G, photo.); Chiguana, 3700 m. alt., March 22, 1921, *Asplund* 5898 (US).

Obviously a close relative of *C. diffusa* and perhaps only an extreme form of it. The two collections cited agree uncommonly well in gross aspect and technical characters. They come from about 450 km. north of the northernmost known station of *C. diffusa* and differ from that species in the weak widely branched habit and smaller broader non-tawny fruiting calyces. No particular nutlet seems to be emphasized in this species.

II. Section EUCRYPTANTHA.—This section seems to be a very natural one. It is apparently derived from the section *Krynitzkia* and in turn seems to have given rise to the section *Geocarya*. With the exception of *C. glomerulifera* and *C. capituliflora*, two high Andean species that extend into western Argentina, it is restricted to Chile. It is characterized by the presence of very numerous simple cleistogamic flowers. These are specialized only in having closed corollas. At maturity the fruiting calyx is quite similar to that characteristic of the chasmogamic flowers of the particular species. Frequently these cleistogamic flowers are slightly smaller than the chasmogamic ones. They appear to be invariably biovulate whereas the chasmogamic flowers, commonly biovulate, are sporadically 4-ovulate. They are always developed in the leaf-axils along the middle and upper parts of the stem, and frequently also down to the lowermost pair of leaves and even into the spikes where they sometimes develop to the exclusion of all chasmogamic flowers. In the leaf-axils, while occasionally solitary, they commonly form small few-flowered glomerules. Occasionally these glomerules elongate but then are readily distinguished from the true spikes by their laxness and abundant bracting. The chief classificatory difficulty in this section is associated with the species, *C. glomerata*. Here the relative abundance of the cleistogamic and chasmogamic flowers varies enormously and makes profound changes in the general aspect.

#### KEY TO SPECIES.

Plant definitely perennial.

Fruiting calyx small, 2–2.5 mm. long; nutlets ca. 2 mm. long.

*Glomeruliferae*.....23. *C. glomerulifera*.